



HATCHER-SAYRE, INC.

December 16, 1988

RECEIVED

DEC 17 1988

Milwaukee, WI

Mr. William E. Muno, Chief
RCRA Enforcement Branch
USEPA
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Re: Freeman Chemical Corporation
Corrective Action Order
Task 3, Project Plans
Job No. 0001-003

Dear Mr. Muno:

Accompanying this letter is the latest revision of Freeman Chemical Corporation's Task 3 Project Plans. Hatcher-Sayre, Inc. is submitting this document on behalf of Freeman Chemical Corporation (FCC). In this revision we have addressed many of the comments received from you on October 19, 1988. Please note however, that some of the comments requested changes which were technically or scientifically not prudent. In the remainder of this letter I will address all of your comments.

Comment 1 - Hatcher-Sayre, Inc. anticipates that two (2) new wells will be constructed at FCC. One of the wells will be in the "feature" boundaries to be determined by the geophysical studies. The other well will be near the river and will be used in the pump test to be conducted next summer. I think at this point it is too early to determine whether or not these wells should be included in the quarterly monitoring program. Once we know more of their location and their proximity to other monitoring points, that issue will be addressed.

Comment 2 - Hatcher-Sayre, Inc. and Freeman Chemical Corporation strongly disagree that every well should be monitored for all the parameters just because wells are present. The proposal set forth in our last Work Plan for using BTX to monitor the more heavily contaminated areas is valid and prudent. We checked back to the annual data to look at what specific compounds are reported in these wells. In the accompanying table, you will note that in most locations the reporting of BTX will account for 99% to 100% of all the contaminants present. In the three locations where this is not the case, i.e., Well 24A, Well 19A, and Well 18A, we agree that BTX is not a proper methodology. However, please note that Wells 18A and 19A are contaminated by activities not related to Freeman Chemical Corporation and are upgradient of the Freeman spills. We are

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Mr. William E. Muno
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aware that EPA is studying the Trichloroethylene spill event separately. Hatcher-Sayre, Inc. therefore recommends that 18A, and 19A be removed from the quarterly sampling program. We will change the text to indicate that 24A will be measured for EPA Method 624 VOC's as you have requested. Please note that in terms of analytical cost utilizing BTX as a substitute for Method 624 VOC's in the locations indicated will save some \$12,000 a year. Given that we will get essentially the same information, it is unconscionable to require more expensive analysis at these locations.

Comment 3 - The August 26, 1988, plan correctly represented the plumbing associated with the four (4) shallow dolomite wells. All four wells do discharge to a common point. At that common point we have the option to either waste the water to the local sewer plant or combine it with the deep dolomite water and send it to the Freeman cooling system. It is at the discharge point to the sewer that we will take the Appendix IX sample representing these four wells.

Comment 4 - We will change the text to indicate that Well 44, if it has water, will be included in the Appendix IX analysis. Concerning identification of peaks not identified as Appendix IX constituents, we will work with the laboratory to see what service they can provide to us. To the extent possible, we will provide this information.

Comment Number 5 is acceptable and the text has been changed to reflect this frequency.

Comment Number 6 has been addressed in the text.

Comment Number 7 is acceptable.

Comment Number 8 was addressed earlier in this letter and clarifications have been made in the text.

What you have requested in Comment Number 9 is not feasible. PW-8 is over 500 ft. deep and has a 6 inch casing down to 100 ft. Most bladder pumps remove less than one gallon per minute. At the depths necessary to purge this well, it is not feasible to provide adequate purging of the well at the rate of one gallon per minute. Hatcher-Sayre, Inc. proposed methodology is not only feasible, it is consistent with many of the other pumping wells in the system. Therefore, we still propose to install a permanent submerged pump in this well for purging and sampling.

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Mr. William E. Muno
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Comment 10 - The complex method for collecting samples at the Saukville POTW was done because it is the only way we can get a representative sample of the impact of water from the Ranney system arriving at the POTW. It should be noted that the area under the plant is essentially dewatered, and that the Ranneys run on a very, very infrequent basis. Your proposal to sample only when all 3 have run continuously under normal operating conditions would result in a situation where we would never have to take a sample. If that is what you want us to do, I think Freeman is agreeable, otherwise, I suggest that you accept our methodology.

Comment 11 is acceptable and the text has been so changed.

Comment 12 is acceptable and the text has been changed to reflect the sampling before chlorination at the POTW.

Comment 13 - We agree that the methodology needs to be presented in more detail in the text and we have made this change. However, please note that it is not practical to insert an HNU probe through a teflon lined cap. The methodology proposed is standard practice for this type of sampling and has been utilized at a nearby site in Wisconsin. Concerning calibration procedures, this information has been added to the text.

Comment 14 - The methodology describing the geophysical study has been rewritten to reflect agreements reached between Bob Smith of your staff and Mark Tusler of the Wisconsin DNR and Hatcher-Sayre, Inc.'s technical staff.

Concerning Comment 15, the same response that we gave for Comment 14 is appropriate.

Concerning Comment 16, the same response that we gave for Comment 14 is appropriate.

Comment 17 - The aquifer pump test will be conducted sometime in early summer, 1989. The Village is redoing part of its well system and will not be able to accommodate us before that time.

Comment 18 is acceptable and we have changed the text to reflect this data presentation.

Comment 19 - Hatcher-Sayre, Inc. will provide this information to you for review.

Mr. William E. Muno
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December 16, 1988

Comment 20 - Please refer to the text in the August 18, 1988, plan. We clearly indicated what methods would be used to interpret data from the pump test.

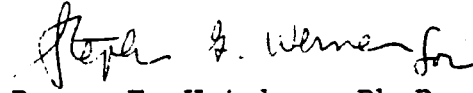
Comment 21 - The Community Relations plan was modified and submitted to you on August 26, 1988. The changes were small, but they did address questions you had raised at that time.

Comment 22 is being address by revising the QAPP. This work has been in progress for several weeks and will be submitted to you shortly after the first of the year.

As we have done in the past, Hatcher-Sayre, Inc. has carefully reviewed your comments in the context of providing an accurate and defensible evaluation of the remediation efforts underway at Freeman Chemical Corporation, Saukville Plant. I believe you will find that all of our changes are technically and scientifically correct and defensible. If this is not the case, please contact us so that we can discuss our differences of opinion.

Sincerely,

HATCHER-SAYRE, INC.



Roger F. Hatcher, Ph.D.
President

RFH/sbp
muno.ltr

cc: Mark Tusler (2 reports)
Franklin Schultz (2 reports)
Craig Bostwick (1 report)
Russell Cerk (1 report)

Note: Revised Project Plans Task 3A, 3B + 3C
are in on Shelf with Corrective Action
Documents 2/20/89 PAM

TABLE 1
 COMPARISON OF REPORTED 624 VOC'S TO
 STANDARD LIST OF BTX COMPOUNDS

WELL NO. & QUARTER ^A	TOTAL VOC's (µg/l)	TOTAL NON-BTX COMPOUNDS (µg/L)	% OF TOTAL VOC's NON-BTX COMP.
RC-1/DEC.87	157,950	650	0.41
RC-2/JUL.88	193,000	0	0.00
RC-3/JUL.88	156,460	460	0.29
18A/ALL	0	0	-
19A/APR.88	1,354	1,354	100
27/APR.88	220.10	220.10	100
41/ALL	0	0	-
42/APR.88	6,400	0	0.00
43/ALL	DRY	DRY	DRY
44/ALL	DRY	DRY	DRY
45/ALL	DRY	DRY	DRY
47/OCT.88	23,100,000	0	0.00
48/ALL	DRY	DRY	DRY
21A/DEC.87	60,500	0	0.00
24A/JUL.88	83	83	100
28/DEC.87	27.7	4	14.44
29/DEC.87	29,463.8	663.8	2.25
38/DEC.87	14,400	0	0.00

^A The quarterly sample with highest VOC values was used.



HATCHER INCORPORATED

August 26, 1988

RECEIVED

AUG 30 1988

United States Environmental Protection Agency
Region 5
230 South Dearborn Street
Chicago, Illinois 60604

Milwaukee, WI

Attn: Ms. Sally K. Swanson, Acting Chief
RCRA Enforcement Branch
(5HS-12)

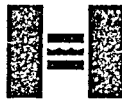
Re: Freeman Chemical Corporation
Saukville, Wisconsin
Corrective Measure Activities
Task 3 Project Plans
Job No. 0001-003

Dear Ms. Swanson:

Enclosed are two (2) copies of the revised Task 3A, 3B and 3C Project Plans for the above referenced project. Also included are revisions to the Task 3D Plans with instructions for replacement of pages in that plan. This revision of the Task 3 Project Plans (originally submitted on December 18, 1987) is based upon numerous written communications, telephone conversations and a meeting between USEPA, WDNR, Freeman Chemical Corporation and Hatcher Incorporated. The QA Program Plan for Environmental Chemical Monitoring prepared by Enseco Incorporated is also attached. We believe these submittals address all of the concerns expressed. This submittal is within the 10 day response period designated by Ms. Laura Lodisio, USEPA in her letter to Hatcher Incorporated received August 19, 1988.

In our July 1, 1988, letter to Ms. Laura Lodisio, we addressed the question of volatile organics emitted to the air with discharge of Freeman wastewaters to the Saukville POTW. Our calculation was based upon a design pumping rate of 10 gpm per Ranney collector well. We were recently informed that the pumping rate for each collector has been reduced to 3 gpm, therefore the data submitted in the table is not correct. A revised table is attached. We intend to respond to your August 8, 1988 request to submit this data to WDNR, Air Management Division for their review and comments once you have reviewed and commented on this revised data.

Your timely review of the project plans is appreciated, as we would like to complete a number of the described field activities (excluding the aquifer testing) before November 1, 1988.



Ms. Sally K. Swanson
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August 26, 1988

Should you have any questions, please contact either me or Steve Werner at the letterhead address.

Sincerely,

HATCHER INCORPORATED

Roger F. Hatcher

Roger F. Hatcher, Ph.D.
President

RFH/sbp
sswanson.ltr
Enclosures

- (1) Project Plans; Tasks 3A, 3B & 3C
- (2) Revisions to Task 3D with Instructions
- (3) QA Program for Environmental Chemical Monitoring, Enseco
- (4) Revision to Table 2 of Hatcher Incorporated's 7/1/88 Submittal to EPA

cc: Russell Cerk (2 copies)
✓ Franklin Schultz (2 copies)
Mark Tusler (2 copies)

*Note: Copy with Reports is on Shelf.
with Corrective Action Documents
2/20/89 PAM*



HATCHER INCORPORATED

August 9, 1988

RECEIVED
AUG 16 1988

Ms. Sally K. Swanson
Acting Chief
RCRA Enforcement Branch
SHS-12
USEPA - Region V
230 S. Dearborn Street
Chicago, Illinois 60604

Re: Freeman Chemical Corporation
Correction Action Order
Task I and III Comments
Job No. 0001-003

Dear Ms. Swanson:

Hatcher Incorporated received on August 8, 1988, your latest set of comments on the Task I and III of Freeman Correction Action Order. Whereas you request we resubmit new plans within 15 days, we are unable to get past the comments from the first three paragraphs of your enclosure.

It is our intention to collect the soil samples for the church yard sampling with a device called a Core Soil Sampler, manufactured by Arts Manufacturing and Supply Company (literature attached). Arts is probably the premier company in supplying soil sampling equipment. In our proposal we stated we would use aluminum sleeves. Given the fact that the soil sample is going to be 2 inches in diameter and that the laboratory will take the actual soil for analysis from the center of the sleeve, we doubt very seriously that the use of aluminum over stainless steel will have any impact on sample validity. Nevertheless, this issue is not worth arguing about and will substitute stainless steel for the aluminum. However, concerning the devices used to cap the ends of the tubing to assure maximum retention of VOC's, we have a real problem. Your reviewers request that we employ teflon caps for this purpose. As you are quite aware, teflon, in the thickness necessary for a tight cap, is a very rigid material. Therefore, it probably does not make a very satisfactory snap-on cap. In checking with Rick Vollweiler, President of Arts Manufacturing, he substantiated our concern about the use of teflon caps for this purpose. Furthermore, he said that to his knowledge teflon caps for this use are unavailable in the marketplace and would have to be specially manufactured.

Since the sampling of the church yard soil seems to be important to the USEPA and State of Wisconsin, we must delay our



Ms. Sally K. Swanson
Page 2
August 9, 1988

response to your letter until you can provide to us either an alternative procedure for capping the samples (i.e., the standard practice of putting a teflon tape or film over the sample covered with an air tight plastic cap) or provide to us a source for purchasing the sampler and materials referenced in your response. Hatcher Incorporated is aware that there are numerous manufacturers of soil sampling equipment and that we may not have contacted the appropriate source.

In order to comply with the 15-day period to revise these documents, we must have your guidance on this issue immediately. If you are unable to provide this information within the 15-day period, then Freeman Chemical will be forced to ask for delay on the submission of the documents until the issue can be resolved.

Thank you for your attention to this matter.

Sincerely,

HATCHER INCORPORATED

Roger F. Hatcher, Ph.D.
President

RFH/pac
swanson.ltr

cc: Laura Lodisio
Mark Tusler
✓ Franklin Schultz
Paul Didier
Russell Cerk
William L. Rosbe, Esq.
Rick Vollweiler

CORE SOIL SAMPLER

The Metric Volume Core Soil Sampler is a precision tool developed solely for taking undisturbed soil samples for the study of absorption, compaction and density, moisture ratio to soil, consistency and specific weight of soil. Taken in increments of 1" or longer, the retaining cylinders, when capped, prevent contamination and preserve the soil for future study and analysis.

A must for civil engineering, building and highway use, the Metric Volume Core Soil Sampler is also extremely useful in the fields of agronomy, horticulture, biology, botany and entomology. By insert-

ing the core sampler over small plants, the soil sample taken can provide information on root structure, root maggot and insect count.

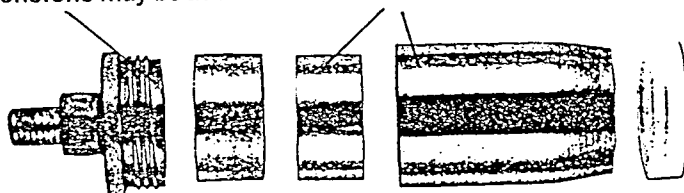
Core samples are in direct comparison to samplers ordered. 2", 3", 4" and 6" Metric Volume Core Soil Samplers available in stock. Special orders on request.

Volume Core Soil Sampler Specifications
Retaining Cylinder: 2" O.D. Aluminum
Diameter of Soil Sampler: 1.90



Cylinder cap threaded externally with acme threads. Screws flush with cylinder cup for continuous sampling and easy extraction. Cap is removable from hammer attachment so that extensions may be added.

Two aluminum retaining cylinders, 2" O.D. by .050 wall thickness. Each is 1" long, or one 2" long can be ordered.



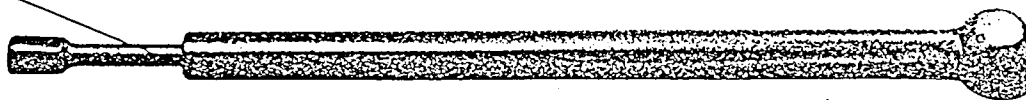
Metric Volume Core Soil Sampler (catalogue No. CSS).

Additional retaining cylinders and airtight plastic cover are available.

20" long steel tubing slides over a hardened steel rod which is internally threaded to 5/8" NC to accommodate Core Soil Sampler.

5. Cylinder cup is approximately 3 1/4" long threaded internally. Beveled cutting edge is heat treated and case hardened. Cylinder is bored internally to receive retaining cylinders. The cup and retaining cylinders can be made longer on special order with price on quotation.

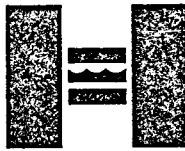
The Hammer attachment can be attached easily to any one of our extension pieces and is recommended for use with the Metric Volume Core Soil Sampler and all AMS soil sample probes where lightly frozen and dry crusted soils are a problem.



Up & Down hammer attachment (catalogue No. HA).

Molded ball grip handle slides on guide rod. Pounds up and down for easy penetration and extraction.

Hammer attachment comes with all Metric Volume Core Soil Samplers.



HATCHER INCORPORATED

July 1, 1988

RECEIVED

JUL 05 1988

D.N.R. SED Hc ..
Milwaukee, WI

Ms. Laura Lodisio
Environmental Scientist
USEPA - Region V
230 South Dearborn Street
Chicago, Illinois 60604

Re: Additional Investigations
Freeman Chemical Corporation
Saukville, Wisconsin
Job No. 0001-003

Dear Ms. Lodisio:

A meeting was held on June 10, 1988 at the USEPA - Region V Office to discuss remaining activities required for the above referenced project. Representatives from the USEPA - Region V, Wisconsin Department of Natural Resources, Freeman Chemical Corporation, and Hatcher Incorporated were in attendance at that meeting. The primary purpose of the meeting was to discuss the status of the Corrective Action Order in the Task I and Task III conditional approvals for this project. Hatcher was concerned that there had been considerable written correspondence between the regulatory agencies and Freeman; however, none of the proposed field work could begin because of unresolved matters. At the conclusion of approximately a two hour meeting, a number of items were assigned to both the USEPA/WDNR personnel and also Hatcher Incorporated for further evaluation. Written responses to these items were to be submitted to all parties at the meeting no later than July 1, 1988 for review and comments.

The following items were assigned to Hatcher Incorporated:

1. Prepare a sampling/testing program for the upper three feet of the church yard.
2. Prepare a plan of study for a hydrologic survey to:
 - a. Determine the hydraulic relationship between the sink hole/river channel near Wells 3A and 20 and the dolomite aquifer.
 - b. Determine the interrelationship between the dolomite aquifer and the river.
 - c. Determine the capture zone of FCC's Well 30.



Ms. Laura Lodisio
Page 2
July 1, 1988

3. Calculation of volatile organic compounds emitted to the air with discharge of Freeman waste waters to the Saukville POTW.

These above items are addressed in the attachments accompanying this letter.

The importance of promptly resolving the items discussed in the June 10 meeting cannot be overemphazied. The above described program will require careful coordination of the multiple tasks so that all of the necessary work can be completed before cold weather begins. We estimate that our total field effort for this project as described herein, will require approximately 60 days. We would like to begin this work in mid August so that it can be completed by mid October.

If you should have any questions concerning this submittal, please contact us.

Sincerely,

HATCHER INCORPORATED

Stephen G. Werner, P.G.
V.P., Hydrogeologic Services

RFH/sbp
lodisio.ltr

cc: Mark Tusler
✓ Franklin Schultz
Paul Didier
Russell Cerk
William L. Rosbe, Esq.

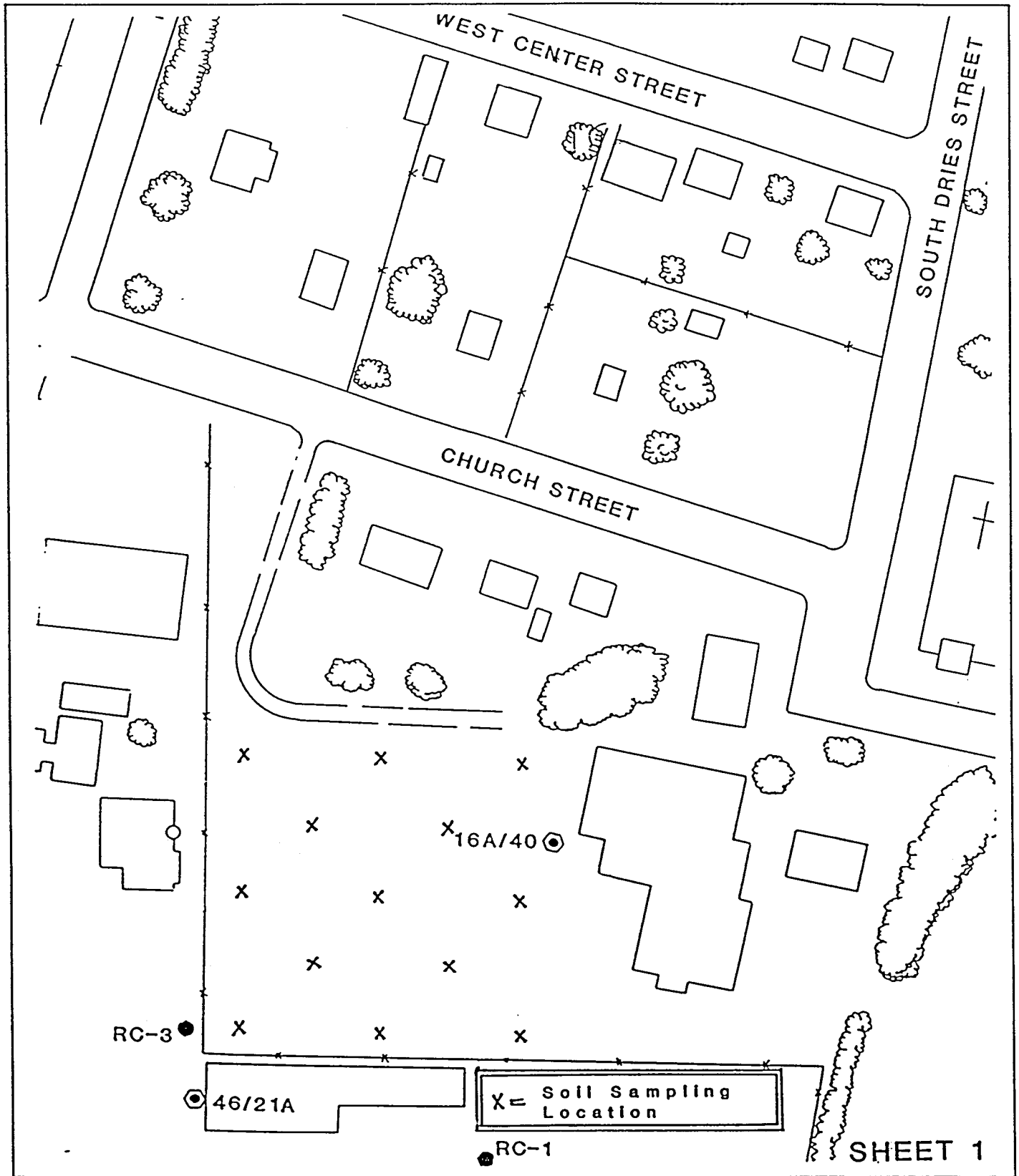
RESPONSES TO ITEMS DISCUSSED
JUNE 10, 1988 MEETING


1. CHURCH YARD SAMPLING/TESTING PROGRAM

The USEPA and WDNR have expressed concern about the presence of volatile organic compounds at shallow depths directly beneath the church property. In order to address this concern, we propose to drill 13 hand auger borings to depths of 3 feet at the locations shown in Sheet 1. Each location will be sampled at 12" - 14" and 36" - 38" depths unless we meet auger refusal at a lesser depth. If we are unable to hand auger to 36", we will move the sampling location. If this is unsuccessful, we will sample from the depth closest to 36". The sampling will be accomplished by first drilling with a hand auger to the specific sampling depth. Then, a hand driven soil core sampler will be used to obtain a 2" long and 1.9" O.D. soil sample. A description of the sampling equipment is included as Sheet 2. The sample will be contained in a 2" long, thin wall aluminum retaining cylinder. Upon completion of the sampling, the cylinder will be removed from the sampler, immediately covered on both ends with teflon tape and capped with plastic cover, then placed in an ice chest. The hole will then be extended to the next sampling depth, and sampling performed at the next interval. Hand auger cuttings will be taken 3" above and below each soil core sample interval and placed in a clean glass jar for field head space analysis with an HNU PID. The head space analysis will not be performed on the individual soil core samples in order to minimize the escape of the VOC's. A total of 26 samples will be taken and sent to ERCO in Cambridge, Massachusetts for HSL 624 volatile organic compound analysis.

The following decontamination procedures will be used at each sampling location:

- a. A clean hand auger and clean sampling spoon with clean aluminum cylinder insert will be used at each location.
- b. The hand auger will be decontaminated between each sampling location and the sampling spoon cleaned between each sampling interval.
- c. A clean aluminum cylinder will be used at each sampling depth. The aluminum cylinder will not be reused. The hand auger bucket and the sampling instrument will be cleaned with a soapy water solution, rinsed with tap water and finally rinsed in distilled water and dried before next use.
- d. Once properly sealed and capped, the aluminum will be placed on ice until all sampling is complete and then shipped to ERCO in Cambridge, Massachusetts for analysis.



JOB #: 0001-003	SCALE: 1":100'	SOIL SAMPLING LOCATION MAP
DATE: July 1, 1988	DRAWN BY: Eva	 HATCHER INCORPORATED

CORE SOIL SAMPLER

The Metric Volume Core Soil Sampler is a precision tool developed solely for taking undisturbed soil samples for the study of absorption, compaction and density, moisture ratio to soil, consistency and specific weight of soil. Taken in increments of 1" or longer, the retaining cylinders, when capped, prevent contamination and preserve the soil for future study and analysis.

A must for civil engineering, building and highway use, the Metric Volume Core Soil Sampler is also extremely useful in the fields of agronomy, horticulture, biology, botany and entomology. By insert-

ing the core sampler over small plants, the soil sample taken can provide information on root structure, root maggot and insect count.

Core samples are in direct comparison to samplers ordered. 2", 3", 4" and 6" Metric Volume Core Soil Samplers available in stock. Special orders on request.

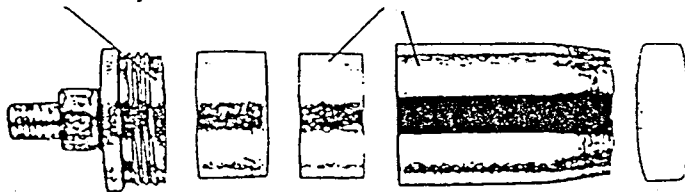
Volume Core Soil Sampler Specifications
 Retaining Cylinder: 2" O.D. Aluminum
 Diameter of Soil Sampler: 1.90



Up & Down hammer attachment

Cylinder cap threaded externally with acme threads. Screws flush with cylinder cup for continuous sampling and easy extraction. Cap is removable from hammer attachment so that extensions may be added.

Two aluminum retaining cylinders, 2" O.D. by .050 wall thickness. Each is 1" long, or one 2" long can be ordered.



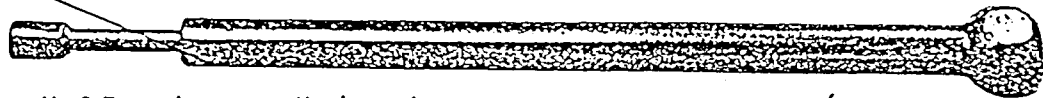
Metric Volume Core Soil Sampler (catalogue No. CSS).

Additional retaining cylinders and airtight plastic cover are available.

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5. Cylinder cup is approximately 3 1/4" long threaded internally. Beveled cutting edge is heat treated and case hardened. Cylinder is bored internally to receive retaining cylinders. The cup and retaining cylinders can be made longer on special order with price on quotation.

The Hammer attachment can be attached easily to any one of our extension pieces and is recommended for use with the Metric Volume Core Soil Sampler and all AMS soil sample probes where lightly frozen and dry crusted soils are a problem.



Up & Down hammer attachment (catalogue No. HA).

Molded ball grip handle slides on guide rod. Pounds up and down for easy penetration and extraction.

Hammer attachment comes with all Metric Volume Core Soil Samplers.

Upon completion of drilling and sampling each hole will be backfilled with hand auger cuttings which have been mixed with bentonite pellets.

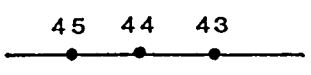
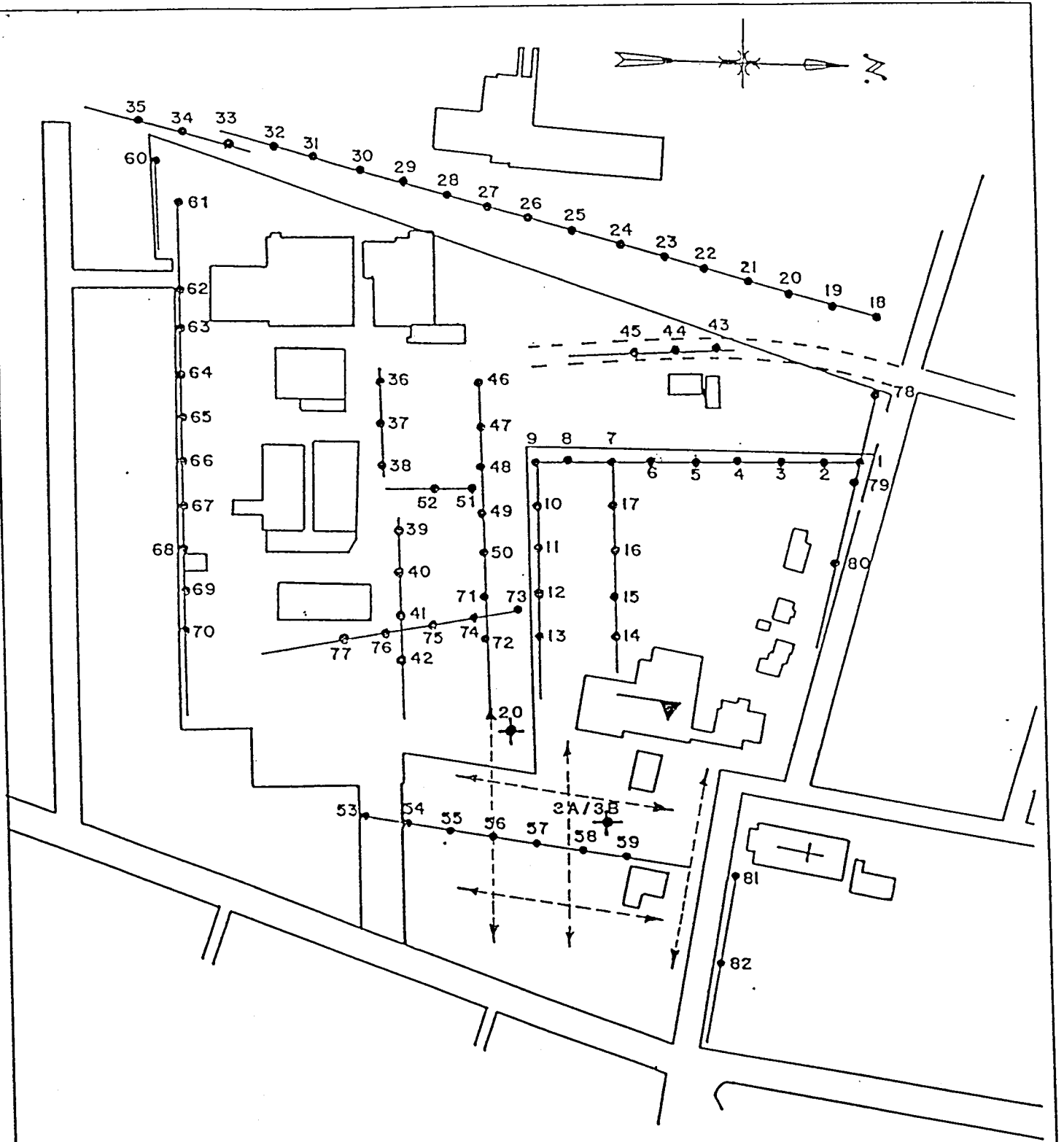
2a. HYDRAULIC RELATIONSHIP BETWEEN THE
SINKHOLE/RIVER CHANNEL AND THE DOLOMITE AQUIFER

Subsurface data developed from the many soil borings and monitoring wells installed on-site indicate that glacial-fluvial sediments of variable thickness overlie a highly irregular dolomite rock surface. This irregularity is the result of karstification. Two wells drilled previously near the northeast corner of the Freeman property (one on-site and one off-site) encountered either an ancient river channel or a sediment filled sinkhole. Approximately 205' of alluvial sands and clayey silts were penetrated in Well 3A. In Well 20, just to the west of Well 3A, 170' of overburden was penetrated without encountering bedrock. Based on this data, it is estimated the base of this ancient channel or sinkhole is about 175' below the present Milwaukee River channel. Since ancient stream channels and sinkholes have a direct hydraulic influence on recharge to the Dolomite Aquifer, it is important that the physical configuration, areal extent and general hydrologic properties of this feature be determined.

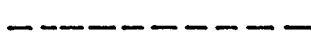
We propose to investigate this area by performing a geophysical survey consisting of a series of seismic refraction survey lines. This program will be supplemented with previous seismic refraction data developed in this general area in 1985. We believe this approach will provide the necessary subsurface data, without drilling numerous borings, to determine the physical character of the feature. A minimum of five 200 to 300 ft. long traverse lines are planned. Proposed locations as well as previous traverse locations are presented on Sheet 3. The actual location of the lines will be controlled in part by physical features such as buildings and fences. Much of the area of interest is off-site, and it will be necessary to obtain permission to work in these areas. Upon completion of the geophysical survey and reduction of the data, at least one well will be drilled to verify the data. The well will be drilled and constructed so that hydrogeologic data can be obtained from this area during performance of the Dolomite Aquifer pumping test, which is described later in this submittal. Data developed during the test from this well will be used in determining the hydraulic relationship between this feature and the Dolomite Aquifer.

2b & 2c. DETERMINE THE INTERRELATIONSHIP BETWEEN THE DOLOMITE
AQUIFER AND THE MILWAUKEE RIVER AND DETERMINE
THE CAPTURE ZONE

One of the major tasks to be completed at the Freeman facility is the performance of aquifer test program. Information



Previous Survey Line



Proposed Survey Line



Monitoring Well

SEISMIC REFRACTION
LOCATION MAP

1" = 200' SHEET 3

Hatcher Incorporated

developed from such a program will provide more accurate characterization of the Dolomite Aquifer in the plant area and also better define the hydraulic relationship between Village wells and Freeman wells. Information developed from this will allow the definition of the capture zone within the Dolomite Aquifer, the hydraulic relationship between the Milwaukee River and the aquifer, and also the sinkhole/river channel (item 2) and the aquifer. Since the aquifer test program represents a major remaining task to be performed, a discussion of both previously developed data and the proposed program are presented below.

Background

The recommended remediation scheme for the Dolomite Aquifer at Saukville, Wisconsin, is withdrawal of contaminated groundwater, principally through a new deep well on the Freeman Chemical Corporation (Freeman) property. The rationale is that reversal of the groundwater gradient from toward the Village's well field to one sloping toward the original source of pollutants will in time flush this aquifer of contaminated groundwater.

Well MW-2 has yielded water having low levels of contaminants and an odor since about 1979. Well MW-1 apparently draws in slugs of contaminated water periodically. It is currently reported to be "clean." There is some circumstantial evidence that not pumping well MW-2 causes contaminated water to be drawn into well MW-1 when it is pumping.

An attempt has been made to place well MW-3 back in service by reducing its "clay" or "silt" content to manageable levels. This has in part been successful, although the well reportedly still yields some "silt." This well reportedly sustained a one-time incident of "contaminated" water and odor problem. However this well is on the opposite side of the Milwaukee River from the Freeman property, and there is extremely little or no demonstrated pumping gradient toward well MW-3. No contamination has ever been detected at well MW-4.

It is obvious from a groundwater hydrology standpoint that the greater the rate at which the new Freeman Remediation Well (W-30) is pumped, the larger its cone of influence, the higher the groundwater flow velocity, and the faster the Dolomite Aquifer will be flushed of contaminants. However, high pumpage rates reportedly substantially reduce the water levels in the Village's wells (except perhaps well MW-3) and therefore, their potential usable potable water supply.

Various combinations of pumping schemes have been proposed and discussed as the one best to: a) remediate the Dolomite Aquifer and b) maintain a potable water supply for the Village. All have some merit.

Some of these schemes include:

- a. Pumping wells MW-3 and MW-4 for potable water, well W-30 for remediation and cooling water, and placing wells MW-2 and MW-1 out of service.
- b. Pumping wells MW-3, MW-4, and MW-1 for potable water; pumping well W-30 (and perhaps the Laubenstein Well, PW-8) for cooling water and remediation; and leaving only well MW-2 off.
- c. Pumping wells MW-3 and MW-4 for potable water; pumping wells MW-2, W-30, MW-1, and perhaps even the Laubenstein Well for remediation and cooling.

Obviously, the rate of pumping, the combination of wells used for pumping potable water versus remediation, and the timing of any pump sequencing all potentially affect the amount of potable water available to the Village as well as the rate of Dolomite Aquifer remediation. Therefore, local Dolomite Aquifer pumpage needs to be managed and coordinated with great care.

Pump Test History

All of the wells now being used by the Village have undergone some form of performance testing. A major aquifer test using wells MW-1, MW-2, MW-3, MW-4, and the Laubenstein well was conducted in the Summer of 1984.

Much was learned from this test about the local aquifer system, the affect of one well's pumpage on the others, and the probable range of T & S (Transmissivity and Coefficient of Storage) of the Dolomite Aquifer. However, the test was conducted under a severe constraint -- the need to provide a continuous source of water to the Village and to Freeman. Also, during this test, pumps cut off and on automatically in response to water needs, and new pump tests were started before the Dolomite Aquifer had totally recovered from a prior test.

Since then, well MW-3 has undergone rehabilitative cleaning and testing, the Laubenstein Well casing has been extended to 100 feet, and a new deep dolomite well has been constructed on the Freeman property.

The new Freeman Well (W-30) underwent a short (24-hour) acceptance test in August 1986 and a longer, step-drawdown test in the Spring of 1987. During the latter test, the water levels and pumpage rates in the Village wells, the Laubenstein well, and the Freeman observation wells were monitored.

No test has been conducted long enough to adequately determine leakage from the thin, low-permeability, glaciofluvial sediments overlying the Dolomite Aquifer. Too, although the

longer pump tests conducted thus far indicate the interception of recharge in the late stages of the test data, the source of that recharge -- whether from the Milwaukee River, local swamps, leakage from the overlying glaciofluvial cover, or some combination of all three -- has not been determined.

Aquifer Management Tests

It is proposed that additional integrated aquifer tests be made to determine:

- a. The efficacy of the several proposed long-term groundwater withdrawal schemes at Saukville.
- b. To further check the accuracy of past pumping test results.
- c. The hydraulic relationship between the on-site river channel/sinkhole and the Dolomite Aquifer.
- d. The hydraulic relationship between the Dolomite Aquifer and the Milwaukee River.

Data developed from the proposed aquifer test program will be used to define the "capture zone," in the area in which contamination would be intercepted as a result of on-site pumping activities.

This test would differ from past tests in several respects, the most important of which being that no test would be conducted until the Dolomite Aquifer had reached a "steady state" pumping condition in response to pumping enough water to keep the Village of Saukville and Freeman supplied with water. Most aquifer tests are conducted under what are termed "static" conditions wherein no water other than that discharged by the well under test is withdrawn from the aquifer. Because it is not possible to attain this non-pumping or "static" condition without closing down Freeman and the Village for a lengthy period of time, it is proposed to conduct new tests after the well or wells necessary to supply only Freeman's and the Village's needs have pumped at a steady, continuous rate long enough for the aquifer to adjust to a "static" or "steady state" pumping condition. For example, this can be accomplished by pumping two wells continuously at approximately 1250 gpm until drawdown in the aquifer has stabilized; starting the test of some other well; and following completion of the test of that other well, allowing the aquifer to recover to its "steady state" condition once more before starting another test on the next well.

Specific Test Protocols

General

Background aquifer storage conditions in the dolomite and overlying glacial sediments must be monitored in order to adjust test results for diurnal changes, barometric effects, rainfall, and other normal seasonal changes. This requires, as a minimum, the monitoring of one unpumped dolomite well and one glacial sediment observation well located outside the potential test pumping zone of influence beginning at least one week prior to the test pumping and continuing throughout the entire testing period. All such background "monitoring" wells should be equipped with continuous recorders.

Because the test cannot be conducted under truly static conditions but rather under "steady state" pumping conditions, water for the Village and Freeman must be withdrawn from the Dolomite Aquifer at a constant and continuous rate. Effectively, this means that whatever well(s) is(are) chosen to supply the 24-hour needs of the Village and Freeman must not ever cut off or change its(their) rate of discharge during the entire test period. To meet this condition slightly more water than is needed must be pumped with the excess going to storage. When storage is full or reaches a preset level, all automatic controls used by the Village to shut off pumps at that point must be in a "manual" or "off" mode so that excess water is wasted to the Milwaukee River. Also, all air lines on all pumps will have to be checked for operational accuracy with an electric tape prior to the test period.

"Steady State" Aquifer Condition

It is proposed that "steady state" aquifer conditions be achieved by pumping wells MW-3 and MW-4 at a combined yield of 1250 gpm for a minimum of one week prior to the inception of the test period or until it is judged from water level measurements in other local dolomite wells that drawdowns in the aquifer resulting from the combined pumpage of wells MW-3 and MW-4 have truly stabilized. Adjustment of the combined output of well MW-3 and MW-4 to slightly more than is necessary for the long-term constant needs of the Village and Freeman will require throttling of well MW-4 output.

Wells MW-2 and MW-1, the Laubenstein Well, and Freeman well W-30 will not be pumped during creation of the "steady state" pumping condition. Furthermore, the on-site Ranney collector wells (R-1, R-2 and R-3) will not be pumped.

Step I Test

The first part of the test period will be pumpage of well W-30 at approximately 600 gpm and observation of its effect on aquifer storage. The Step I Test will be continued until it is determined that sufficient test data have been collected to document all long-term effects on aquifer storage and areal distribution of its drawdown cone of influence. This is expected to take from 3 days to 1 week. Wells MW-3 and MW-4 will continue to pump at a constant rate of 1250 gpm. Discharge from well W-30 can be either used for cooling or wasted. If used for cooling, then provision for an equivalent wasting of water at the Village storage reservoir must be assured. In conjunction with monitoring the deep dolomite wells, we also plan to monitor water levels in select glaciofluvial wells in order to determine the hydraulic interconnection between the Dolomite Aquifer and the overlying unconsolidated materials.

After all data have been collected in the Step I test, the pump test results will be analyzed before proceeding to Steps II, III, and IV, which will be completed at a later date.

Step II Test

Following total recovery of well W-30, judged from a return of pre-pumping water levels at that well, well MW-2 will be pumped at approximately 250 gpm until the same confidence in the data set as needed for Step I is established. This is anticipated to take from 2 to 4 days. Wells W-30 and MW-1 will remain off, and wells MW-3 and MW-4 will continue to be pumped at a constant rate during this period.

Step III Test

Following complete recovery of well MW-2 (1 to 3 days), well MW-1 will be pumped at approximately 300 gpm until the same set of data conditions as above are met (2 to 4 days). Wells MW-2 and W-30 will be off, and wells MW-3 and MW-4 will be on and pumping at the same rate as before during this step.

Step IV Test

Optionally, some combination of wells W-30 and MW-2 or wells W-30, MW-1, and MW-2 will be run while pumping MW-3 and MW-4 at a constant rate.

Monitoring Program

The monitoring program will utilize those wells which are expected to provide data essential to evaluating the Dolomite Aquifer. The following dolomite wells will be utilized: MW-1, MW-2, MW-3, MW-4, PW-8, W-30, a residential well on the east side

of the river, and a new well on the west bank of the river. The following six groups or nests of glacial overburden and shallow dolomite wells will also be monitored: 14B/24A, 18A/22, 43/38, 46/21A, 16A/40 and 3B/3A (or a new well drilled in the middle river channel area). A summary of the monitoring wells to be used in each pumping test are presented in Table I and their locations are presented on Sheets 4 and 5. Water level readings will be taken with electronic water level indicators, airline pressure gauges, chart recorders and possibly with pressure transducers.

Pumping Test Schedule

Because it is necessary for the Dolomite Aquifer to stabilize at a "steady state" pumping condition before pump tests can begin and completely recover between tests of individual well tests, the proposed long term aquifer management test is expected to last from 25 to 50 days. This schedule provides two days for the installation of water level recorders on wells outside the local aquifer use area to obtain background water storage data.

Also, 1 to 2 weeks has been allowed for the stabilization of the aquifer and any adjustments to yields or Village and Freeman water handling procedures that may be necessary. It is imperative that this section of the schedule be as short as possible to prevent undo migration of contaminants toward well MW-4, and long enough to ensure stabilization of the aquifer.

Following achievement of the desired steady state condition a 1 day period is provided to ascertain that everyone who will be participating in test monitoring understand their task and water level measuring schedule and that all equipment is in working order. The subsequent tests will be run sequentially, 24 hours per day, allowing only breaks for total recovery of the well being currently tested. At the conclusion of each pump test period (during the recovery period) the pump test results will be evaluated as to the need for any adjustment of pump test scheduling of the remaining wells.

Water Quality Testing

It is proposed that Municipal Wells 1 & 2 and Freeman Well W-30 be monitored for chemical oxygen demand and conductivity to ensure that changes in water quality which could occur as a result of the continuous pumping be quickly recognized. These tests would be performed every eight hours throughout the duration of the pump test.

Personnel Complement

This Aquifer Management test will need different levels of staffing depending on what activity is being done. Installation of the recorders, background monitoring, and monitoring the progress of aquifer stabilization requires one senior technician

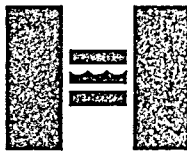
TABLE I

Summary of Aquifer Test Program

<u>Test</u>	<u>Monitoring</u>		
	<u>Logarithmic</u> ^a	<u>Continuous</u> ^b	<u>Hourly/Daily</u> ^c
Step I, W-30 (600 gpm for 3-7 days)	MW-1, MW-2 PW-8, W-30	Residential Well/east bank, New Well/ west bank	24A/14B, 38/43 46/21A, 22/18A, 16A/40, 3A/3B (or new well) MW-3, MW-4
Step II, MW-2 (250 gpm for 2-4 days)	"	"	"
Step III, MW-1 (300 gpm for 2-4 days)	"	"	"
Step IV, (Optional) Combination of W-30, MW-1, MW-2	"	"	"

- a. Every minute 0-30 min; every 5 min. 30-60 min; every 10 min. 60-120 min; every 15 min., 120-180 min; every 30 min., 180-240 min; hourly, 240 min - 1080 (12 hrs.) every 4 hrs., 12 hrs - 24 hrs., twice daily until termination of pump. Use same frequency for recovery.
- b. Chart recorder
- c. Hourly for first 12 hrs, then follow sequence for wells MW-1, MW-2, PW-8, W-30.

Note: Background water level readings will be obtained for all on-site monitoring wells at least 3 days prior to performance of the tests. During the tests readings will be taken periodically for all wells not listed above.



HATCHER INCORPORATED

April 4, 1988

RECEIVED

APR 05 1988

D.N.R. SED Hqtrs:
Milwaukee, WI

Mr. William E. Muno, Chief
RCRA Enforcement Branch
EPA Region V
230 South Dearborn Street
Chicago, Illinois 60604

Re: Freeman Chemical Corporation
Corrective Action Order
Task 3 Comments
Job No. 0001-003

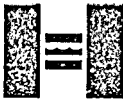
Dear Mr. Muno:

On behalf of Freeman Chemical Corporation, Hatcher Incorporated reviewed your February 29, 1988 [received on March 3, 1988] to Russell Cerk concerning the Freeman Chemical Corporation Corrective Action Order, Task 3 plans submitted to your Department in December, 1987. We are disappointed that your staff was able to identify 31 deficiencies in the plans, especially those associated with the Sampling and Data Management Plans. A considerable amount of effort and professional judgement were put into the plans. We contend that the plans, as submitted, would have been substantially adequate to provide the necessary documentation that the in-place control structures at Freeman are functioning as designed.

Please do not mistake our comments expressed in this letter as desiring a confrontation with the EPA. Since the discovery of the groundwater problems in Saukville, Freeman Chemical Corporation has cooperated fully with the State and Federal Agencies to achieve correct remedial measures. It is unfortunate that the personnel from the State of Wisconsin and the Federal EPA were not associated with the development and execution of the existing program. I believe this rather late introduction of new staff to the program may have caused some misunderstandings about what has and is occurring at the site.

While some of the review comments were justified, others were technically incorrect, some showed lack of understanding for the project as it is built today, and others represent an expense just simply not warranted. When your staff has had an opportunity to review our response, we will:

- (1) Revise the document to accommodate your revised review, assuming we are in substantial agreement with your revised comments, or



Mr. William Muno
Page 2
April 4, 1988

- (2) Request a meeting with you and your staff to discuss the technical differences in opinion.

The attachment with this letter presents our comments to each of the items in your February, 1988 letter. When you have a chance to review these comments, please notify us as to how we are to proceed in this matter.

Hatcher Incorporated and Freeman Chemical Corporation look forward to your continued cooperation on this matter.

Sincerely,

HATCHER INCORPORATED

Roger F. Hatcher

Roger F. Hatcher, Ph.D.,
President

RFH/sbp
wmuno.ltr

Attachment

cc: Russell Cerk
Craig Bostwick
Mark Tusler (3 copies)
✓ Franklin Schultz (2 copies)

*Note: Copy with Attachment is on Shelf with Corrective
Action Documents 2/20/89 P.A.M.*