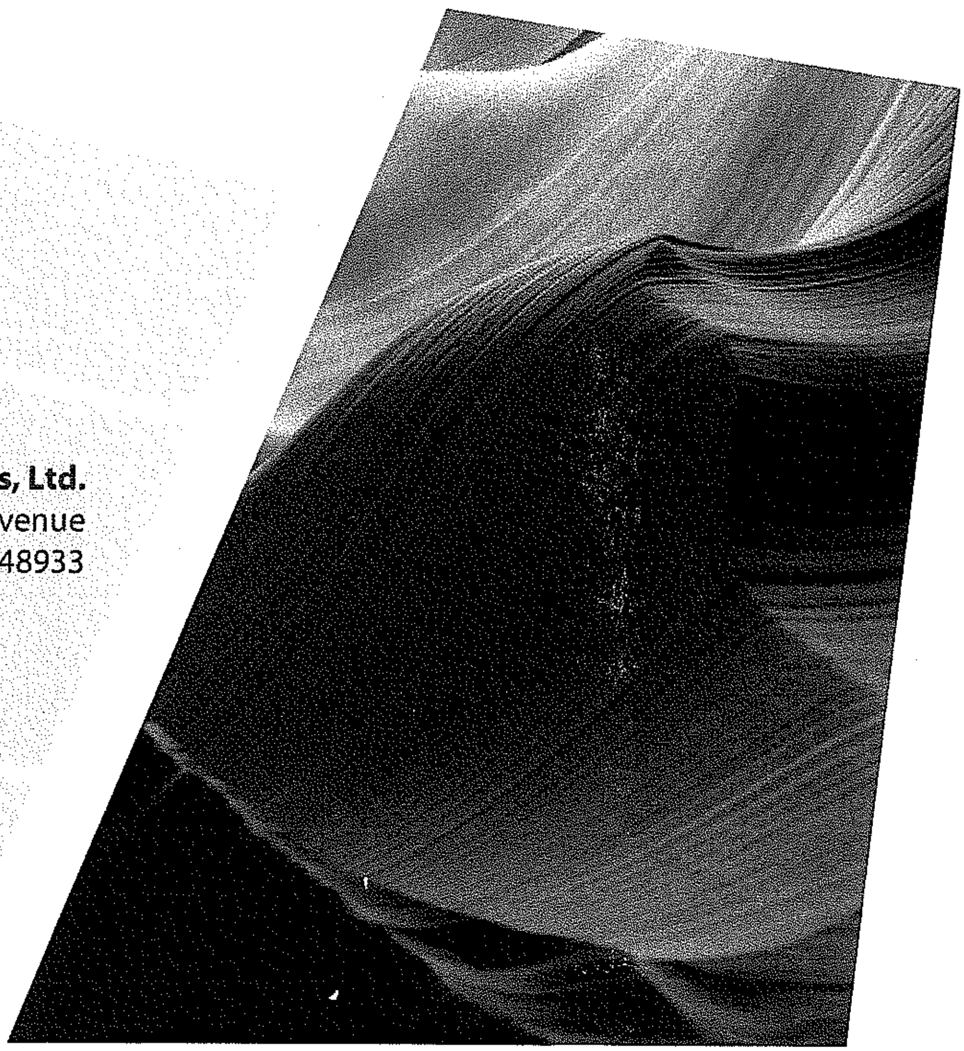
Report

Conservation Innovation Grants

Adoption of a Rapid, Direct Measure Device to Measure Specific Discharge from Earthen-Lined Waste Storage Ponds

Prepared for:
USDA-NRCS
Agreement No.: NRCS 68-3A75-6-135
NTH Project No. 74-080272-00
February 15, 2010



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Mr. William Reck, P.E.
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East National Technology Support Center
200 E. Northwood Street, Suite 410
Greensboro, NC 27401

February 15, 2010
NRCS 68-3A75-6-135
NTH Proj. No. 74-080272-00

RE: Grant Agreement NRCS 68-3A75-6-135
Final Report

Dear Mr. Reck:

The following is the final report for Grant Agreement (NRCS 68-3A75-6-135) executed on April 7, 2009 for the Rapid Direct Measure Seepage Meter (the seepage meter). As you know we had mixed success on this project; although we did not obtain reproducible results, we identified a number of items that would improve the device for future application.

We ultimately believe the seepage meter represents a good alternative to the current method (i.e., laboratory testing of discreet samples) for estimating the infiltration rate of animal waste storage facilities in the state of Michigan. However, without making our recommended proposed improvements and performing the laboratory testing we do not believe the current data demonstrates that the seepage meter is robust enough to be accepted on a generic level as a means for replacing Michigan's current method for testing pond infiltration rates. Additional time and project funding is needed to best evaluate the seepage meter. At a minimum twenty four months are needed to make design improvements, perform the necessary laboratory tests, and conduct field testing. We estimate the additional work proposed in the attached report represents approximately $34,000 in additional labor and expenses.

We continue to appreciate the USDA-NRCS' understanding, patience, and willingness to help the project succeed. We would very much appreciate the opportunity to discuss options of keeping the project moving. Please contact either Tim at 616-262-6513 or Rick at 248-324-5265 so we may discuss this further.

Sincerely,

NTH Consultants, Ltd.

Timothy Krause, P.E.
Project Engineer

Richard L. Burns
Sr. Vice President

cc: Steve Davis, USDA-NRCS
Larry Haywood, Sand Creek Dairy
Del Botticher, SWET
Gregorio Cruz, USDA-NRCS

TCK/RLB/mjb
Attachment: Final Report

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APPENDICES

ACEC MEMBER

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CONSERVATION INNOVATION GRANTS
FINAL REPORT

Grantee Name: **NTH Consultants, Ltd.**	
Project Title: **Adoption of a Rapid, Direct Measure Device to Measure Specific Discharge from Earthen-Lined Waste Storage Ponds**	
Agreement Number: **NRCS 68-3A75-6-135**	
Project Director: **Richard L. Burns, Sr. Vice President**	
Contact Information: **41780 Six Mile Road Northville, MI 48168-3459**	Phone Number: **248-324-5265** E-Mail: **rburns@nthconsultants.com**
Period Covered by Report: **January 1, 2010 – February 9, 2010**	
Project End Date: **February 9, 2010**	

1.0 SUMMARY OF WORK PERFORMED DURING THE PROJECT PERIOD

The following provides dates and general descriptions of project milestones.

April 9, 2007 – The project was initiated with the execution of the signed agreement between the USDA-NRCS and NTH Consultants, Ltd. (NTH).

October 10, 2007 – Notification of key personnel change. The original person identified as the individual who would assist in managing, monitoring, and evaluating the project left NTH. This change resulted in a delay in the project schedule and a general change with respect to the timing of tasks in the original project scope.

October 25, 2007 – Execution of Memo of Understanding (MOU) between NTH and Sand Creek Dairy.

January 2008 – Development of Seepage Meter shop drawings for fabrication. Dr. Del Bottcher of Soil & Water Engineering Technology (SWET) provided drawings to reference for fabrication. These drawings are included in Appendix A as Plates 1A to 8A. Thomas Fabrication, Inc. from of Mason, Michigan provided shop drawings. These drawings are included in Appendix A as Plates 1B to 4B.

June 2008 – Device Fabrication – The seepage meter was fabricated by Thomas Fabrication, Inc. in Mason, Michigan.

August 7-8, 2008 – Initial Test – The seepage meter was tested on the "Top Water Pit" at Sand Creek Dairy in Hastings, Michigan. A site map showing the approximate location of the structure, the location of the test, the pond inlet structure, and where bank recharge was observed (discussed in more detail below) is included in Appendix B.

Background

In June 2007, NTH performed an Evaluation of Existing Components for the animal waste management system at Sand Creek Dairy. The evaluation was conducted in accordance with the Michigan Agriculture Environmental Assurance Program (MAEAP), CNMP Answers to Frequently Asked Questions (FAQ), dated January 11, 2007. We concluded a minimum of three samples from the structure's liner were required to demonstrate equivalency with current USDA-NRCS Michigan liner standards. However, as an alternative and the primary purpose of this study we proposed using the seepage meter to demonstrate equivalency to specific discharge requirements.

Overview

The individuals present for the test included Mr. Bill Reck of USDA-NRCS; Dr. Del Bottcher of SWET, and Mr. Tim Krause and Ms. Paula Steiner of NTH Consultants, Ltd. (NTH). Sand Creek Dairy personnel (the Haywoods) were on site and assisted by stopping flow into the pond, turning off mechanical devices (aerators), and fabricated a valve handle extensions for the seepage meter. The afternoon was spent insuring that all of the materials needed to run the test were available. Three tests were run that evening.

Procedure

The device was setup and tests were run in accordance with the procedures described in the "Installation, Calibration, and Measurement Procedures for Pond Leakage Apparatus" by SWET. The device was calibrated and three tests were run. The tests consisted of two short runs at the beginning and end of the testing procedure with one longer run in between. The field data sheets, photographs, weather information, and calculation sheets are attached for reference in Appendix C.

Calibration

The calibration included adding increments of 25 milliliters of water and recording the measured change in reading on the staff gauge. A calibration factor of 0.00077 centimeters per inch (cm/in) was measured. Note the procedures recommend a calibration factor of 0.00055 to 0.00065 cm/in. The following are the estimated gross increase/loss rates resulting from each respective test.

Run #1 - Evening (Duration 98 minutes)

A gross increase of $1.65X10^{-6}$ cm/s was measured during this run.

Run #2 - Overnight (Duration 453 minutes)

A gross loss of $2.69X10^{-6}$ cm/s was measured during this run.

Run #3 - Morning (Duration 71 minutes)

A gross loss of $1.28X10^{-6}$ cm/s was measured during this run.

September 25, 2008 – A letter explaining unanticipated labor and expenses associated with the preparation of the first test was sent to Conservation Innovation Grants (CIG) coordinator in Washington, D.C. The letter inquired about potential avenues of additional funding. We were informed that no more funding was available at that time.

January 23, 2009 – A "No-Cost Extension of Time" letter was sent to the federal office. The request extended the current contract until February 9, 2010.

2.0 SIGNIFICANT RESULTS, ACCOMPLISHMENTS, AND LESSONS LEARNED

In every run associated with the initial test, the last step (Step 10) which is opening the middle valve (Valve 1) resulted in the measured level dropping. It is our understanding that in ideal conditions the device should not respond in this manner. When the middle valve is opened to allow the pans to equalize, it is expected that the measurement pan will rise or stay the same. That is, the evaporation pan is subjected ONLY to evaporation while procedures on the other pan measure the water drop in the pond which is a function of seepage AND evaporation.

Given the unexpected phenomena in Step 10, we do not believe the evaporation measurement to be accurate. Therefore, we do not believe the calculated Pond Leakage and Evaporation Rates to be accurate and the best we can estimate from these test runs is the Gross Increase or Loss occurring over the period of the test.

The following list describes challenges that were observed during the test runs that may have affected the accuracy of the measurements. These can be categorized as challenges pertaining to the seepage meter or testing methodology and challenges pertaining to the site. They are listed in relative order of perceived importance.

Equipment or Methodology Specific Improvements

- The test was performed with equipment that had not been tested in a controlled environment. This may have lead to the calibration factor being higher than recommended and errors in measuring the evaporation. It is possible that one of the valves did not close completely or provide a complete seal. These suspected problems could be more readily identified and addressed in a more controlled setting (i.e., a laboratory).
- During the initial test, dew was accumulating on most exposed surfaces and insects were landing on the seepage meter. The additional weight on the device float plate resulted in readings/measurements indicating that the water level was dropping much faster than it actually was. A portable flood light was used to heat the surface and reduce the dew accumulation on the float plate. However not all of the dew/insects could be removed and it is unknown how much this condition affected the measurements. Hourly weather data, including dew point temperature and relative humidity, is included in Appendix C.

- An aluminum plate was installed at the pond inlet to stop flow into the pond. The inlet was observed and there did not appear to be flow into the pond. However, it is possible that a small amount of flow was still entering the storage structure. A more reliable and repeatable means of stopping flow into structures would help eliminate this as a possible recharge source.

Site Specific Observations

- After the test, we observed a seep or bank recharge near the southwest corner of the pond approximately 3 feet above the water level. Its location is marked on the Figure in Appendix B.
- Gas Accumulation (Bubbles) - During the evening a layer of bubbles was observed over the entire surface of the pond. The bubbles seemed to disperse when exposed to sunlight. Entrained bubbles or gas within the waste storage structure may have artificially increased its volume. The following factors may have contributed to an increase in otherwise natural gas production.
    - Specialty microbes were periodically being added to the waste storage structure as part of the farm's operational procedures.
    - There are two submerged aerators that were turned off the afternoon before the test.
- The test was conducted on a waste storage facility in which the subsurface and liner specifications were not documented. Although using this device to verify specific discharge from similar facilities is the ultimate intent of the seepage meter, it is not ideal conditions for attempting to demonstrate the functionality of the device.

3.0 RECOMMENDATIONS

The act of running the test(s) helped identified the need for the following improvements.

Equipment Specific Improvements

<u>Dew/Insect Protection System</u>

The seepage meter's mirror and float system are so sensitive that one theory for unreliable readings is that the accumulation of dew and insects may have affected the measurement. Through discussions with our USDA-NRCS technical contact, Mr. Bill Reck, and sub-consultant, Dr. Del Bottcher of SWET, we determined a dew/insect protection system was needed. We discussed fabricating a tent-like dew/insect guard that could be installed over the measurement pan to protect the float plate from insects and dew accumulation during the test. A pocket or port would need to be located over the mirror area so readings could be taken. Attached in Appendix A as Plate 8A is a conceptual rendering of the dew/insect guard provided by SWET.

Pond Inlet Sealing System

Ensuring water is not entering the pond via typical transfer paths (i.e., piping) is essential to the accuracy of the test. Therefore, it would make sense that sealing the pipe should be the responsibility of those conducting the test and the owner and operator of the system being tested. We propose having various-sized pipe plugs to accompany the seepage meter in an attempt to have enough plugs to install at the inlet and outlet of the pipe feeding the pond being tested. We are considering inflatable pressure plugs which come in a range of sizes and pressure ratings. The plugs are durability and there are various size ranges.

Bases for the Support Legs

Currently the legs of the seepage meter get hammered into clay and do not need a base. However, to run the seepage meter on liner types other than clay, bases for the legs are needed.

Laboratory Testing

Through discussions with the USDA-NRCS and SWET, we also determined an in-lab calibration and a leak check and verification of the evaporation pan is needed. In retrospect this should have been performed prior to the first field test. These tests could be performed at NTH's Livonia, Michigan laboratory in a controlled environment.

During the calibration a leak check and verification that the evaporation pan is working should be performed. This can be accomplished by running a closed-system test for at least 200 minutes. The closed-system test should be run after the calibration. The evaporation pan should drop (because of evaporation) and the measurement side should not because it is not subject to evaporation or seepage. This test could validate that leaks are not occurring and the evaporation measurement is reliable. If successful, one could infer that the errors observed in the initial test were due to field conditions.

More Controlled Testing Environments

Ideally the seepage meter should be demonstrated in a laboratory setting and then field tested at locations were the subsurface conditions and liner specifications are known, which was not the case in our first trials. Accordingly we recommend the following tests.

Laboratory Test

The seepage meter could be tested in NTH's Livonia laboratory. After the laboratory testing discussed above is complete, an actual test in a pool should be performed. To simulate seepage, during the test we recommend removing a known amount of water from the pool. If the seepage meter is operating correctly the measurements should confirm the volume of water removed.

Field Testing Locations

The seepage meter should be tested on animal waste storage facilities where subsurface and liner specifications are known. In past reports we recommended the following locations:

- Thelen Dairy Farm - An earthen-lined structure where sampling and laboratory testing demonstrated that the clay was exceeding USDA-NRCS specifications;
- Clover Family Farms – A clay lined structure previously constructed under an EQIP contract; and
- Masselink Dairy – A plain concrete-lined structure or a clay-lined structure previously constructed under an EQIP contract.

4.0 ADDITIONAL FUNDING REQUIRED

Preparation for the first test and project management (i.e., reporting) ultimately exhausted the financial resources of the project. Plus our project managers have contributed countless more unpaid hours in an attempt to keep the project moving. Given the state of the economy and business, we (NTH) were unable to self-fund this project in the past year. Subsequently, the tasks to be performed in 2009 were not completed.

The following describes the scope of work for each of the recommended tasks and assigns an estimated fee for the labor and expenses anticipated. To save time, we did not break down the fees on a fee-match basis nor was our previously agreed upon multiplier (3.0144) assigned to labor. Instead it is our intention to discuss the project with the USDA-NRCS and agree upon a direction to proceed prior to discussing a means for funding, if approved. The proposed schedule for completing these tasks is included in the table below. Attached in Appendix D is a draft Work Plan in spreadsheet format that summarizes the labor and expenses anticipated for each task.

Dew/Insect Protection System

We plan to discuss the dew/insect guard with Dr. Del Bottcher and Mr. Bill Reck. We estimate that these discussions will take approximately 2 hours per person involved. We will share concepts and prototypes. We have an estimate from a specialty shop in Southfield, Michigan for the manufacture the guard.

Manufacture of Device Leg Bases

We will have the bases fabricate for the ~1.5 inch diameter steel pipe/legs. Each base will consist of a steel plate approximately 2 feet X 2 feet or larger with a pipe in the middle that will be the receiving end for the 1.5 inch diameter pipe/leg. The leg and base will have a locking mechanism to secure them to the devive. We will also consider a swivel/u-joint where the tube connects to the plate to better match the legs to slightly irregular subgrade / pond bottoms. We have a quote from a manufacture in Alpena, Michigan to manufacture the bases.

Pond Inlet Sealing Systems

We will purchase various sized temporary pipe plugging equipment (i.e., pipe plugs). We will purchase them on an as-needed basis as we perform the tests at the different farms.

Laboratory Testing

Ideally the laboratory testing should take approximately one day. However, we have included a contingency to repeat testing if necessary. Therefore, we have budgeted for two people with two days of labor to conduct the tests.

More Controlled Testing Environments

Laboratory Test

We estimate that two people can complete this test in one day.

Field Testing Locations

Each field test will require two trips to the site; one in the afternoon/evening to set up and begin the test and another in the morning to take the final reading and collect equipment. We estimate that each test will require labor from two people at approximately 12 hours each. Finally each test will require expenses (e.g., generator rental fees) plus mileage.

Data Analysis and Evaluation

After each test we will prepare the data so it can be reported. We will evaluate the data in an attempt to determine if the results are reliable. If we conclude the results are faulty we will attempt to determine the reason and will also attempt to correct issues prior to the next test.

Project Management and Reporting

We estimate that the project will require 1.5 hours per month to review invoicing and discussions with appropriate personnel. We also estimate that reporting will require 2 hours each quarter for financial reporting only and 5 hours semi-annually for financial and semi-annual reporting. Finally we estimate that the final report will require 12 additional hours for preparation.

5.0 GRANT AGREEMENT REPORTING REQUIREMENTS

Financial Status Report (Section VIII.2)

A SF-269 is included in Appendix E. As no funding is being requested, we did not complete a SF-270 form. Also included in Appendix E is a detailed analysis of labor and expenses. To date our total project outlays are approximately $24,400 including $17,000 in labor, $6,000 in expenses, and $1,350 of an in kind contribution from SWET for the seepage meter design drawings.

Project Goals vs. Accomplishments (Section IX.2)

Actual Accomplishments Compared to Project Goals

BENCHMARKS	PROJECT GOALS	ACTUAL/REVISED
Project Initiation	APR 2007	APR 2007
Soil and Water Engineering Technology (SWET) Visit	MOVED (AUG 2008)	MOVED (AUG 2008)
Development of Shop Drawings	JAN 2008	JAN 2008
Device Bid	FEB-APR 2008	FEB-APR 2008
Device Fabrication	MAY-JUN 2008	MAY-JUN 2008
Initial Test / SWET Visit	JUN 2008	AUG 2008
Laboratory Testing	DEC 2008	NA
"Dew Guard" Fabrication	MAY 2009	NA
In-field Testing	JUN-AUG 2009	NA
Evaluation / Reporting	SEPT-DEC 2009	JAN-FEB 2010

Example of Extended Timeline

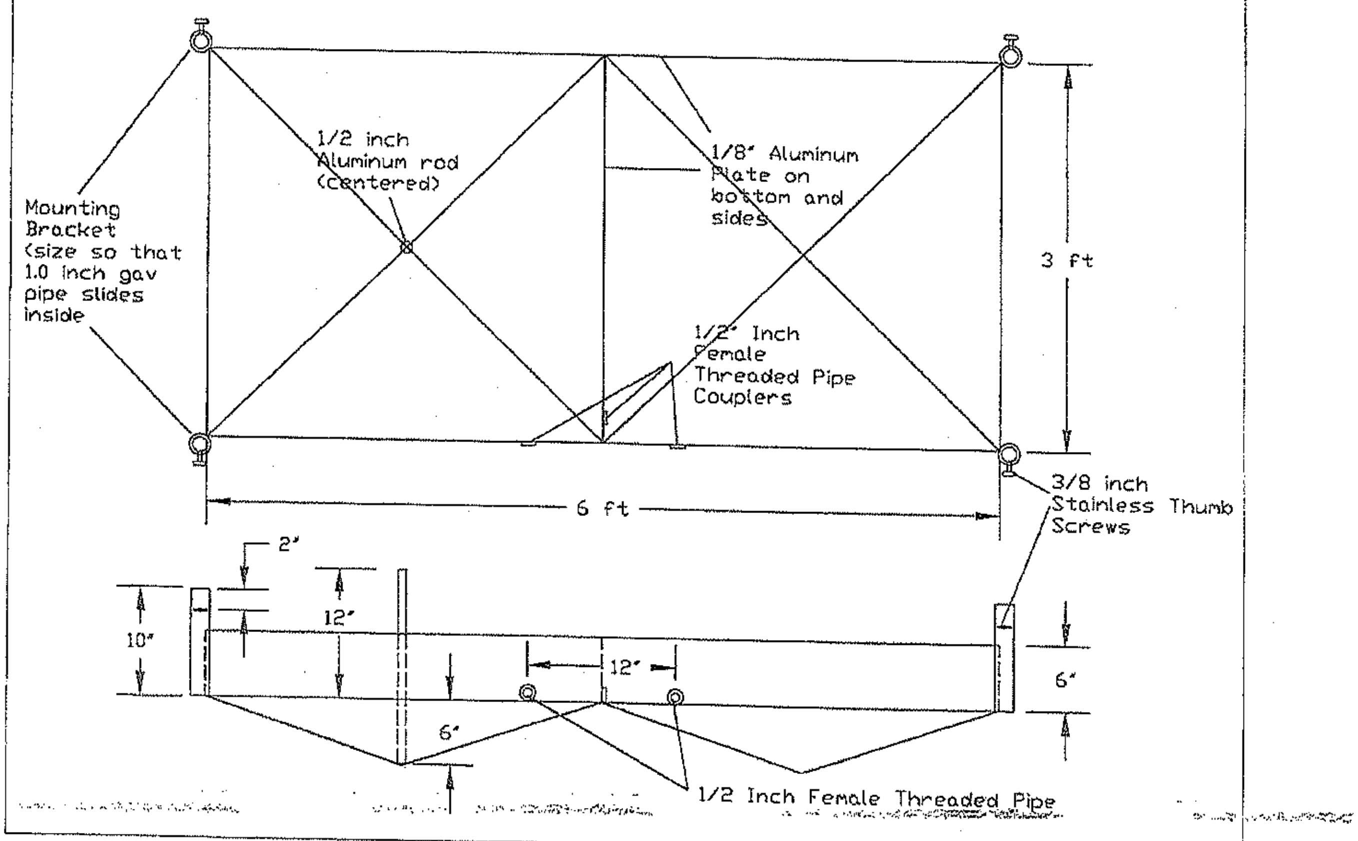
BENCHMARKS	DATE*
Fabrication of Leg Bases	JAN-APR 2010
Manufacture Dew/Bug Guard	JAN-MAY 2010
Laboratory Testing	JAN-APR 2010
Laboratory Test	MAY 2010
Field Tests	JUN-AUG 2010
Evaluation / Reporting	SEPT-DEC 2010

* The actual project start date will depend on the contract execution date. Approximately 5 months are needed to perform the laboratory testing and prepare the instrument for field tests. Field testing should occur during the months of May through September. If this window is missed additional time will be needed to complete the project.

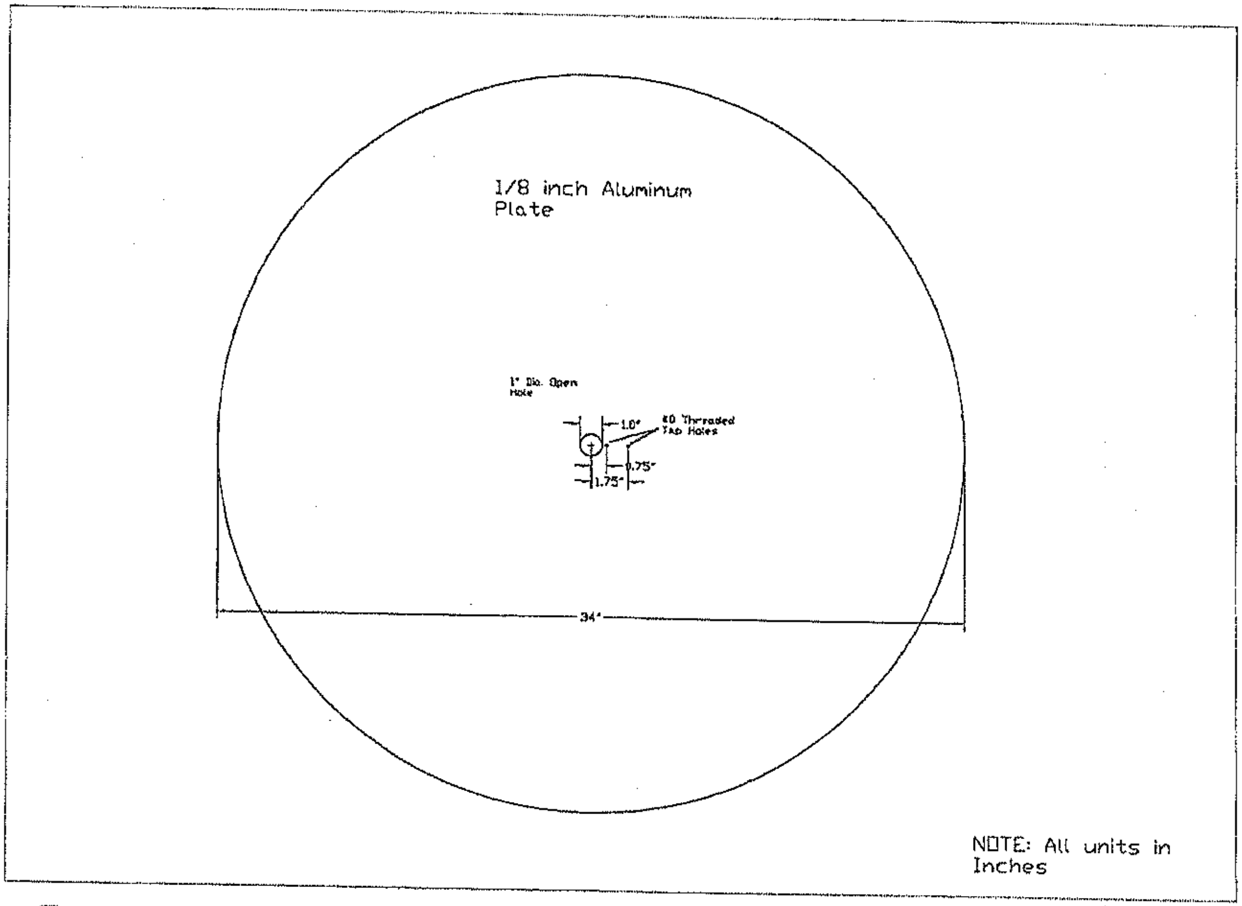
APPENDIX A

SEEPAGE METER SHOP DRAWINGS

Monitoring Pan for Pond Leakage



Project No.: 74-080272-00 Scale: NTS	Monitoring Pan Plan and Profile	SWET Fabrication Drawings	Date: JAN 2008
	NTH Consultants, Ltd. **Infrastructure Engineering and Environmental Services** **Northville, Detroit, Exton, Grand Rapids, Lansing**		Plate No.: 1A



Float Plate

Project No.: 74-080272-00	Float Plate Plan View	SWET Fabrication Drawings	Date: JAN 2008
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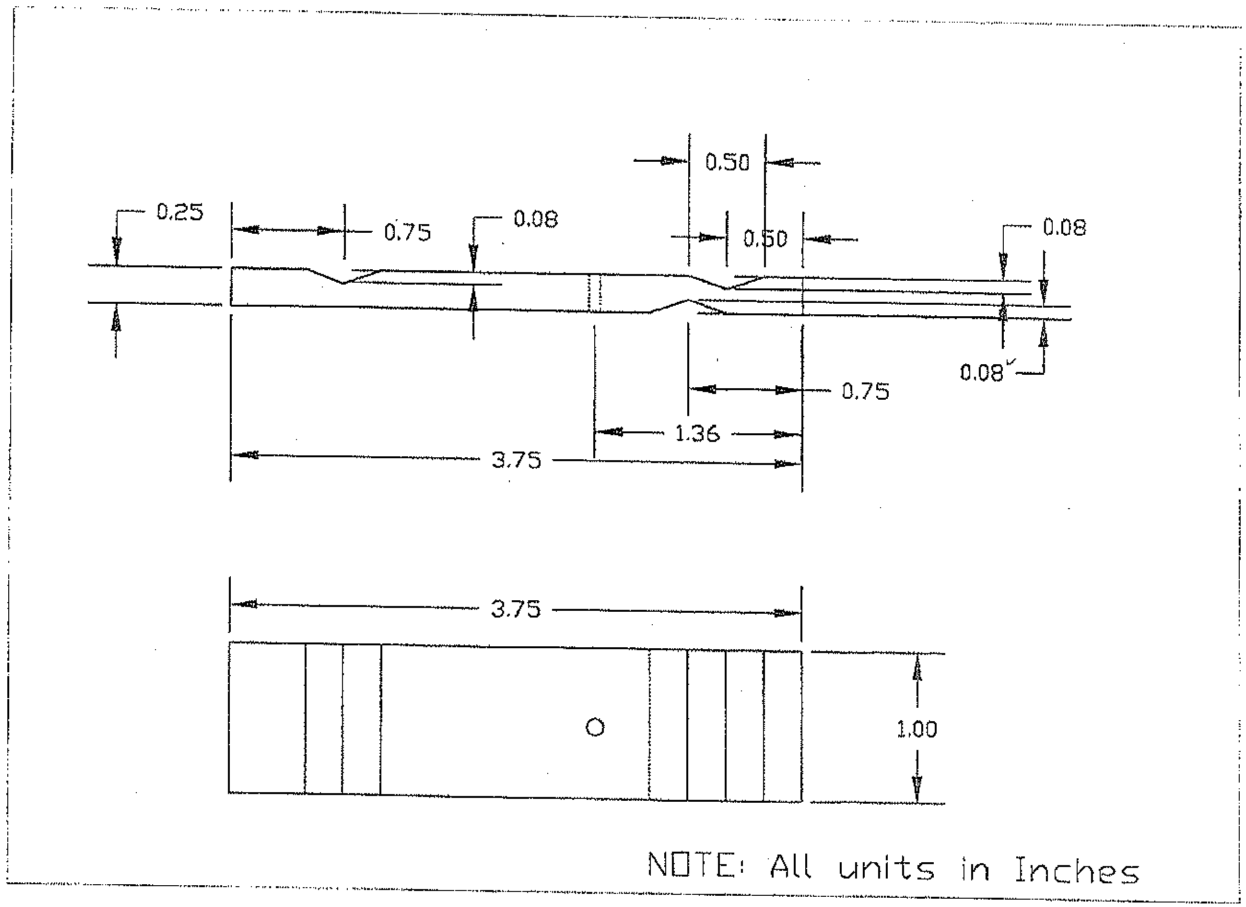
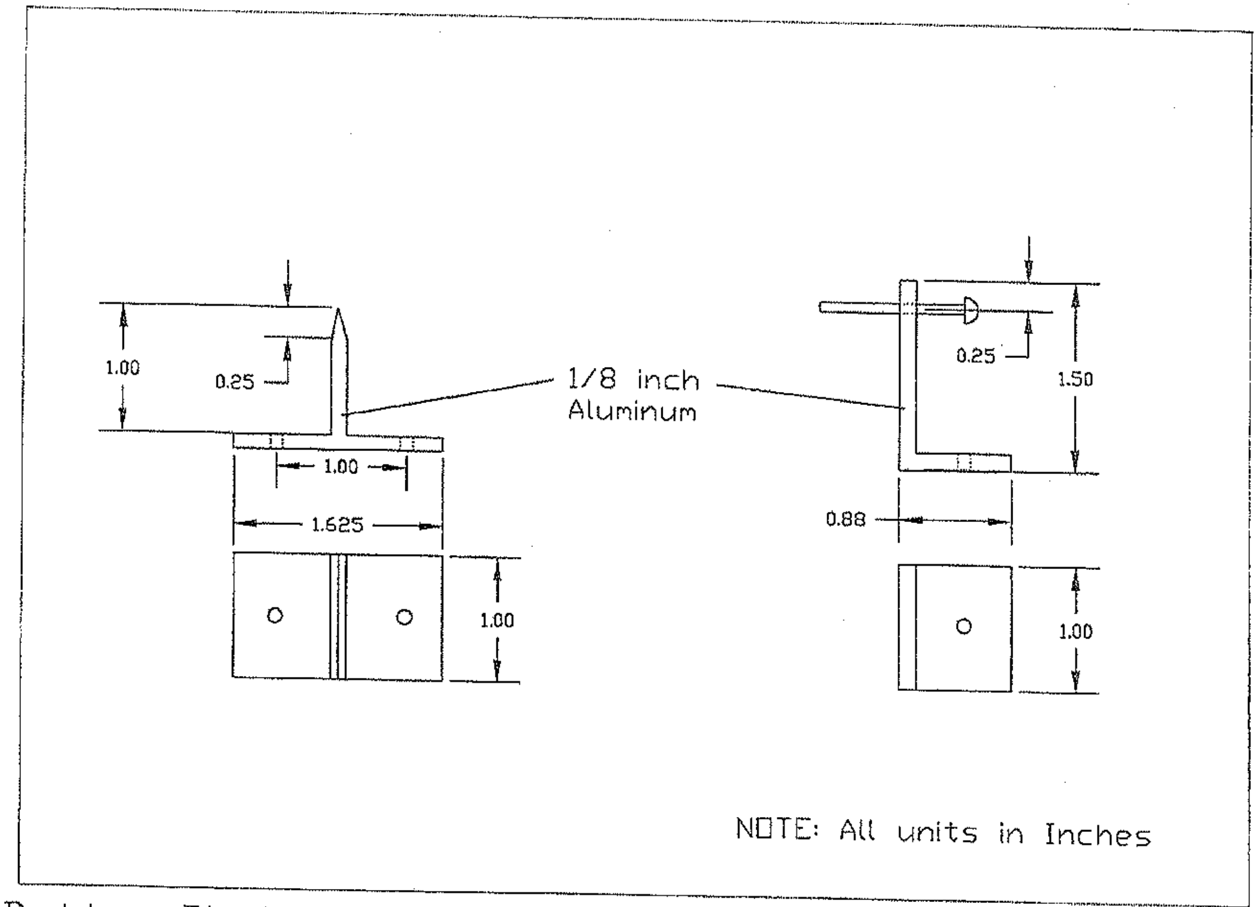


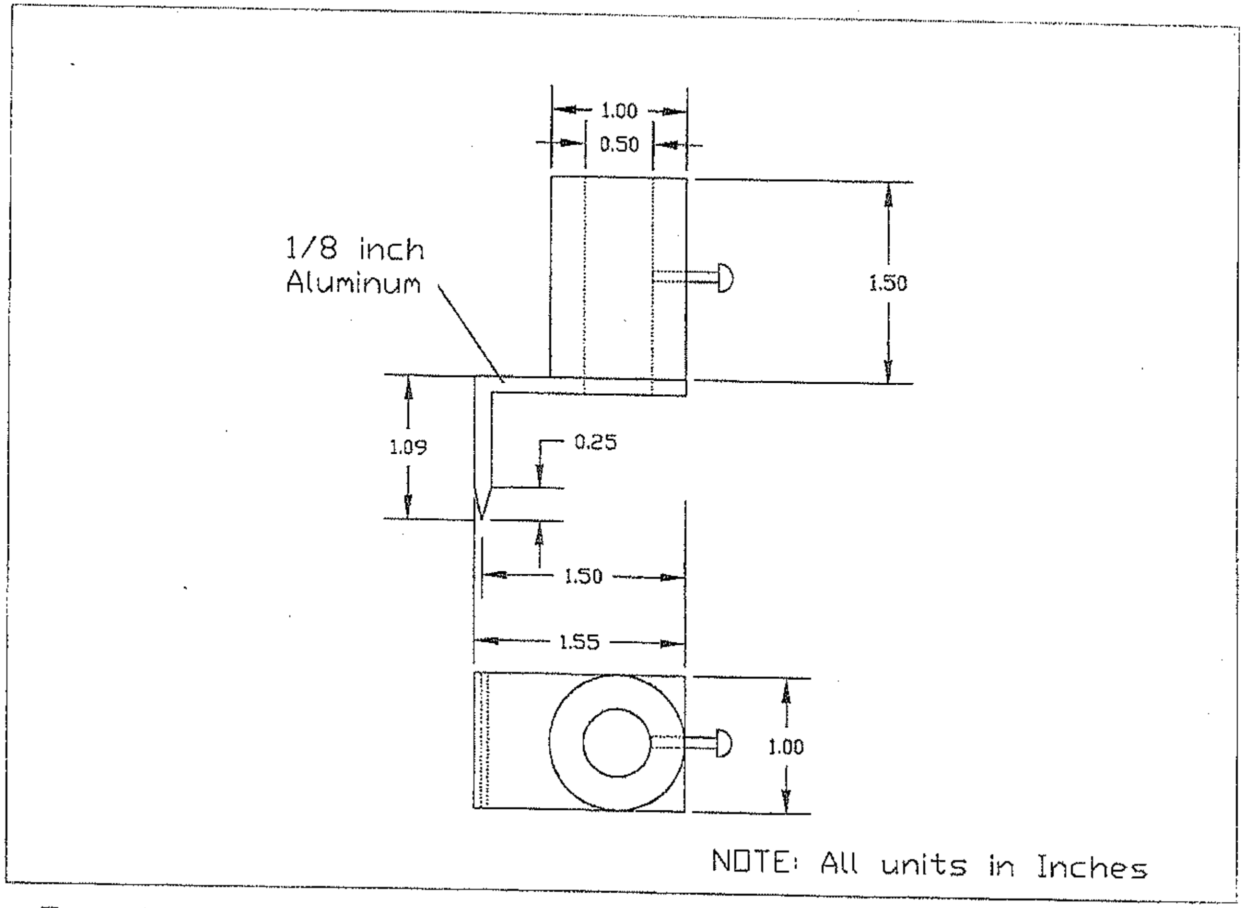
Mirror and Focum Plate

Project No.: 74-080272-00 Scale: NTS	Mirror and Focum Plate Plan and Profile	SWET Fabrication Drawings	Date: JAN 2008
	NTH Consultants, Ltd. Infrastructure Engineering and Environmental Services Northville, Detroit, Exton, Grand Rapids, Lansing		Plate No.: 3A



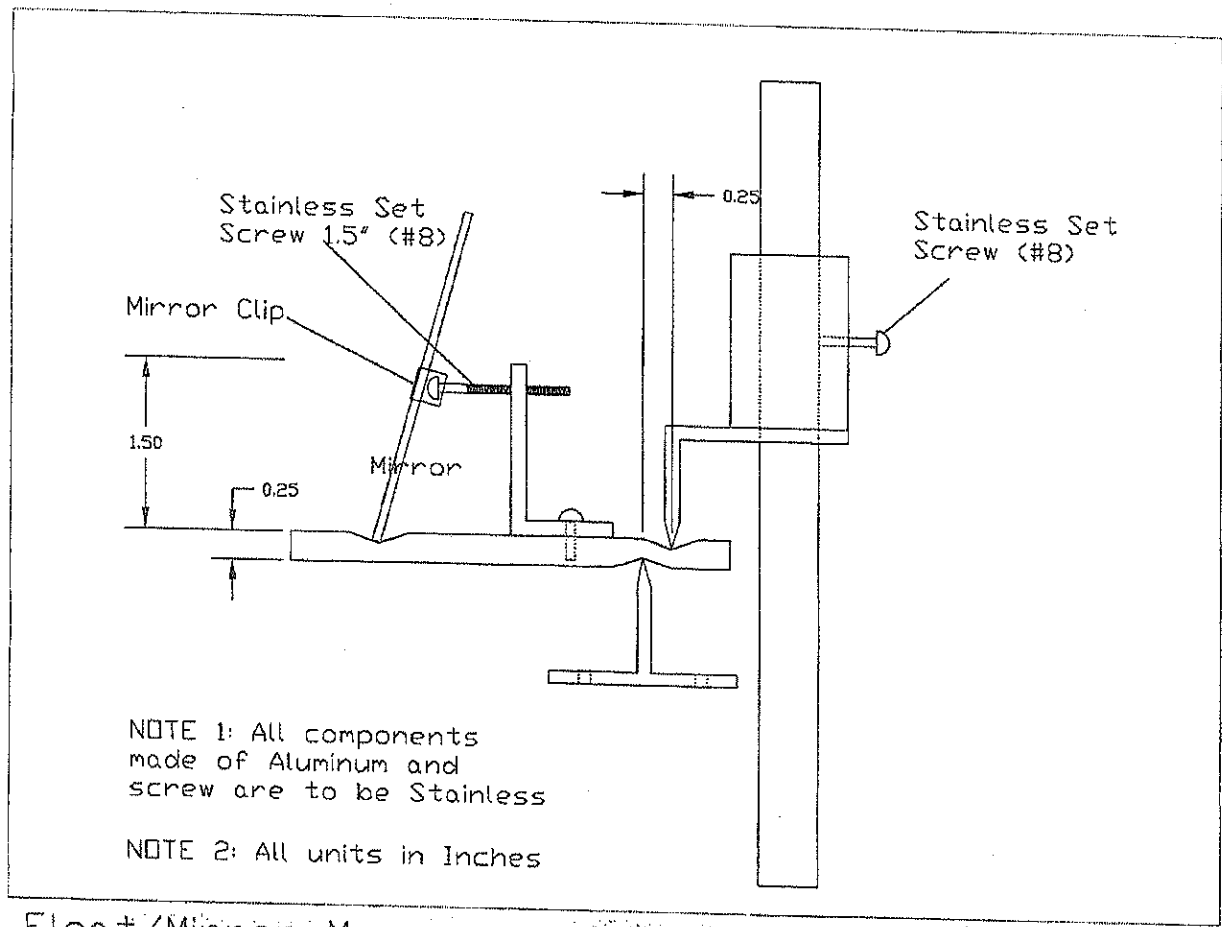
Bottom Blade w/ Mounting Bracket, plus Mirror Mount

Project No.: 74-080272-00 Scale: NTS	Bottom Blade w/ Mounting Bracket, plus Mirror Mount	SWET Fabrication Drawings	Date: JAN 2008
	NTH Consultants, Ltd. Infrastructure Engineering and Environmental Services Northville, Detroit, Exton, Grand Rapids, Lansing		Plate No.: 4A



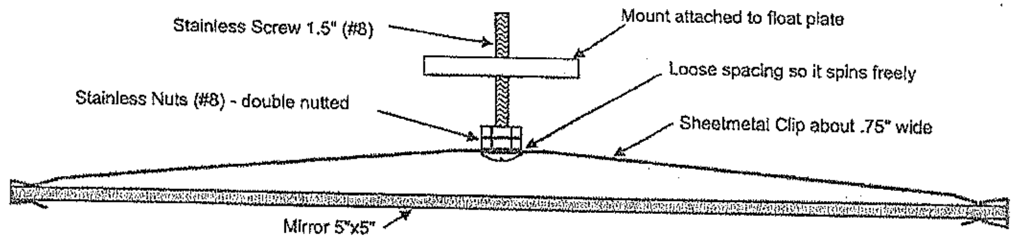
Top Blade and Mounting Bracket

Project No.: 74-080272-00 Scale: NTS	Top Blade and Mounting Bracket	SWET Fabrication Drawings	Date: JAN 2008
	NTH Consultants, Ltd. Infrastructure Engineering and Environmental Services Northville, Detroit, Exton, Grand Rapids, Lansing		Plate No.: 5A

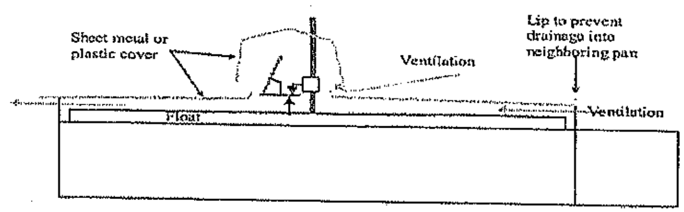


Float/Mirror Measurement Apparatus

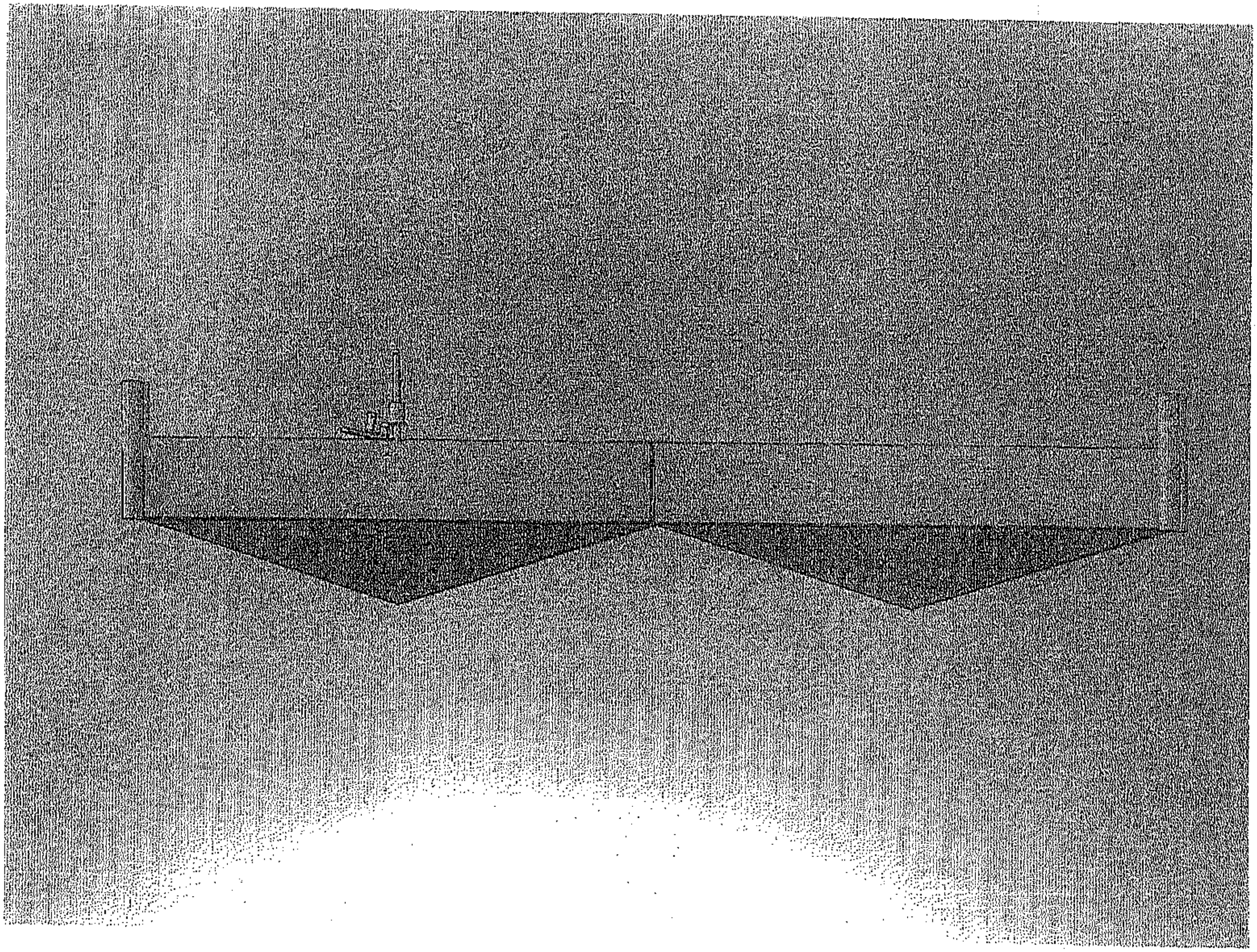
Project No.: 74-080272-00 Scale: NTS	Float/Mirror Measurement Apparatus	SWET Fabrication Drawings	Date: JAN 2008
	NTH Consultants, Ltd. **Infrastructure Engineering and Environmental Services** **Northville, Detroit, Exton, Grand Rapids, Lansing**		Plate No.: 6A



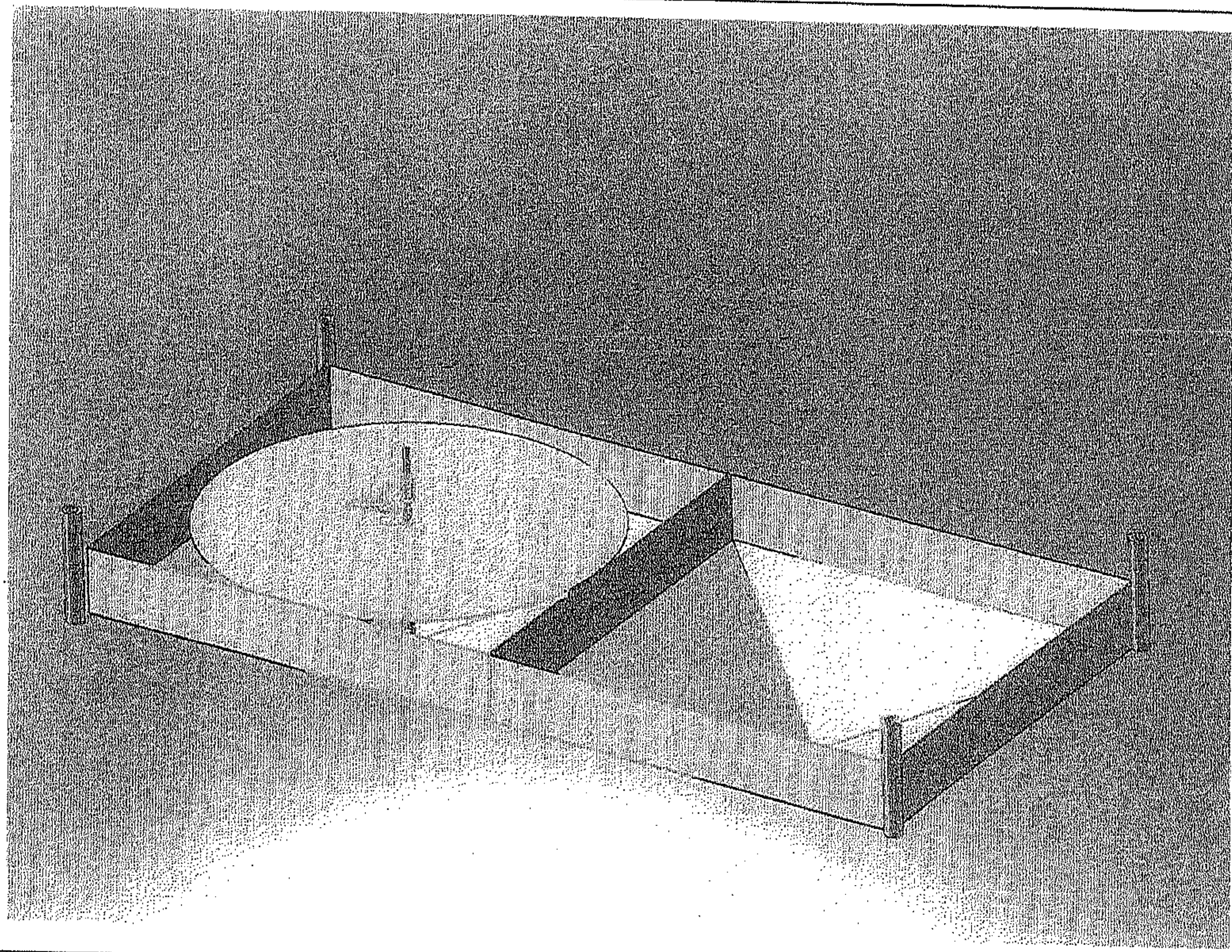
Project No.: 74-080272-00 Scale: NTS	Mirror Mounting Bracket	SWET Fabrication Drawings	Date: JAN 2008
	NTH Consultants, Ltd. **Infrastructure Engineering and Environmental Services** **Northville, Detroit, Exton, Grand Rapids, Lansing**		Plate No.: 7A



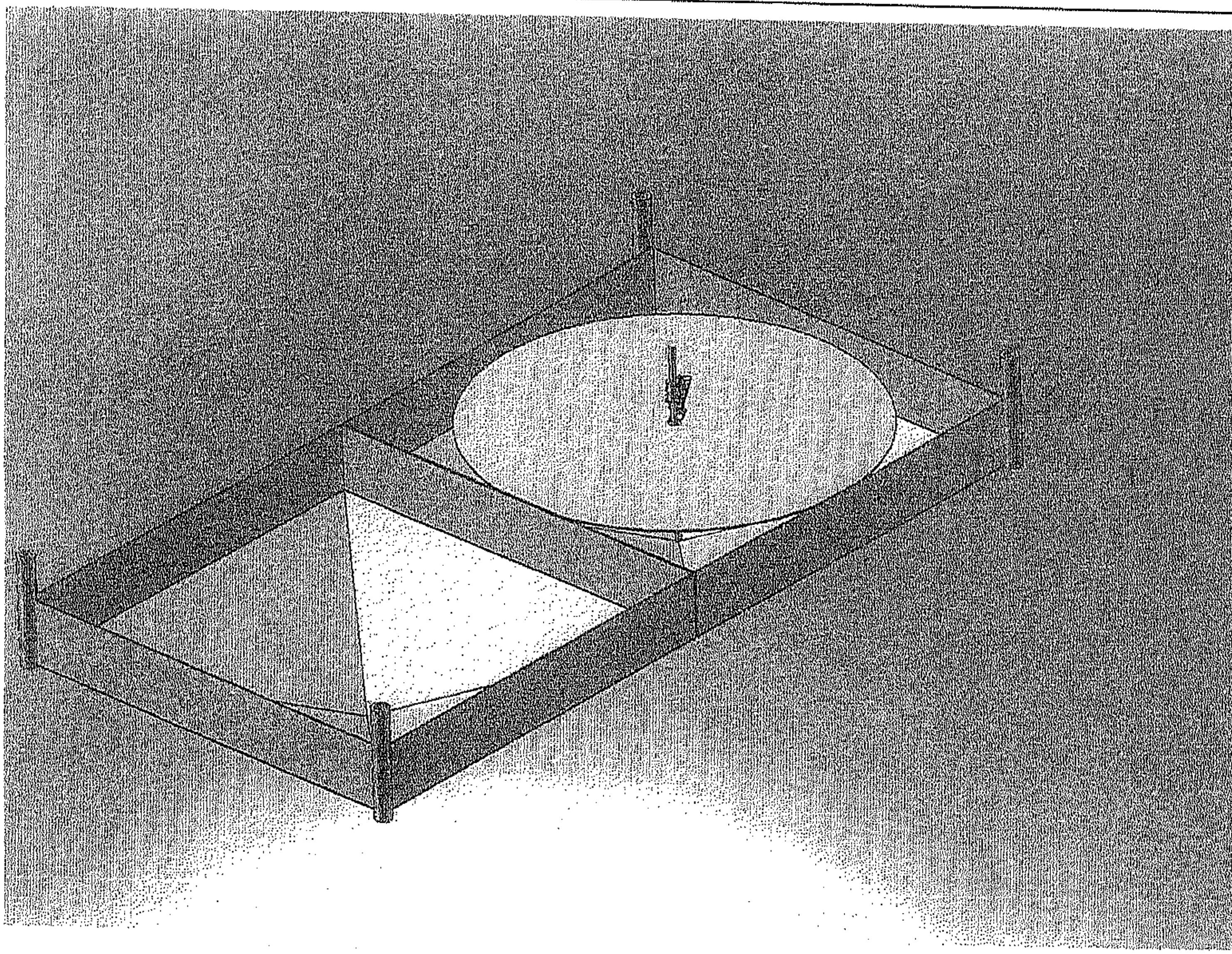
Project No.: 74-080272-00	Conceptual Plan Dew/Insect Protection System	SWET Fabrication Drawings	Date: JAN 2008
Scale: NTS			
	NTH Consultants, Ltd. Infrastructure Engineering and Environmental Services Northville, Detroit, Exton, Grand Rapids, Lansing		Plate No.: 8A



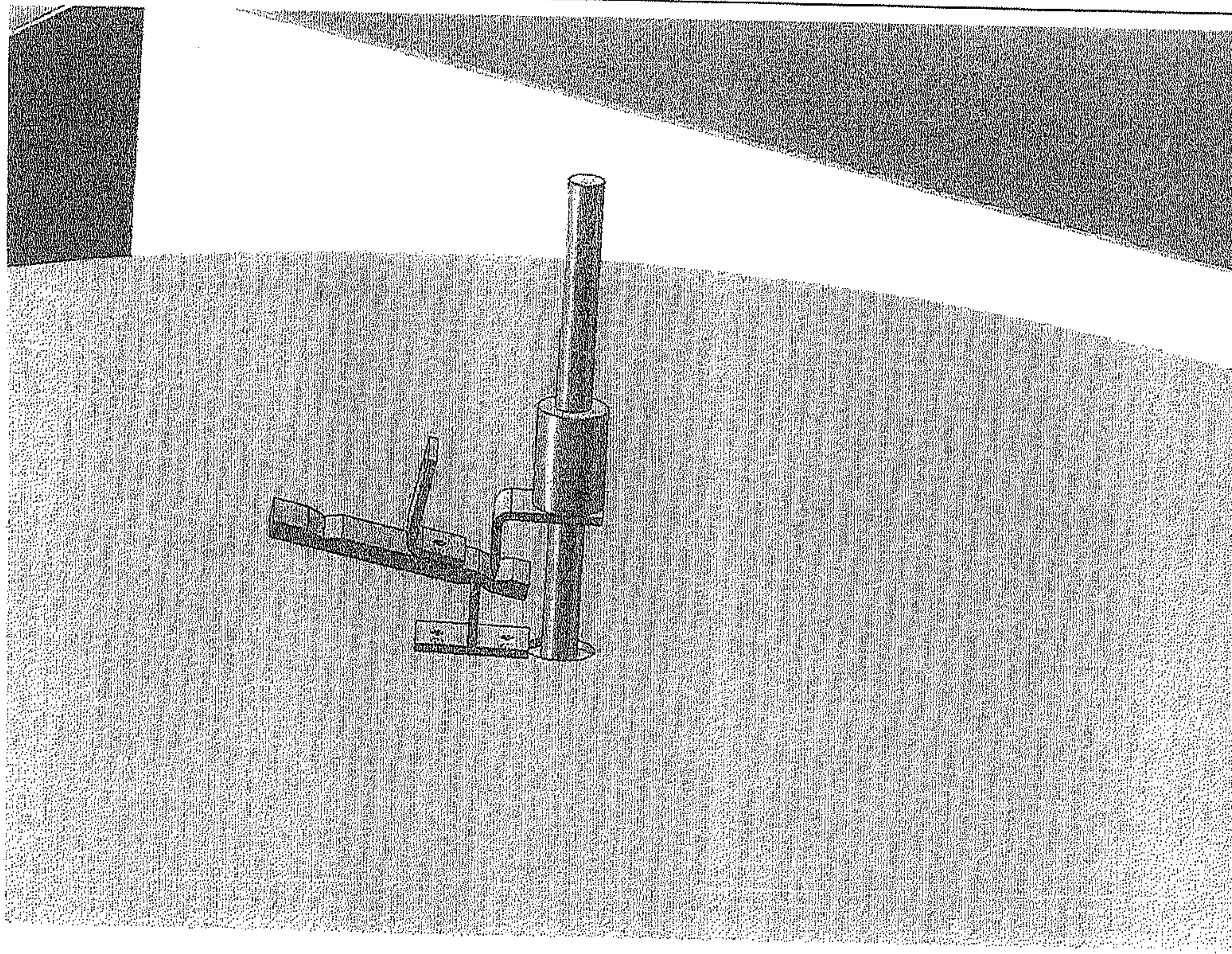
Project No.: 74-080272-00 Scale: NTS	Monitoring Pan Profile	Seepage Meter Shop Drawings Thomas Fabrication Inc.	Date: JAN 2008
	NTH Consultants, Ltd. **Infrastructure Engineering and Environmental Services** **Northville, Detroit, Exton, Grand Rapids, Lansing**		Plate No.: 1B



Project No.: 74-080272-00 Scale: NTS	Float Plate and Monitoring Pan Planometric View	Seepage Meter Shop Drawings Thomas Fabrication Inc.	Date: JAN 2008
	NTH Consultants, Ltd. **Infrastructure Engineering and Environmental Services** **Northville, Detroit, Exton, Grand Rapids, Lansing**		Plate No.: 2B



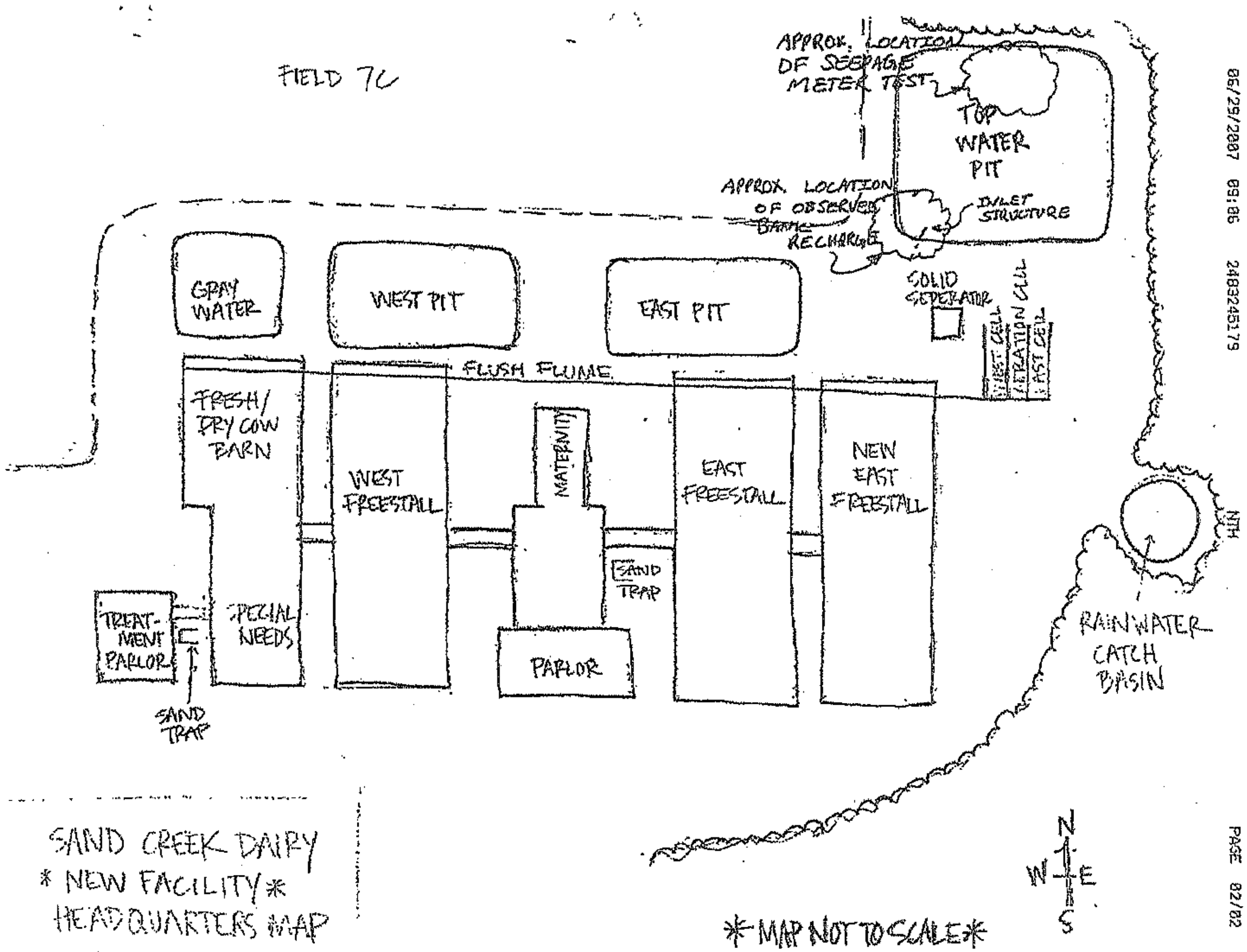
Project No.: 74-080272-00 Scale: NTS	Float Plate and Monitoring Pan Planometric View	Seepage Meter Shop Drawings Thomas Fabrication Inc.	Date: JAN 2008
	NTH Consultants, Ltd. **Infrastructure Engineering and Environmental Services** **Northville, Detroit, Exton, Grand Rapids, Lansing**		Plate No.: 3B



Project No.: 74-080272-00	Mirror and Focum Plate, Top & Bottom Blades, and Mounting Brackets	Seepage Meter Shop Drawings Thomas Fabrication Inc.	Date: JAN 2008
Scale: NTS	**NTH Consultants, Ltd.** **Infrastructure Engineering and Environmental Services** **Northville, Detroit, Exton, Grand Rapids, Lansing**		Plate No.: 4B

APPENDIX B

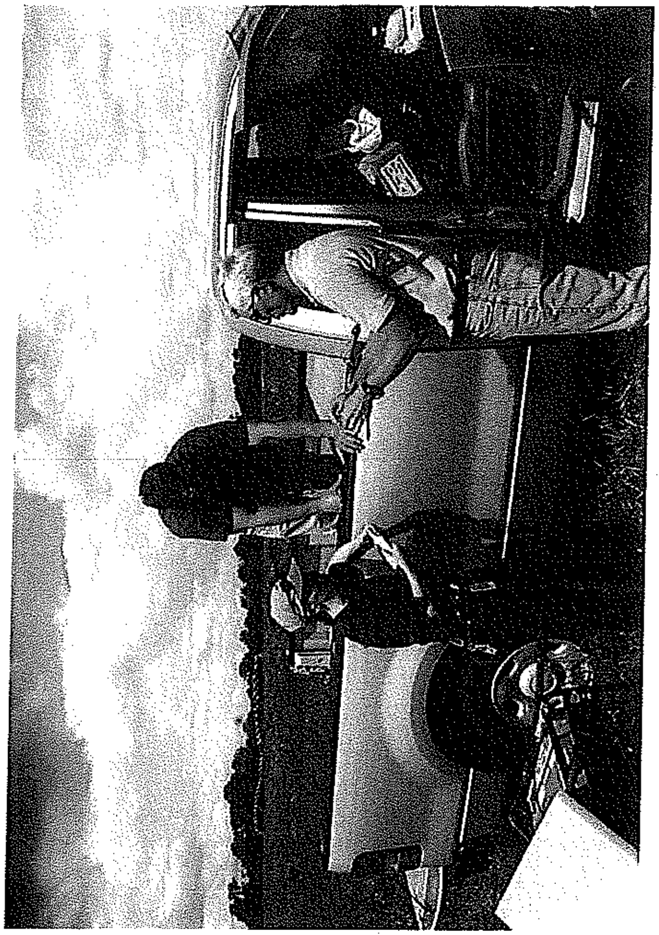
INITIAL TEST SITE MAP - SAND CREEK DAIRY

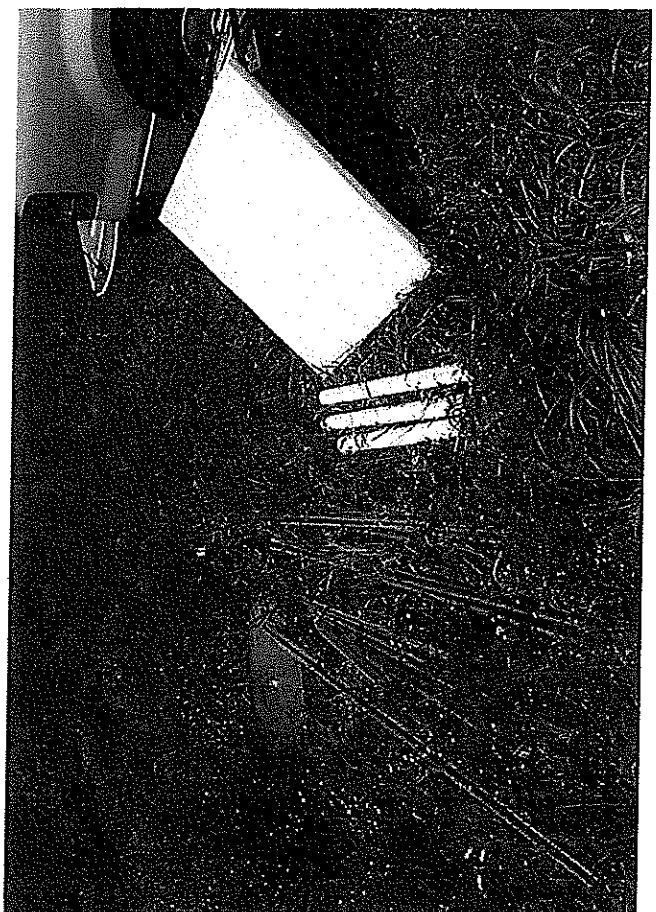


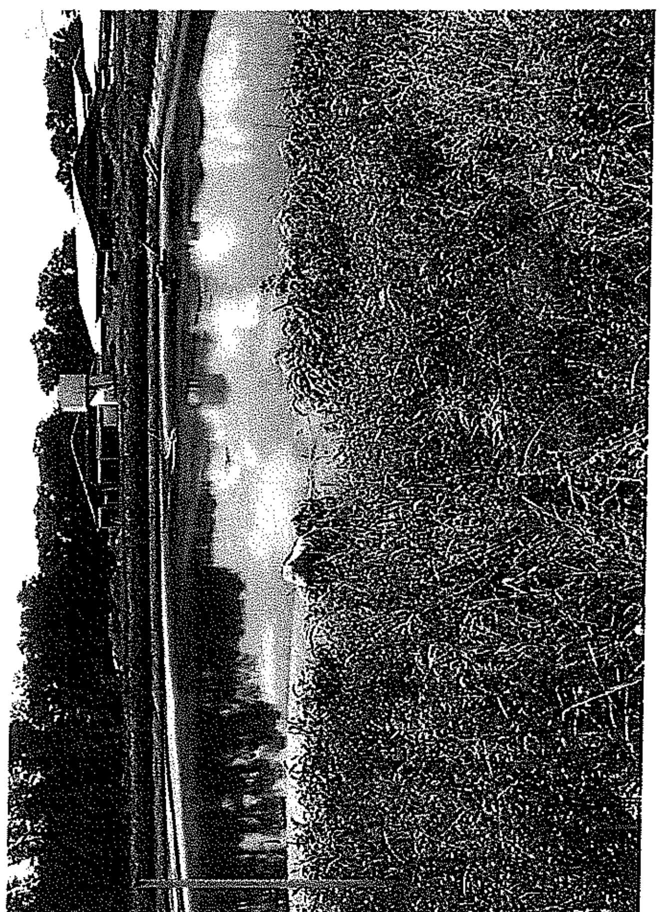
Project No.: 74-080272-00	Sand Creek Dairy	Seepage Meter Initial Test Location	Date: FEB 2010
Scale: NTS			
	NTH Consultants, Ltd. Infrastructure Engineering and Environmental Services Northville, Detroit, Exton, Grand Rapids, Lansing		Figure No.: 1

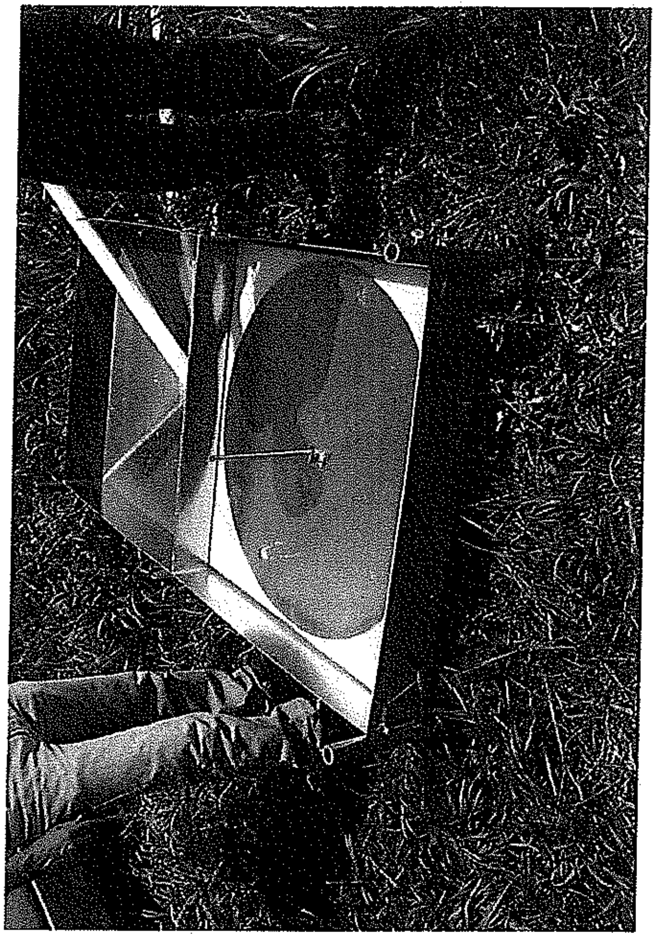
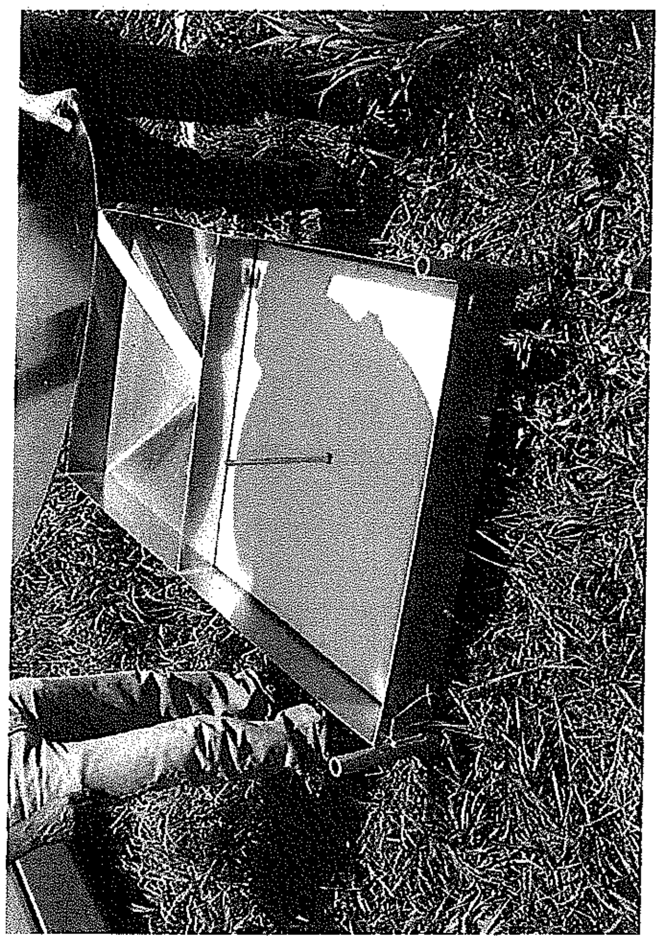
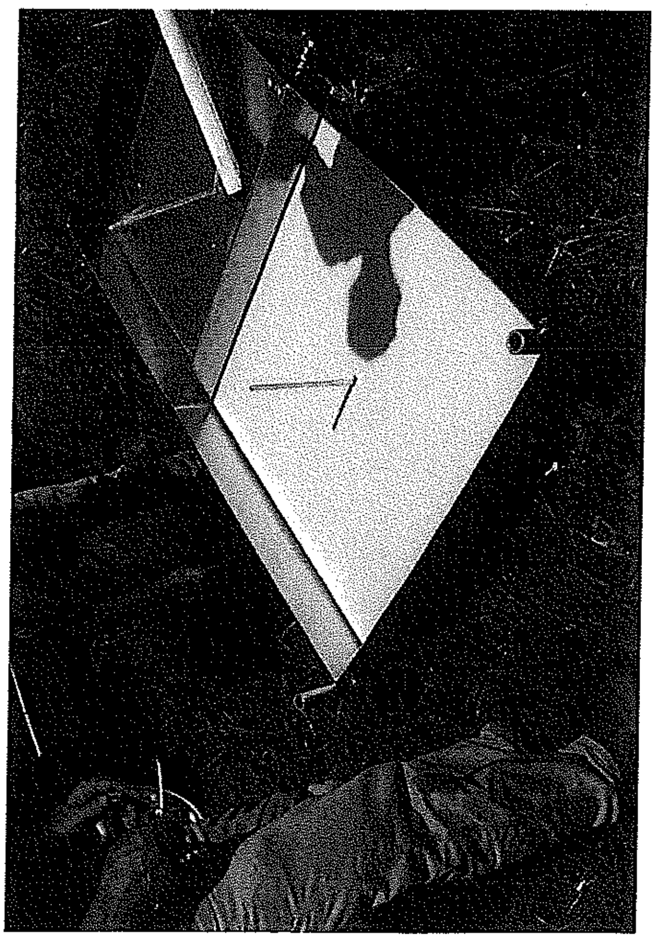
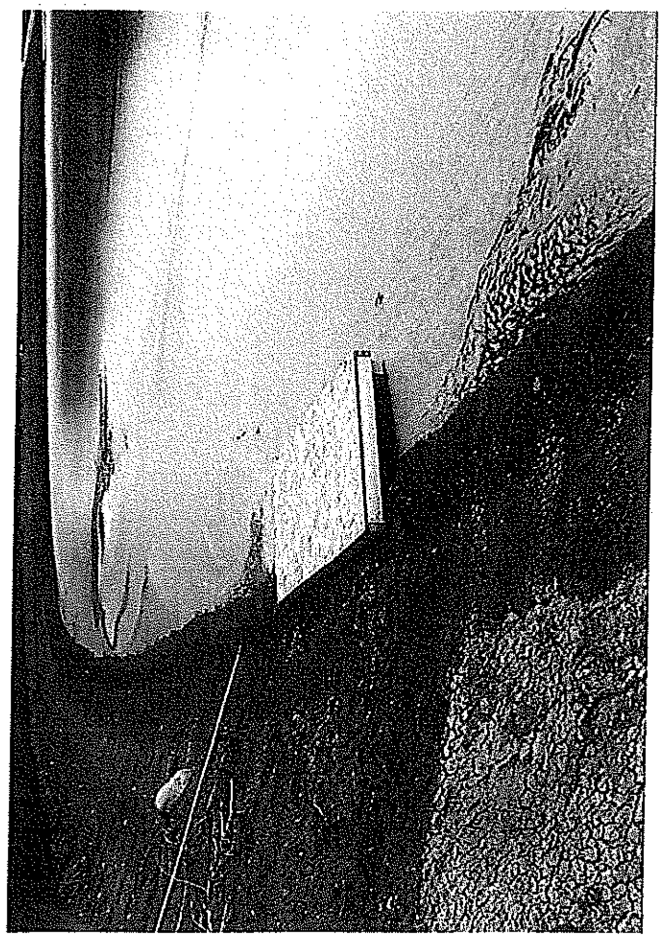
APPENDIX C

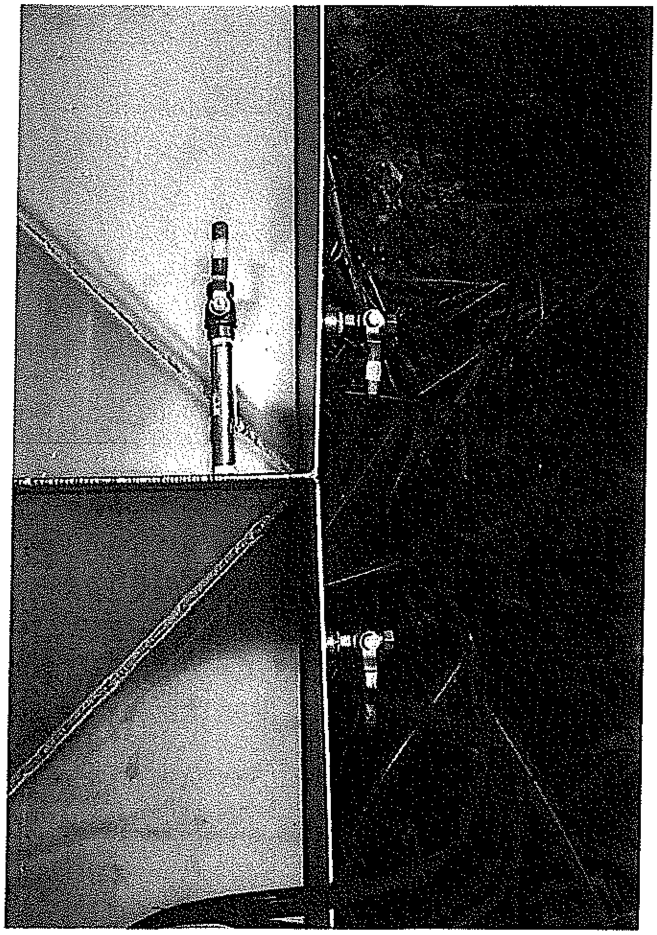
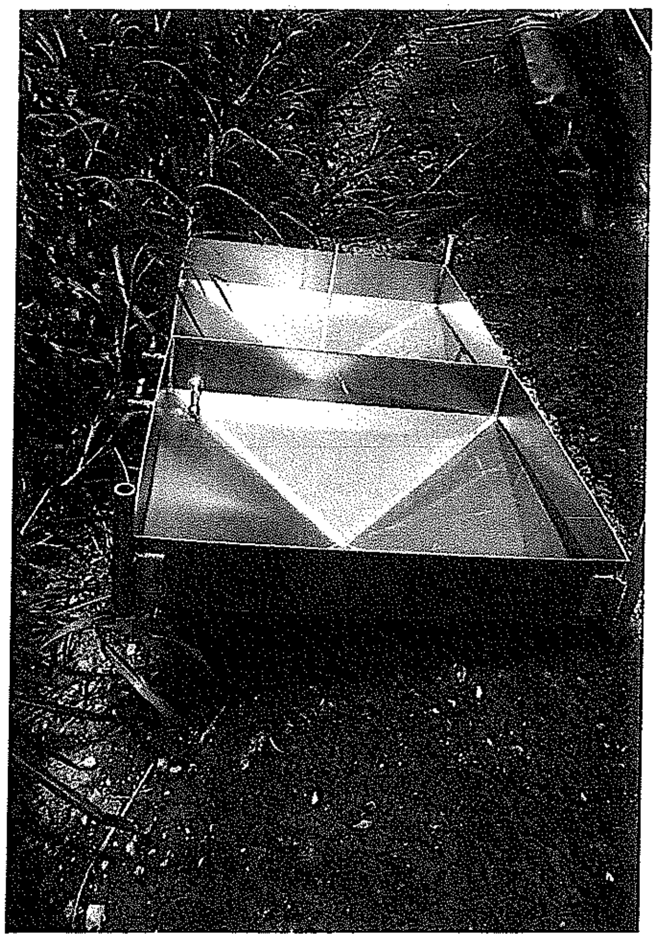
INITIAL TEST PHOTOGRAPHS / FIELD AND WEATHER DATA

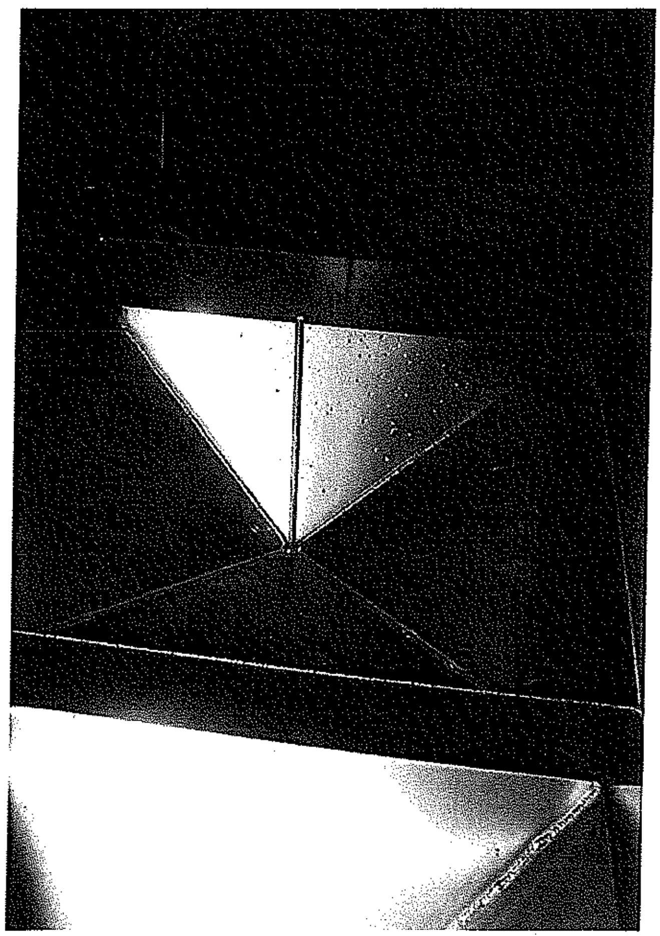


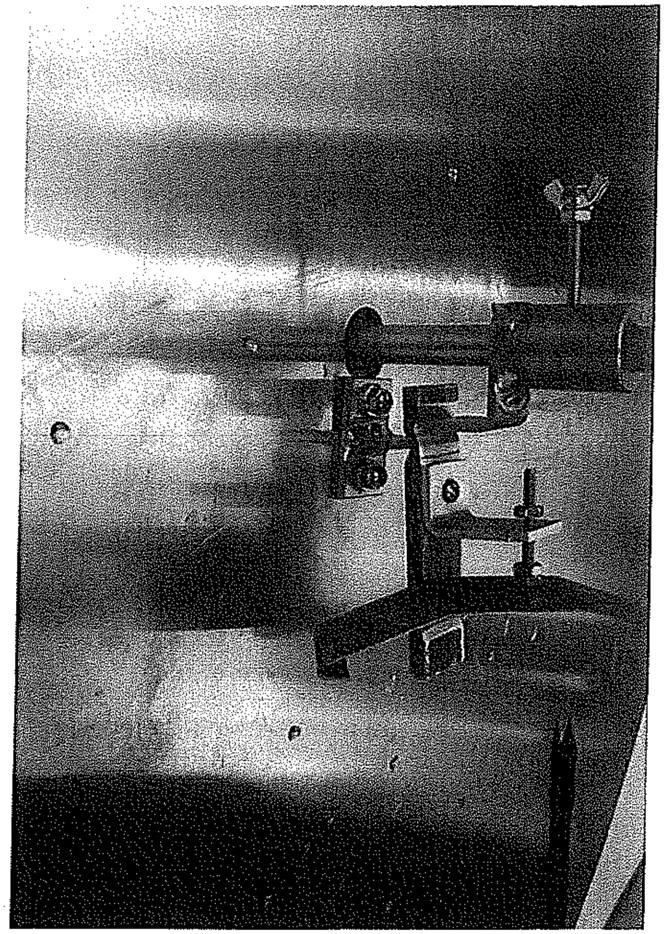
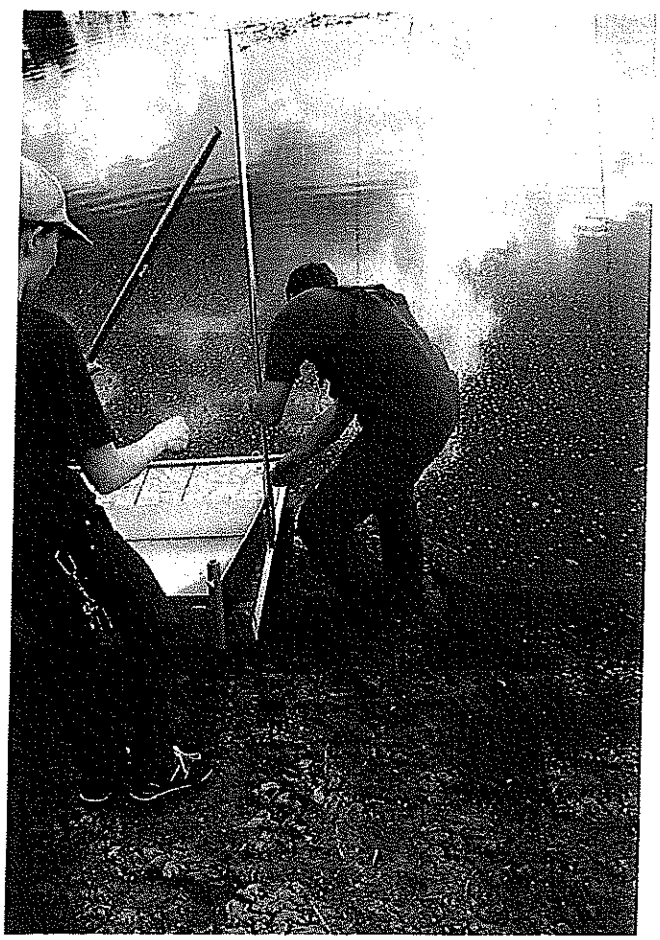
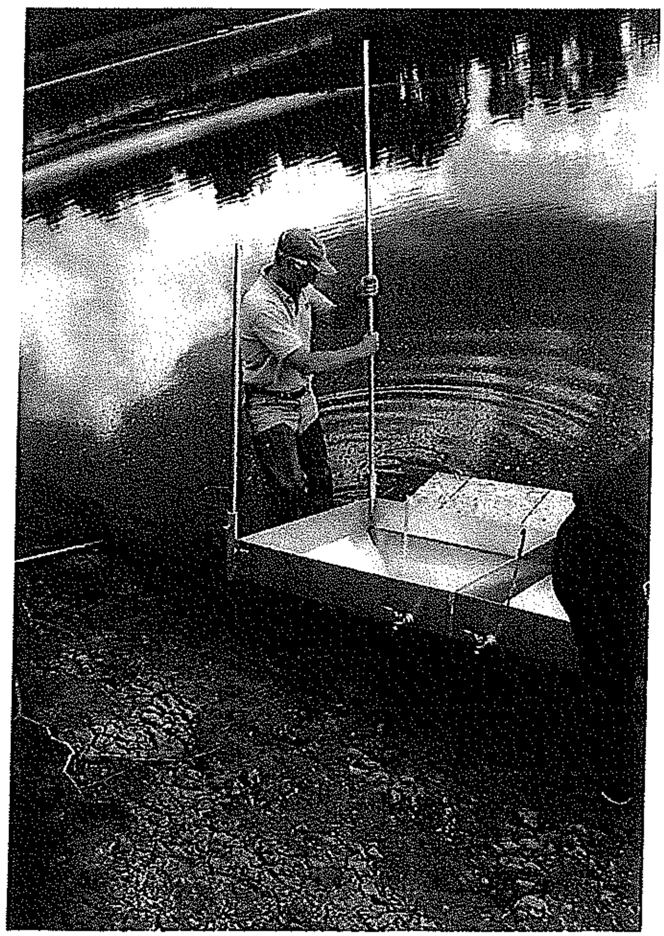


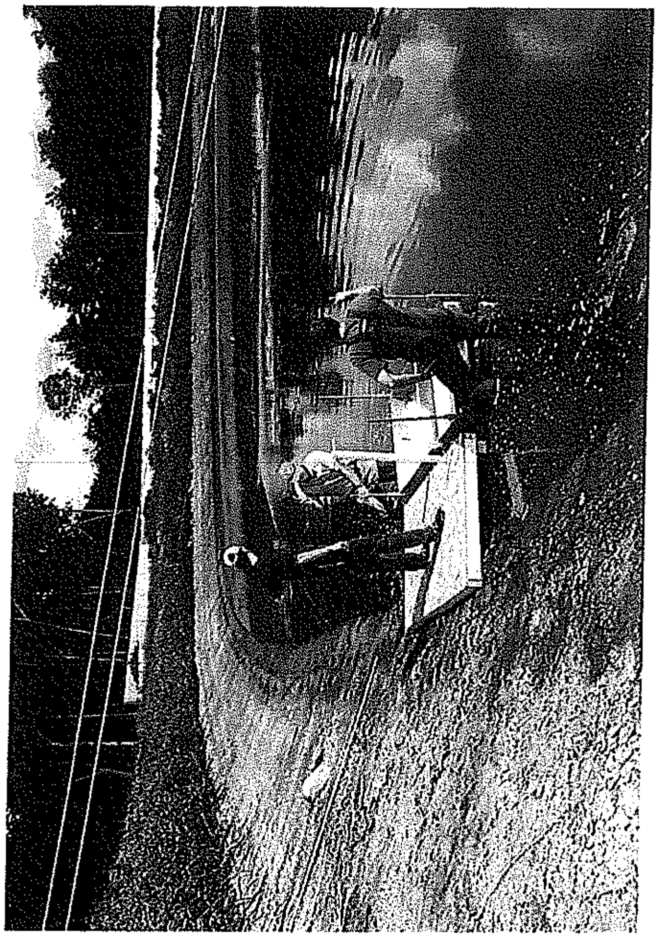
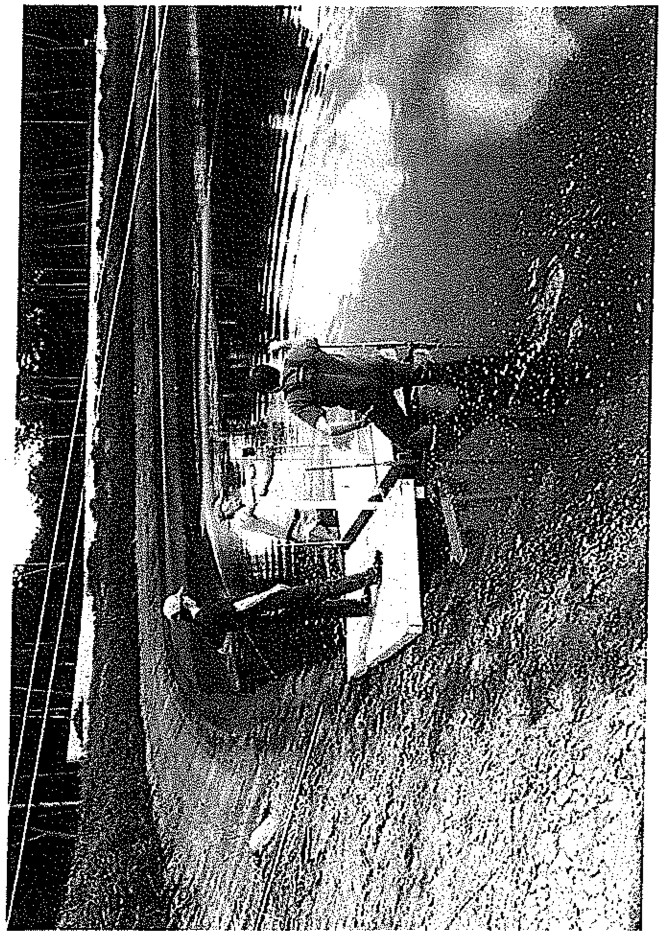
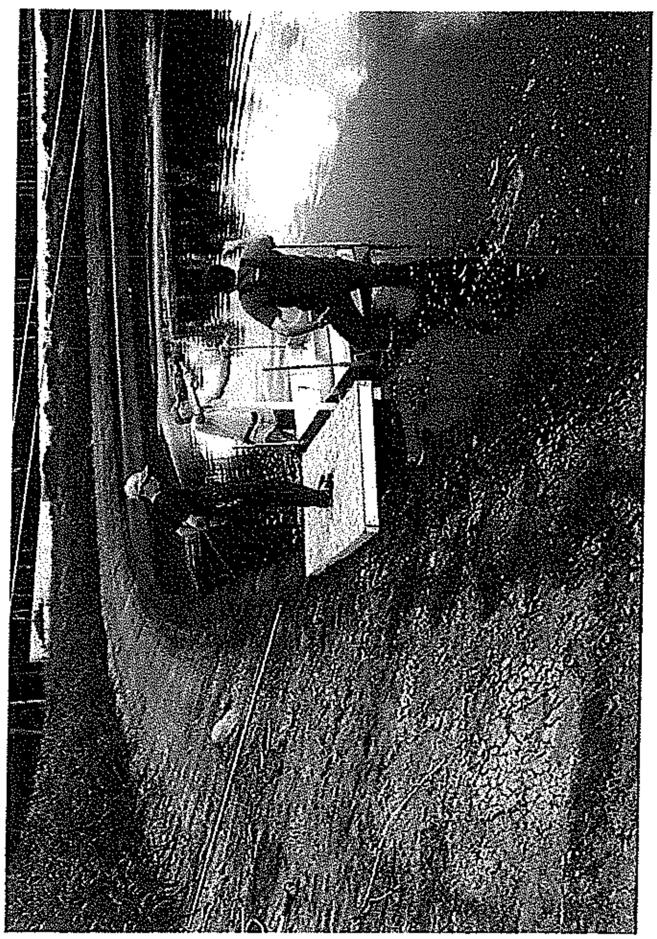
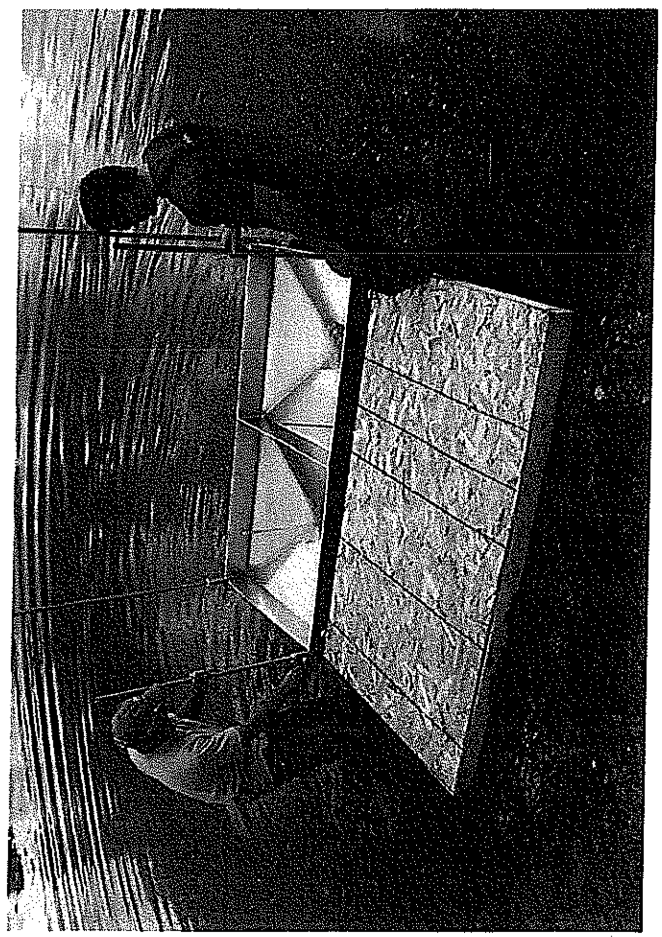


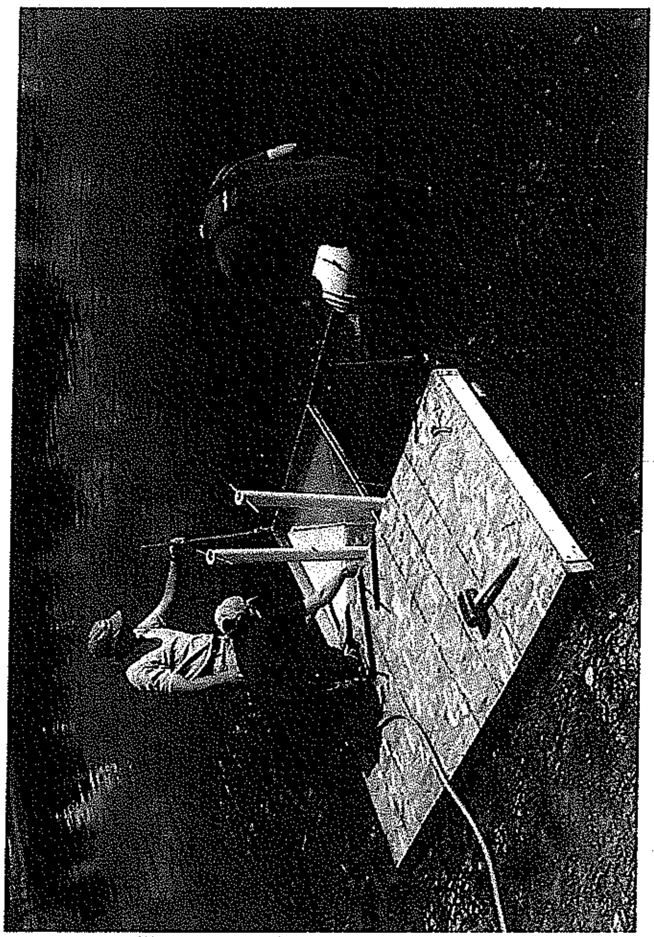





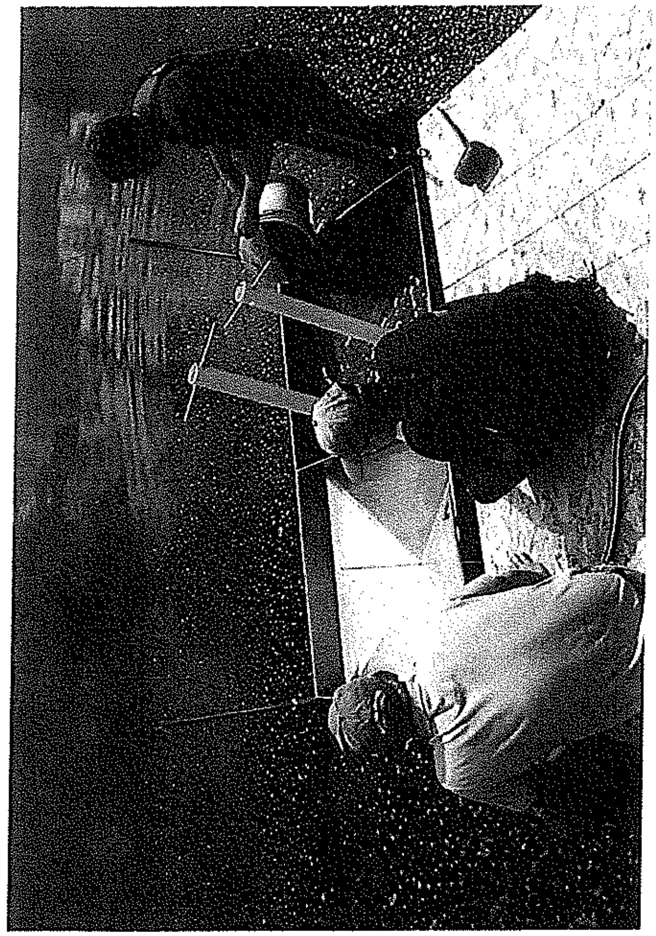



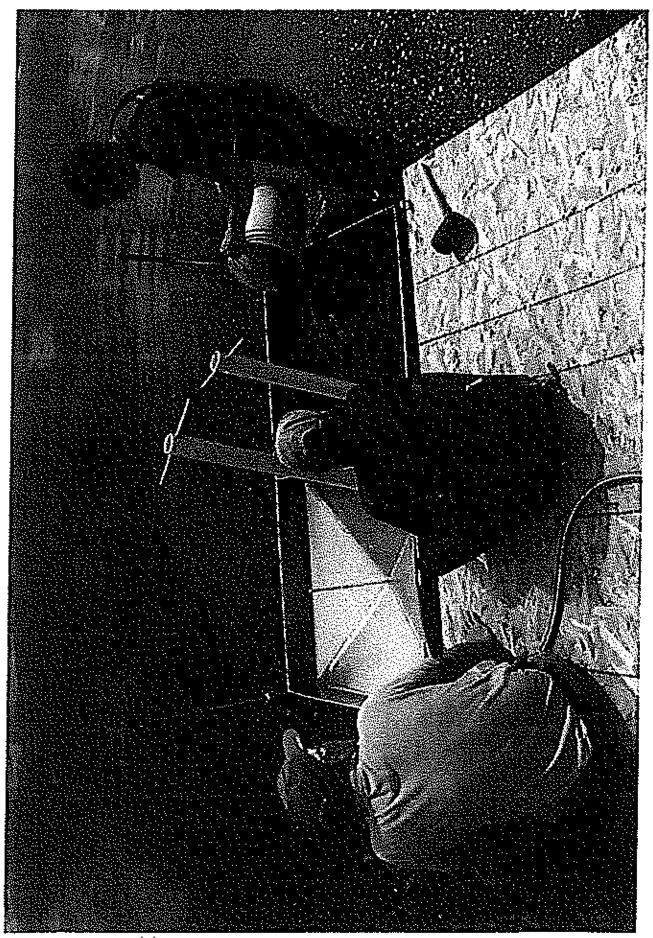


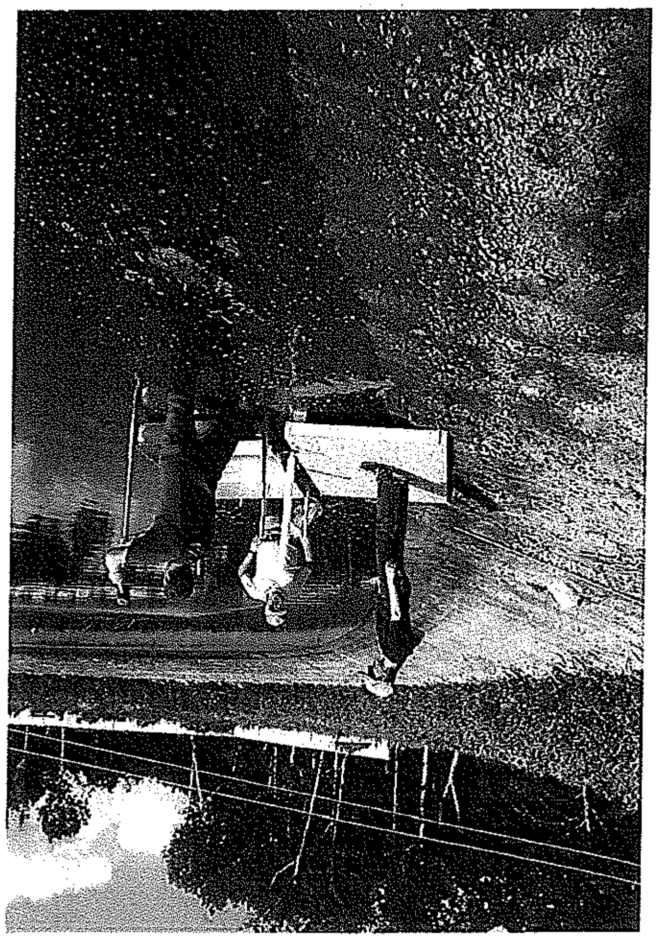





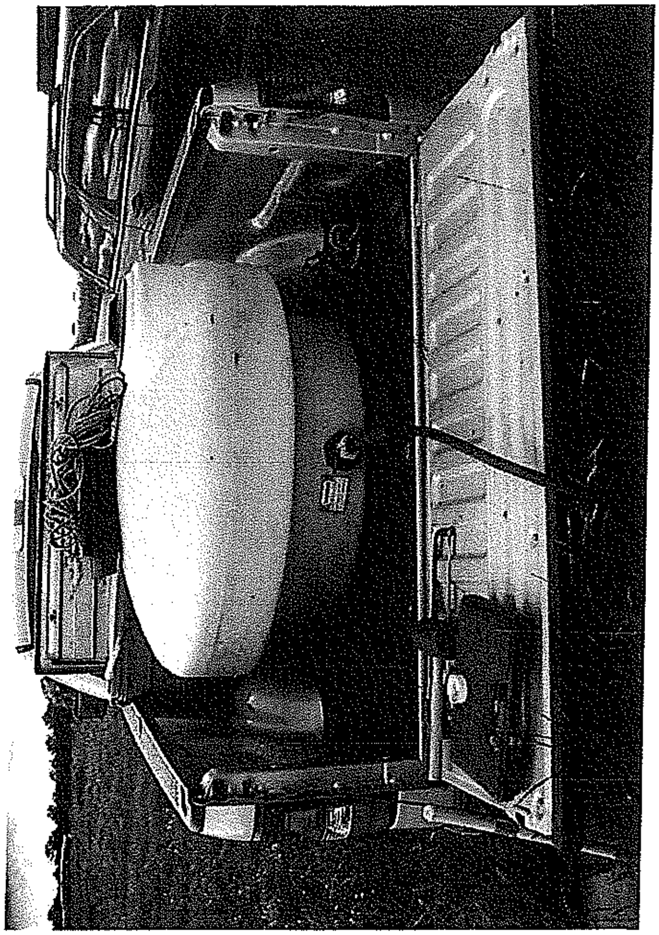
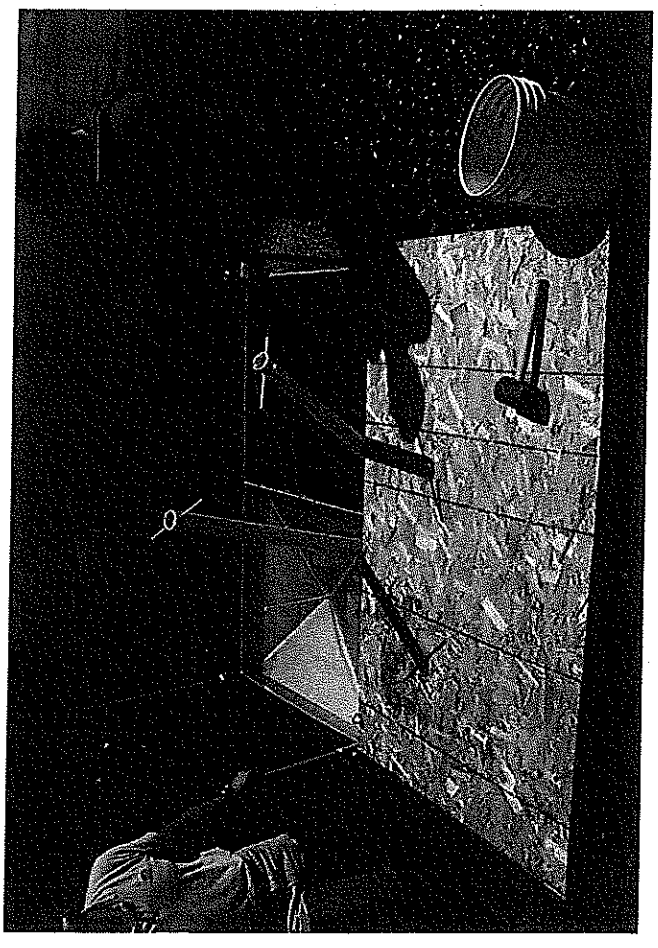
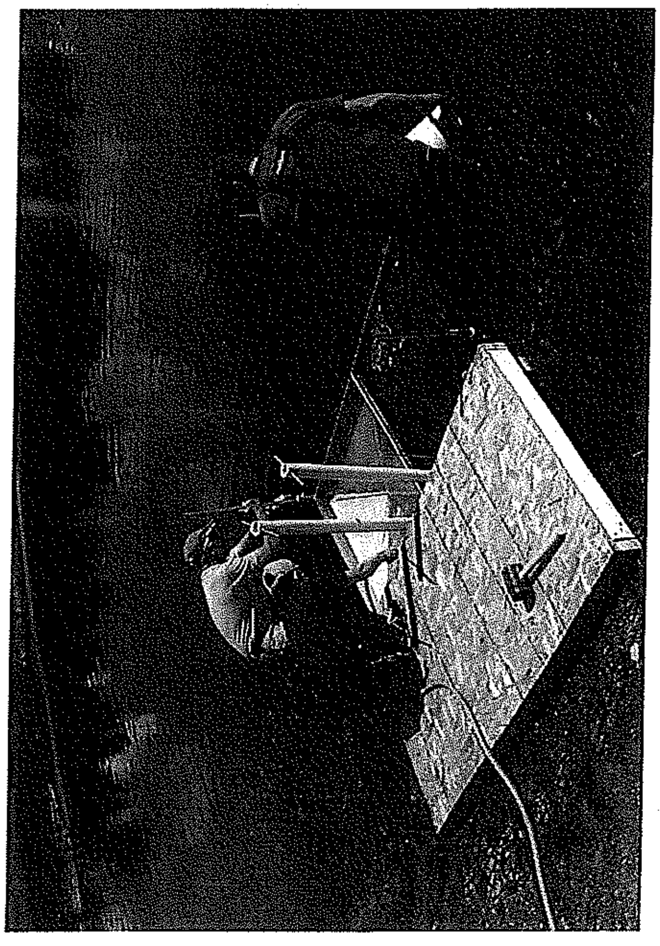





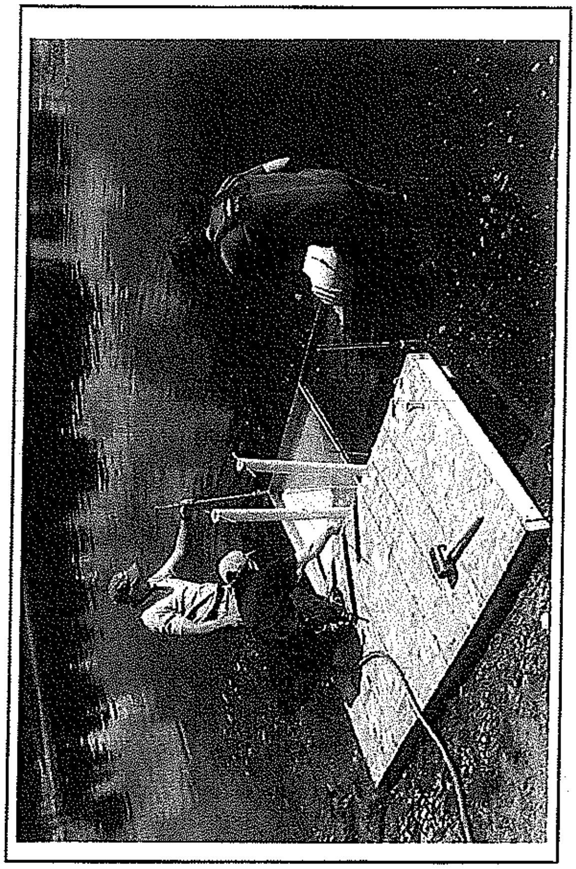


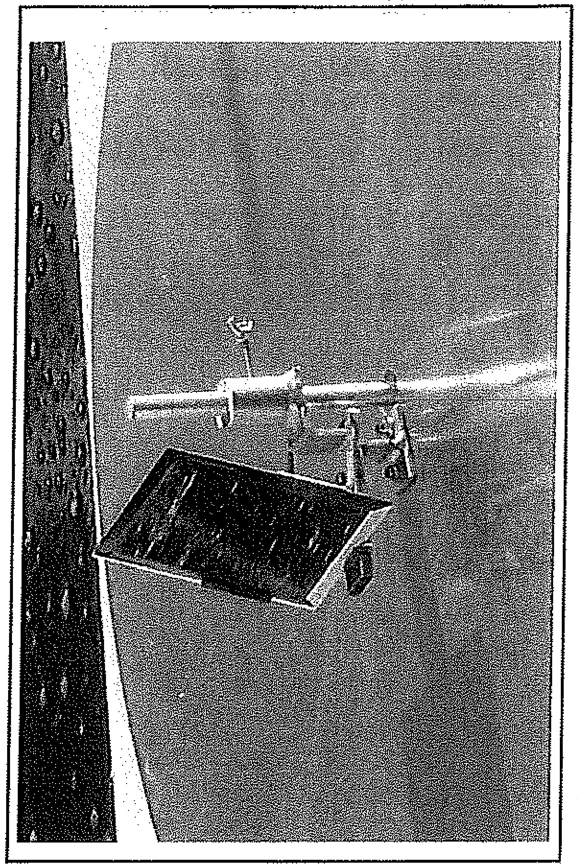


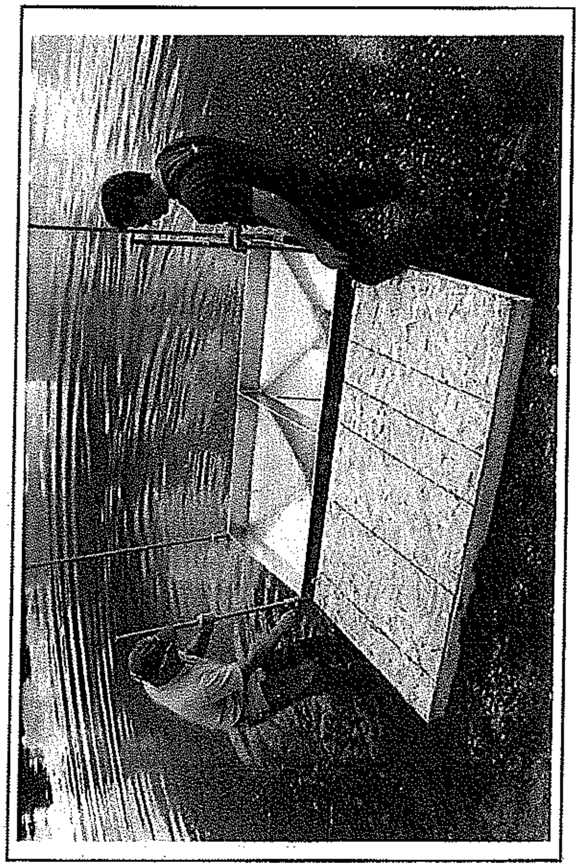


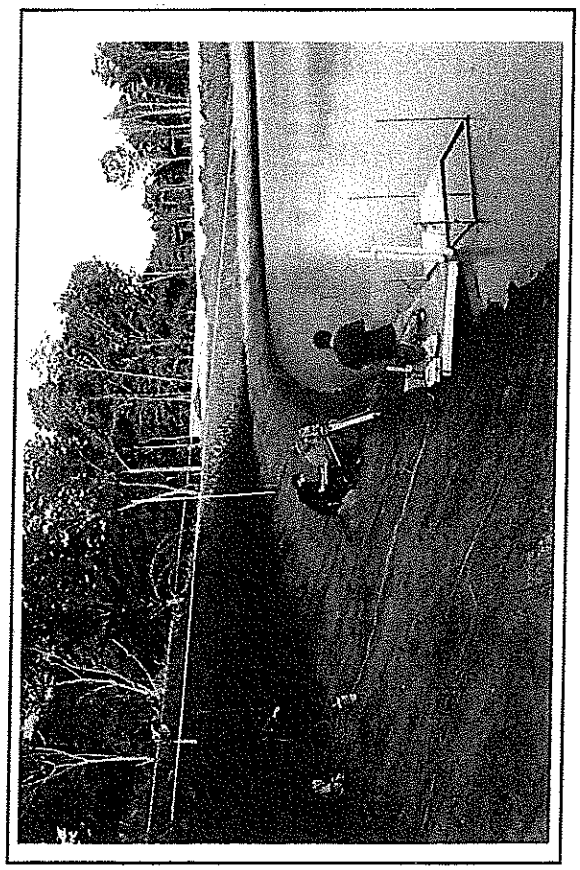


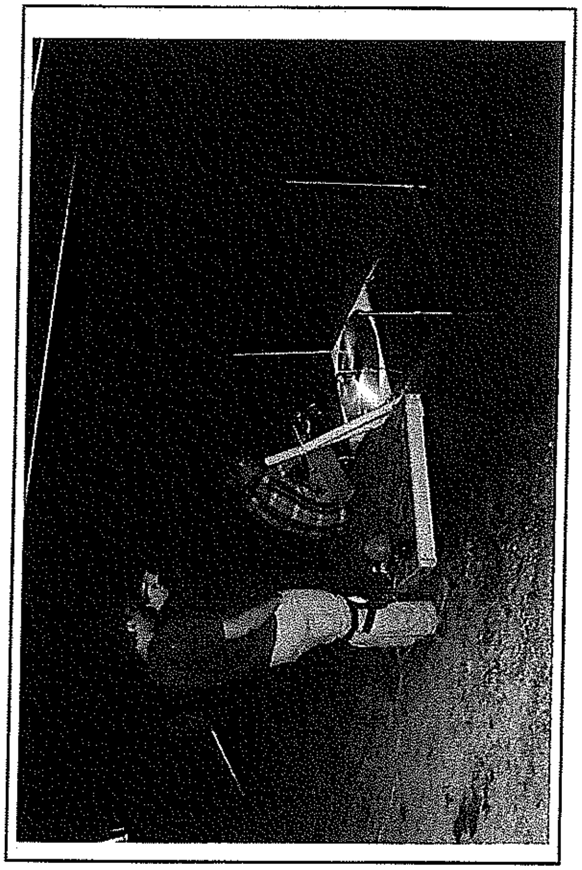





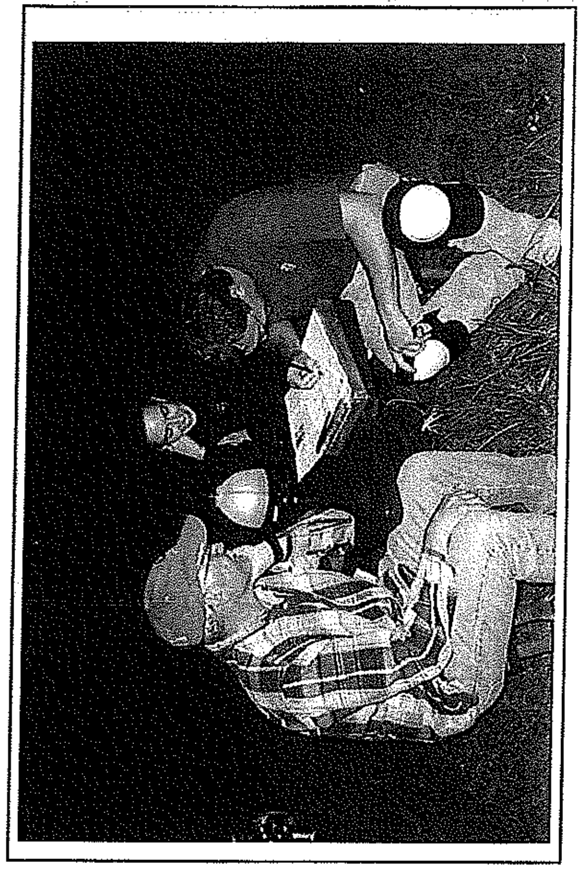


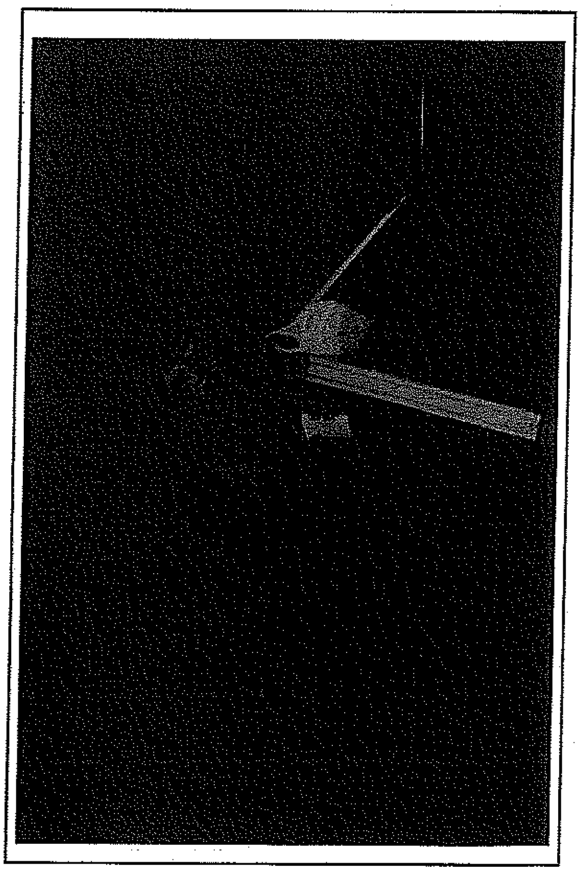


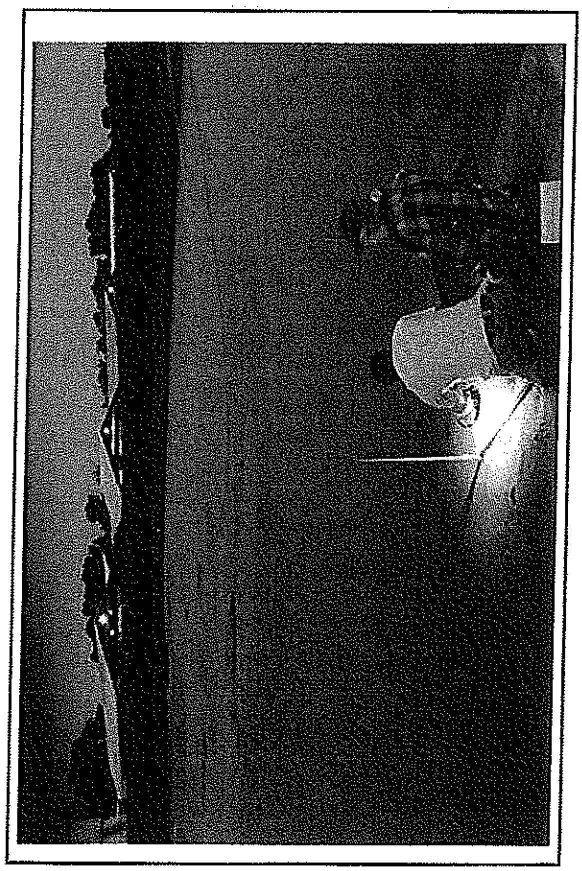


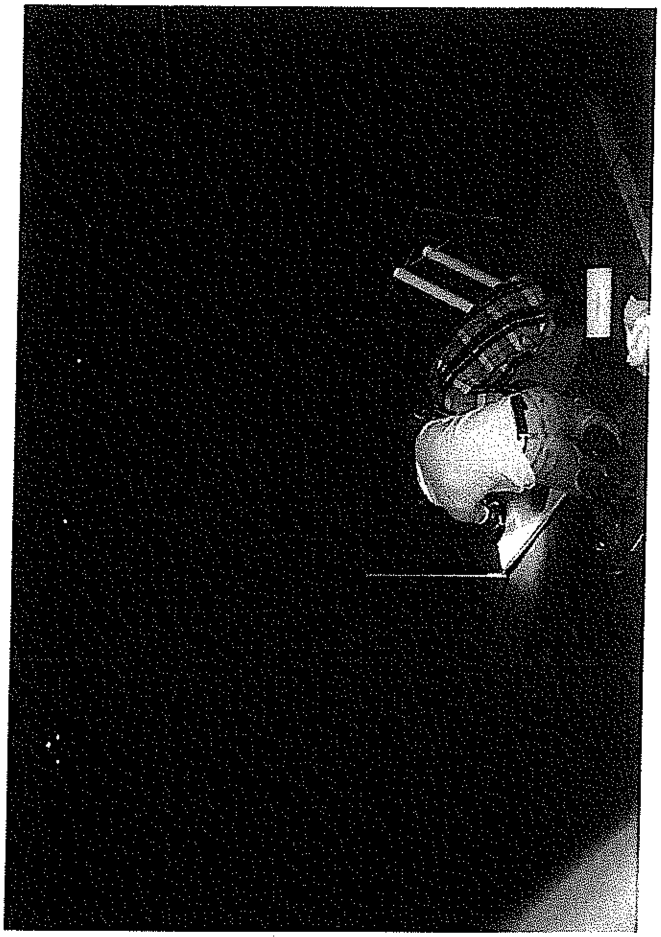
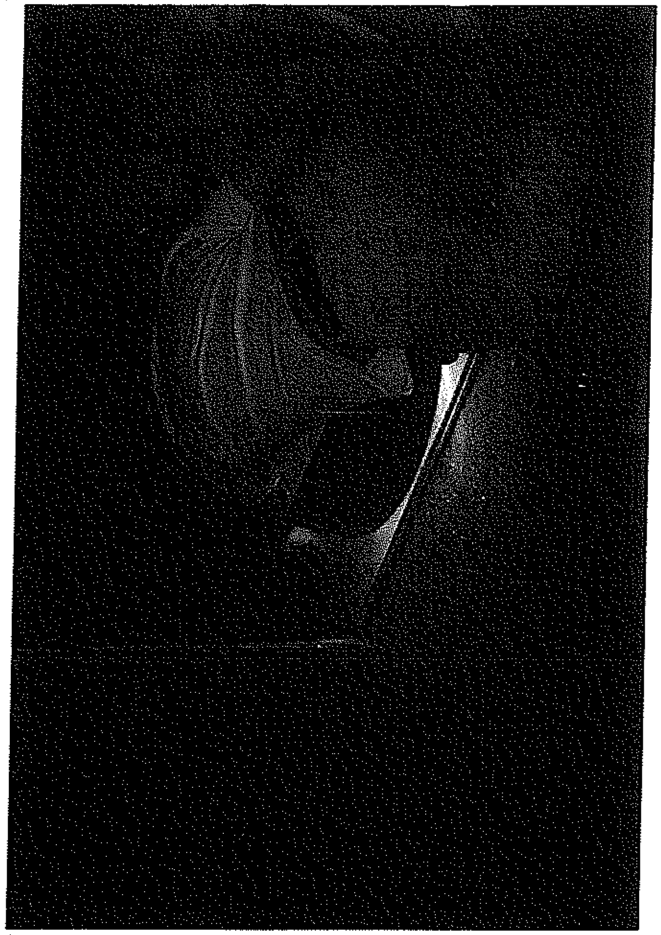
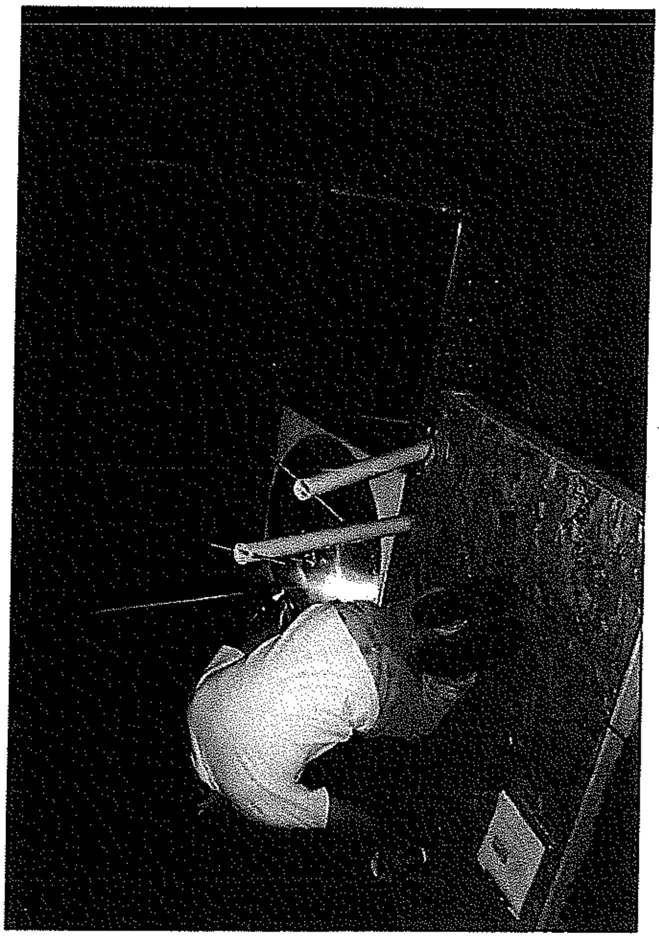
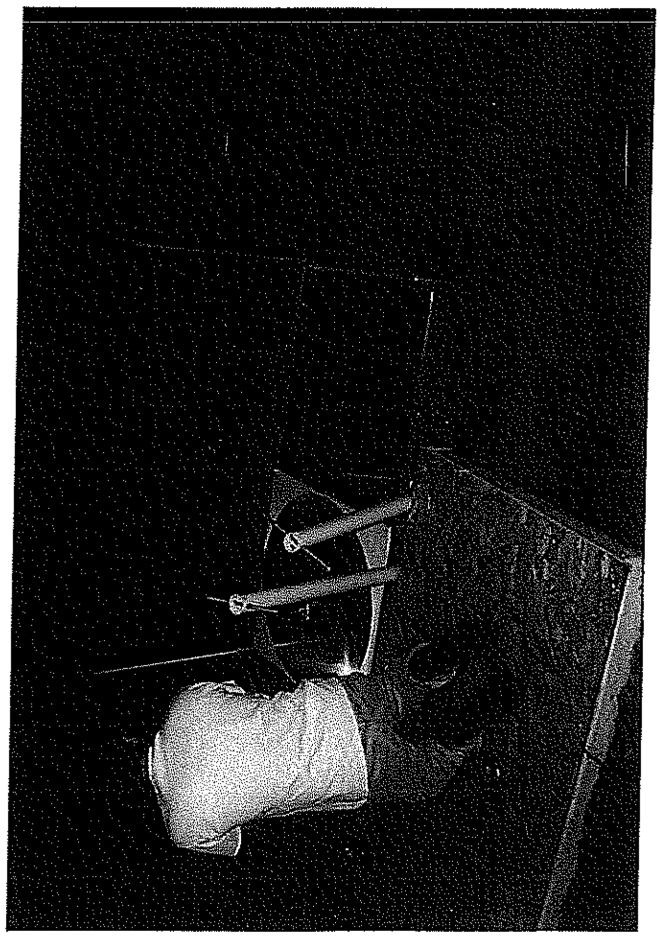










Pond Leakage Measurements
Run #1 – Sand Creek Dairy

Person Responsible (Print) Tim Krause / Paula Steiner Date 8/7/08
Are Pumps OFF? YES
Record level of any existing stage gages in pond: Not Present – Pond Approximately ½ full

Step #	Action Item	Time (Military)	Staff Gage Reading (feet)	Staff Gage Reading (inches)
1	Open all valves, to equilibrate[1]			
2	Close all values (tight)	21:17		
3	Wait allotted time			
4	Reading prior to valve opening[2]	22:47	11.05	132.6
5	Open Valve 2 (left valve)			
6	Reading after stable[3]	22:55	12.1	145.2
7	Close Valve 2 (left valve)[4]			
8	Reading after stable	22:56	12.35	148.2
9	Open Valve 1 (middle valve)			
10	Final Reading[5]	23:00	11.4	136.8

[1] Use mirror and staff gage to determine when stable. If oscillating, track oscillations and close valves at middle value or average of oscillations. Note range of oscillations.

[2] This reading is only needed if the amount of evaporation is wanted. If used set crosshairs near the top of staff gage to allow for maximum downward movement. **NOTE THIS STEP NOT NEEDED FOR POND LEAKAGE DETERMINATION AND WILL LENGTH MEASUREMENT TIME.**

[3] If step 4 is used, be ready to quickly close valve 2 during step 5 if crosshairs start to drop below staff gage, if this happen you will have to reset the optics again to top of staff gage and reopen value 2. Once stable, take reading and add all drop measurements together. If oscillating, track oscillations and close valve at middle value or average of oscillations. Note range of oscillations. If evaporation rate is not desired, i.e. skipping step 4, then simply let system equilibrate while adjusting mirror optical alignment so the crosshairs will start as low as possible on the staff gage to maximize range of seepage readings.

[4] Close valve 2 immediately after reading, then take the next reading which should be a stable version of the previous reading since all valves are closed. Note, when closing valves when there are oscillations requires trying to close the valve exactly or as close as possible to the average of the oscillations.

[5] Watch out for overshoot, i.e. reading may go past final reading a little, so wait till stable.

Pond Leakage Rate (cm/sec)

$$= \frac{2*(\text{Step 10} - \text{Step8}) * \text{Calibration Factor}}{[\text{Difference of Time (min) @ Step 6} - \text{Step 2}] * 60 \text{ sec/min}}$$

= ______$-2.99X10^{-6}$________ cm/sec

Evaporation (cm/sec)

$$= \frac{[(\text{Step 4} - \text{Step 6}) - 2*(\text{Step 10} - \text{Step8})] * \text{Calibration Factor}}{[\text{Difference of Time (min) @ Step 6} - \text{Step 2}] * 60 \text{ sec/min}}$$

= ______$1.34X10^{-6}$________ cm/sec

Gross Increase/Loss (cm/sec)

$$= \frac{[(\text{Step 4} - \text{Step 6}) * \text{Calibration Factor}}{[\text{Difference of Time (min) @ Step 6} - \text{Step 2}] * 60 \text{ sec/min}}$$

= ______$-1.65X10^{-6}$________ cm/sec (increase)

NOTE: Values given where Step # is indicated are in inches.
Also, the calibrator Factor should be equal to about 0.0006 cm/in

Pond Leakage Measurements
Run #2 – Sand Creek Dairy

Person Responsible (Print) Tim Krause / Paula Steiner   Date 8/7-8/08

Are Pumps OFF? YES

Record level of any existing stage gages in pond: Not Present – Pond Approximately ½ full

Step #	Action Item	Time (Military)	Staff Gage Reading	
			(feet)	(inches)
1	Open all valves, to equilibrate[1]			
2	Close all values (tight)	23:09		
3	Wait allotted time			
4	Reading prior to valve opening[2]	06:36	16.52	198.24
5	Open Valve 2 (left valve)			
6	Reading after stable[3]	06:42	8.60	103.2
7	Close Valve 2 (left valve)[4]			
8	Reading after stable	06:42	8.54	102.48
9	Open Valve 1 (middle valve)			
10	Final Reading[5]	06:44	7.12	85.44

[1] Use mirror and staff gage to determine when stable. If oscillating, track oscillations and close valves at middle value or average of oscillations. Note range of oscillations.

[2] This reading is only needed if the amount of evaporation is wanted. If used set crosshairs near the top of staff gage to allow for maximum downward movement. **NOTE THIS STEP NOT NEEDED FOR POND LEAKAGE DETERMINATION AND WILL LENGTH MEASUREMENT TIME.**

[3] If step 4 is used, be ready to quickly close valve 2 during step 5 if crosshairs start to drop below staff gage, if this happen you will have to reset the optics again to top of staff gage and reopen value 2. Once stable, take reading and add all drop measurements together. If oscillating, track oscillations and close valve at middle value or average of oscillations. Note range of oscillations. If evaporation rate is not desired, i.e. skipping step 4, then simply let system equilibrate while adjusting mirror optical alignment so the crosshairs will start as low as possible on the staff gage to maximize range of seepage readings.

[4] Close valve 2 immediately after reading, then take the next reading which should be a stable version of the previous reading since all valves are closed. Note, when closing valves when there are oscillations requires trying to close the valve exactly or as close as possible to the average of the oscillations.

[5] Watch out for overshoot, i.e. reading may go past final reading a little, so wait till stable.

Pond Leakage Rate (cm/sec)

$$= \frac{2*(\text{Step 10} - \text{Step 8}) * \text{Calibration Factor}}{[\text{Difference of Time (min) @ Step 6} - \text{Step 2}] * 60 \text{ sec/min}}$$

= $-9.65X10^{-7}$ cm/sec

Evaporation (cm/sec)

$$= \frac{[(\text{Step 4} - \text{Step 6}) - 2*(\text{Step 10} - \text{Step8})] * \text{Calibration Factor}}{[\text{Difference of Time (min) @ Step 6} - \text{Step 2}] * 60 \text{ sec/min}}$$

= $3.66X10^{-6}$ cm/sec

Gross Gain/Loss (cm/sec)

$$= \frac{[(\text{Step 4} - \text{Step 6}) * \text{Calibration Factor}}{[\text{Difference of Time (min) @ Step 6} - \text{Step 2}] * 60 \text{ sec/min}}$$

= $2.69X10^{-6}$ cm/sec (loss)

NOTE: Values given where Step # is indicated are in inches.
Also, the calibrator Factor should be equal to about 0.0006 cm/in

Pond Leakage Measurements
Run #3 – Sand Creek Dairy

Person Responsible (Print) Tim Krause / Paula Steiner   Date 8/8/08
Are Pumps OFF? YES
Record level of any existing stage gages in pond: Not Present – Pond Approximately ½ full

Step #	Action Item	Time (Military)	Staff Gage Reading (feet)	Staff Gage Reading (inches)
1	Open all valves, to equilibrate[1]			
2	Close all values (tight)	07:03		
3	Wait allotted time			
4	Reading prior to valve opening[2]	08:06	6.63	79.56
5	Open Valve 2 (left valve)			
6	Reading after stable[3]	08:14	6.04	72.48
7	Close Valve 2 (left valve)[4]			
8	Reading after stable	08:14	6.05	72.60
9	Open Valve 1 (middle valve)			
10	Final Reading[5]	08:16	5.86	70.32

[1] Use mirror and staff gage to determine when stable. If oscillating, track oscillations and close valves at middle value or average of oscillations. Note range of oscillations.
[2] This reading is only needed if the amount of evaporation is wanted. If used set crosshairs near the top of staff gage to allow for maximum downward movement. **NOTE THIS STEP NOT NEEDED FOR POND LEAKAGE DETERMINATION AND WILL LENGTH MEASUREMENT TIME.**
[3] If step 4 is used, be ready to quickly close valve 2 during step 5 if crosshairs start to drop below staff gage, if this happen you will have to reset the optics again to top of staff gage and reopen value 2. Once stable, take reading and add all drop measurements together. If oscillating, track oscillations and close valve at middle value or average of oscillations. Note range of oscillations. If evaporation rate is not desired, i.e. skipping step 4, then simply let system equilibrate while adjusting mirror optical alignment so the crosshairs will start as low as possible on the staff gage to maximize range of seepage readings.
[4] Close valve 2 immediately after reading, then take the next reading which should be a stable version of the previous reading since all valves are closed. Note, when closing valves when there are oscillations requires trying to close the valve exactly or as close as possible to the average of the oscillations.
[5] Watch out for overshoot, i.e. reading may go past final reading a little, so wait till stable.

Pond Leakage Rate (cm/sec)

$$= \frac{2*(\text{Step 10} - \text{Step8}) * \text{Calibration Factor}}{[\text{Difference of Time (min) @ Step 6} - \text{Step 2}] * 60 \text{ sec/min}}$$

= -8.24×10^{-7} cm/sec

Evaporation (cm/sec)

$$= \frac{[(\text{Step 4} - \text{Step 6}) - 2*(\text{Step 10} - \text{Step8})] * \text{Calibration Factor}}{[\text{Difference of Time (min) @ Step 6} - \text{Step 2}] * 60 \text{ sec/min}}$$

= 2.10×10^{-6} cm/sec

Gross Gain/Loss (cm/sec)

$$= \frac{[(\text{Step 4} - \text{Step 6}) * \text{Calibration Factor}}{[\text{Difference of Time (min) @ Step 6} - \text{Step 2}] * 60 \text{ sec/min}}$$

= 1.28×10^{-6} cm/sec (loss)

NOTE: Values given where Step # is indicated are in inches.
Also, the calibrator Factor should be equal to about 0.0006 cm/in

Worksheet for Calibration
For Pond Leadage Apparatus

Person Responsible: Dei Boiciner   Date/Time: 8/7/08 [illegible]

Distance from Mirror to Staff Gage = 50 feet

Water Added (ml)	Water Depth Change (cm)	Staff Gage Reading (feet)	Staff Gage Reading (inches)	Convert to (inches)	Diff.* between Readings
0	0.0000	5.42		5.04	
25	0.0015	5.52		6.24	1.20
50	0.0030	5.63		7.56	1.32
75	0.0045	5.85		10.20	2.64
100	0.0060	6.05		12.60	2.40
125	0.0075	6.23		14.74	2.14
				Average =	1.944 ✓

* Current Reading (inches) minus previous Reading (inches)

Staff Gage
Calibration Factor = 0.00150 cm ÷ [Average Value of Diff. (in inches)]

Insert Answer = .00077 ✓ .000716 cm/in ,which is cm of water depth change for 1 in on staff

NOTE that if calibration factor is not between 0.00055 and 0.00065 cm/in, then there is a setup problem.

If not within range,

Check distance from mirror to staff, should be 50ft.

Check mirror mounts and that focum edges are in perfect alignment

Check if float is rubbing on pan walls.

Be sure values 2 and 3 to the pond are closed and value 1 between pans is open

[illegible]   5.94 closed

Time (EDT):	Temp.:	Dew Point:	Humidity:	Sea Level Pressure:	Visibility:	Wind Dir:	Wind Speed:	Gust Speed:	Precip:	Events:	Conditions:
12:53 AM	63.0 °F	63.0 °F	100%	29.92 in	10.0 miles	Calm	Calm	-	N/A		Clear
1:53 AM	63.0 °F	62.1 °F	97%	29.92 in	10.0 miles	WNW	3.5 mph	-	N/A		Clear
2:53 AM	62.1 °F	60.1 °F	93%	29.91 in	9.0 miles	WSW	6.9 mph	-	N/A		Clear
3:53 AM	62.1 °F	59.0 °F	90%	29.90 in	9.0 miles	WSW	3.5 mph	-	N/A		Clear
4:53 AM	62.1 °F	59.0 °F	90%	29.91 in	9.0 miles	West	5.8 mph	-	N/A		Clear
5:53 AM	63.0 °F	60.1 °F	90%	29.92 in	8.0 miles	West	4.6 mph	-	N/A		Scattered Clouds
6:53 AM	63.0 °F	59.0 °F	87%	29.93 in	10.0 miles	NW	4.6 mph	-	N/A		Scattered Clouds
7:53 AM	64.9 °F	60.1 °F	84%	29.94 in	9.0 miles	NW	3.5 mph	-	N/A		Partly Cloudy
8:53 AM	68.0 °F	61.0 °F	78%	29.94 in	10.0 miles	NNW	8.1 mph	-	N/A		Scattered Clouds
9:53 AM	70.0 °F	61.0 °F	73%	29.95 in	10.0 miles	WNW	3.5 mph	-	N/A		Partly Cloudy
10:53 AM	73.9 °F	57.9 °F	57%	29.95 in	10.0 miles	NNW	5.8 mph	-	N/A		Scattered Clouds
11:53 AM	75.9 °F	57.0 °F	52%	29.94 in	10.0 miles	WNW	9.2 mph	-	N/A		Mostly Cloudy
12:53 PM	73.9 °F	57.9 °F	57%	29.93 in	10.0 miles	North	15.0 mph	-	0.01 in		Mostly Cloudy
1:53 PM	78.1 °F	57.9 °F	50%	29.92 in	10.0 miles	NW	15.0 mph	20.7 mph	N/A		Scattered Clouds
2:53 PM	77.0 °F	55.9 °F	48%	29.91 in	10.0 miles	NW	13.8 mph	19.6 mph	N/A		Partly Cloudy
3:53 PM	78.1 °F	57.9 °F	50%	29.91 in	10.0 miles	West	15.0 mph	20.7 mph	N/A		Mostly Cloudy
4:53 PM	79.0 °F	54.0 °F	42%	29.89 in	10.0 miles	NNW	12.7 mph	24.2 mph	N/A		Mostly Cloudy
5:53 PM	77.0 °F	52.0 °F	42%	29.91 in	10.0 miles	NW	18.4 mph	25.3 mph	N/A		Scattered Clouds
6:53 PM	75.9 °F	54.0 °F	46%	29.92 in	10.0 miles	NNW	13.8 mph	24.2 mph	N/A		Scattered Clouds
7:53 PM	73.9 °F	54.0 °F	50%	29.93 in	10.0 miles	NNW	17.3 mph	21.9 mph	N/A		Scattered Clouds
8:53 PM	71.1 °F	54.0 °F	55%	29.95 in	10.0 miles	NNW	9.2 mph	-	N/A		Partly Cloudy
9:53 PM	69.1 °F	55.0 °F	61%	29.96 in	10.0 miles	North	9.2 mph	-	N/A		Partly Cloudy
10:53 PM	66.9 °F	55.0 °F	66%	29.97 in	10.0 miles	NW	8.1 mph	-	N/A		Clear
11:53 PM	66.0 °F	55.0 °F	68%	29.97 in	10.0 miles	NNW	6.9 mph	-	N/A		Clear

Hourly Observations

Time (EDT):	Temp.:	Dew Point:	Humidity:	Sea Level Pressure:	Visibility:	Wind Dir:	Wind Speed:	Gust Speed:	Precip:	Events:	Conditions:
12:53 AM	64.0 °F	55.0 °F	73%	29.97 in	10.0 miles	North	9.2 mph	-	N/A		Clear
1:53 AM	63.0 °F	55.0 °F	75%	29.97 in	10.0 miles	North	10.4 mph	-	N/A		Clear
2:53 AM	61.0 °F	54.0 °F	78%	29.97 in	10.0 miles	NNW	5.8 mph	-	N/A		Clear
3:53 AM	60.1 °F	54.0 °F	80%	29.97 in	10.0 miles	NNW	6.9 mph	-	N/A		Clear
4:53 AM	60.1 °F	54.0 °F	80%	29.98 in	10.0 miles	NW	6.9 mph	-	N/A		Clear
5:53 AM	59.0 °F	53.1 °F	81%	29.99 in	10.0 miles	NW	5.8 mph	-	N/A		Clear
6:53 AM	57.9 °F	53.1 °F	84%	30.00 in	10.0 miles	NW	5.8 mph	-	N/A		Clear
7:53 AM	61.0 °F	54.0 °F	78%	30.02 in	10.0 miles	NW	5.8 mph	-	N/A		Clear
8:53 AM	66.0 °F	55.9 °F	70%	30.03 in	10.0 miles	North	9.2 mph	-	N/A		Clear
9:53 AM	68.0 °F	57.0 °F	68%	30.04 in	10.0 miles	North	9.2 mph	-	N/A		Partly Cloudy
10:53 AM	71.1 °F	55.9 °F	59%	30.03 in	10.0 miles	NW	6.9 mph	-	N/A		Partly Cloudy
11:53 AM	73.0 °F	55.0 °F	53%	30.03 in	10.0 miles	NNW	11.5 mph	-	N/A		Scattered Clouds
12:53 PM	73.9 °F	53.1 °F	48%	30.01 in	10.0 miles	NNW	8.1 mph	19.6 mph	N/A		Scattered Clouds
1:53 PM	77.0 °F	52.0 °F	42%	29.99 in	10.0 miles	North	8.1 mph	16.1 mph	N/A		Scattered Clouds
2:53 PM	79.0 °F	51.1 °F	38%	29.98 in	10.0 miles	NW	10.4 mph	-	N/A		Scattered Clouds
3:53 PM	78.1 °F	52.0 °F	40%	29.97 in	10.0 miles	NW	8.1 mph	-	N/A		Scattered Clouds
4:53 PM	78.1 °F	52.0 °F	40%	29.96 in	10.0 miles	NW	11.5 mph	18.4 mph	N/A		Scattered Clouds
5:53 PM	77.0 °F	55.0 °F	47%	29.95 in	10.0 miles	West	13.8 mph	-	N/A		Scattered Clouds
6:53 PM	75.0 °F	55.0 °F	50%	29.96 in	10.0 miles	WNW	15.0 mph	-	N/A		Scattered Clouds
7:53 PM	73.0 °F	54.0 °F	51%	29.95 in	10.0 miles	WNW	12.7 mph	-	N/A		Scattered Clouds
8:53 PM	71.1 °F	52.0 °F	51%	29.94 in	10.0 miles	WNW	9.2 mph	-	N/A		Scattered Clouds
9:53 PM	68.0 °F	53.1 °F	59%	29.95 in	10.0 miles	WNW	9.2 mph	-	N/A		Scattered Clouds
10:53 PM	66.0 °F	53.1 °F	63%	29.95 in	10.0 miles	WNW	4.6 mph	-	N/A		Partly Cloudy
11:53 PM	64.9 °F	53.1 °F	65%	29.95 in	10.0 miles	WSW	3.5 mph	-	N/A		Partly Cloudy

APPENDIX D
DRAFT WORK PLAN

NTH Consultants, Ltd.

WORK PACKAGE PLANNING SHEET

Client: USDA-NRCS
Project Name: CIG Seepage Meter
Prepared By: TCK

NTH Proj. No. 74-080272-00

12/30/2009

Detailed List of Steps or Tasks Required To Complete This Work Package	DB SWET $130	RLB PM $155	TCK PE $120	NTH EIII $90	WP MJB $48	OTHER DIRECT COST	SUB COST EST.	HOUR TOTALS	FEE ESTIMATE
Additional Labor Contributed to the Project									
						$2,000			$2,000
Dew/Insect Guard Fabrication									
Discussion								0	
Manufacture	2	1	2					5	$655
							$2,100	0	$2,415
								0	**$3,070**
Base Fabrication								0	
		2	4				$900	6	**$1,825**
Pond Inlet Sealing System								0	
			2				$500	2	**$815**
Laboratory Testing								0	
	2	1	16	16				35	**$3,775**
Field Testing								0	
Laboratory Test								0	
Thelen Dairy			8	8				16	$1,680
Travel (60 mile round trip X 2)		1	12	12				25	$2,675
Equipment						$120		0	$120
Clover Family Farm						$150		0	$150
Travel (82 miles round trip X 2)		1	12	12				25	$2,675
Equipment						$164		0	$164
Masselink Dairy						$150		0	$150
Travel (130 miles round trip X 2)		1	14	14				29	$3,095
Equipment						$260		0	$260
						$150		0	$150
									$11,119
Data Analysis and Evaluation									
	4	4	16	24	4	$100		48	**$5,320**
Project Management and Reporting									
Project Management									
Reporting (On-going)		9	9					18	$2,475
Final Report		7	7		4			14	$1,925
		6	6		2			12	$1,650
									$6,050
TOTAL HOURS PER TEAM MEMBER	8	33	108	86	10	$1,094	$3,500		
TOTAL PLANNED MAN-HOURS								187	
TOTAL COST ESTIMATE THIS SCOPE OF WORK									$33,974

APPENDIX E
FINANCIAL STATUS REPORT

FINANCIAL STATUS REPORT
(Long Form)
(Follow instructions on the back)

1. Federal Agency and Organizational Element to Which Report is Submitted USDA-NRCS	2. Federal Grant or Other Identifying Number Assigned By Federal Agency NRCS-68-3A75-6-135	OMB Approval No. 0348-0039	Page 1 of 1 pages
3. Recipient Organization (Name and complete address, including ZIP code) NTH Consultants, Ltd., 41780 Six Mile Road, Northville, MI 48168-3459			
4. Employer Identification Number 38-1880747	5. Recipient Account Number or Identifying Number 29942	6. Final Report ☒ Yes ☐ No	7. Basis ☒ Cash ☐ Accrual
8. Funding/Grant Period *(See instructions)* From: (Month, Day, Year) 4/9/2007	To: (Month, Day, Year) 2/9/2010	9. Period Covered by this Report From: (Month, Day, Year) 1/1/2010	To: (Month, Day, Year) 2/9/2010

10. Transactions:	I Previously Reported	II This Period	III Cumulative
a. Total outlays	19,639.00	4,749.00	24,388.00
b. Refunds, rebates, etc.	0.00	0.00	0.00
c. Program income used in accordance with the deduction alternative	0.00	0.00	0.00
d. Net outlays *(Line a, less the sum of lines b and c)*	19,639.00	4,749.00	24,388.00
Recipient's share of net outlays, consisting of:			
e. Third party (in-kind) contributions	1,350.00	0.00	1,350.00
f. Other Federal awards authorized to be used to match this award	0.00	0.00	0.00
g. Program income used in accordance with the matching or cost sharing alternative	0.00	0.00	0.00
h. All other recipient outlays not shown on lines e, f or g	6,289.00	4,749.00	11,038.00
i. Total recipient share of net outlays *(Sum of lines e, f, g and h)*	7,639.00	4,749.00	12,388.00
j. Federal share of net outlays *(line d less line i)*	12,000.00	0.00	12,000.00
k. Total unliquidated obligations			0.00
l. Recipient's share of unliquidated obligations			0.00
m. Federal share of unliquidated obligations			0.00
n. Total Federal share *(sum of lines j and m)*			12,000.00
o. Total Federal funds authorized for this funding period			12,000.00
p. Unobligated balance of Federal funds *(Line o minus line n)*			0.00
Program income, consisting of:			
q. Disbursed program income shown on lines c and/or g above			
r. Disbursed program income using the addition alternative			
s. Undisbursed program income			
t. Total program income realized *(Sum of lines q, r and s)*			0.00

11. Indirect Expense	a. Type of Rate *(Place "X" in appropriate box)* ☐ Provisional ☒ Predetermined ☐ Final ☐ Fixed			
	b. Rate 1.56259	c. Base 0.00	d. Total Amount 0.00	e. Federal Share 0.00

12. *Remarks: Attach any explanations deemed necessary or information required by Federal sponsoring agency in compliance with governing legislation.*

13. Certification: **I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays and unliquidated obligations are for the purposes set forth in the award documents.**

Typed or Printed Name and Title Richard L. Burns, Sr. Vice President	Telephone (Area code, number and extension) 248-324-5265
Signature of Authorized Certifying Official Richard L. Burns	Date Report Submitted January 26, 2010

NTH Consultants, Ltd.
Project Detail Charges

EVC Code / Name	Class / GL Acct	Task	/Co	/Org	Actv/ Unit	Bill Ind	Document Number	Transaction Date	Period End Date	Reg / OT	Hours / Quantity	Effort Rate	Effort Amount
Project : 74080272 - CIG-Seepage Meter													
Phase : 00 - Pond Seepage Meter													
Labor													
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	8/2/2006	4/25/2008	R	0.50	3.0144	46.09
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	8/14/2006	4/25/2008	R	1.40	3.0144	129.05
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	8/22/2006	4/25/2008	R	3.00	3.0144	276.54
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	8/23/2006	4/25/2008	R	0.70	3.0144	64.54
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	8/28/2006	4/25/2008	R	0.30	3.0144	27.64
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	8/31/2006	4/25/2008	R	0.10	3.0144	9.22
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	9/8/2006	4/25/2008	R	0.20	3.0144	18.45
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	9/14/2006	4/25/2008	R	1.50	3.0144	138.27
000185 Groenleer, Marc E.	10	****	00	0110004	20PP	B	431	9/19/2006	4/25/2008	R	0.40	3.0144	46.54
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	9/21/2006	4/25/2008	R	3.80	3.0144	350.27
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	11/6/2006	4/25/2008	R	1.20	3.0144	110.63
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	11/7/2006	4/25/2008	R	2.00	3.0144	184.36
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	4/5/2007	4/25/2008	R	0.10	3.0144	9.22
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	4/9/2007	4/25/2008	R	0.10	3.0144	9.22
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	7/10/2007	4/25/2008	R	0.40	3.0144	36.87
001249 Petroelje, David J.	40	****	00	0110004	20PP	B	431	9/10/2007	4/25/2008	R	1.50	3.0144	70.33
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	9/18/2007	4/25/2008	R	1.00	3.0144	92.18
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	10/3/2007	4/25/2008	R	0.40	3.0144	36.87
001293 Steiner, Paula	30	****	00	0110003	20PP	B	431	10/9/2007	4/25/2008	R	0.60	3.0144	37.41
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	10/10/2007	4/25/2008	R	0.50	3.0144	46.09
001293 Steiner, Paula	30	****	00	0110003	20PP	B	431	10/19/2007	4/25/2008	R	0.70	3.0144	43.65
001293 Steiner, Paula	30	****	00	0110003	20PP	B	431	10/22/2007	4/25/2008	R	0.35	3.0144	21.82
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	11/6/2007	4/25/2008	R	0.40	3.0144	36.87
001293 Steiner, Paula	30	****	00	0110003	20PP	B	428	1/22/2008	4/25/2008	R	0.10	3.0144	6.24
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	1/23/2008	4/25/2008	R	0.70	3.0144	64.54
001351 Cogan, Charles	30	****	00	0110003	20PP	B	431	1/29/2008	4/25/2008	R	0.50	3.0144	22.61
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	1/29/2008	4/25/2008	R	1.00	3.0144	92.18
001351 Cogan, Charles	30	****	00	0110003	20PP	B	431	2/8/2008	4/25/2008	R	0.10	3.0144	4.52
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	2/8/2008	4/25/2008	R	0.50	3.0144	46.09
001351 Cogan, Charles	30	****	00	0110003	20PP	B	431	2/12/2008	4/25/2008	R	0.40	3.0144	18.09
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	2/12/2008	4/25/2008	R	1.00	3.0144	92.18
001351 Cogan, Charles	30	****	00	0110003	20PP	B	431	2/19/2008	4/25/2008	R	0.20	3.0144	9.04
001351 Cogan, Charles	30	****	00	0110003	20PP	B	431	2/20/2008	4/25/2008	R	0.20	3.0144	9.04
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	431	2/20/2008	4/25/2008	R	0.20	3.0144	18.45
001351 Cogan, Charles	30	****	00	0110003	20PP	B	431	2/22/2008	4/25/2008	R	0.40	3.0144	18.09
001351 Cogan, Charles	30	****	00	0110003	20PP	B	431	2/26/2008	4/25/2008	R	0.40	3.0144	18.09
001351 Cogan, Charles	30	****	00	0110003	20PP	B	431	3/7/2008	4/25/2008	R	0.30	3.0144	13.56
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	000962	4/4/2008	4/25/2008	R	2.00	3.0144	190.27
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	000962	4/9/2008	4/25/2008	R	2.00	3.0144	190.27
001293 Steiner, Paula	30	****	00	0110003	20PP	B	001293	4/10/2008	4/25/2008	R	0.50	3.0144	31.17
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	000962	4/14/2008	4/25/2008	R	0.60	3.0144	57.09
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	000962	4/21/2008	4/25/2008	R	0.60	3.0144	57.09
000962 Krause, Timothy C.	20	****	00	0110004	20PP	B	000962	4/22/2008	4/25/2008	R	3.00	3.0144	285.40
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	4/28/2008	5/2/2008	R	1.00	3.0144	95.13
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	4/29/2008	5/2/2008	R	1.40	3.0144	133.18
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	4/30/2008	5/2/2008	R	1.60	3.0144	152.23
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	5/2/2008	5/2/2008	R	1.00	3.0144	95.13
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	5/27/2008	5/30/2008	R	0.10	3.0144	9.53
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	6/3/2008	6/6/2008	R	0.20	3.0144	19.02

NTH Consultants, Ltd.
Project Detail Charges

Project : 74080272 - CIG-Seepage Meter
Phase : 00 - Pond Seepage Meter

Labor

EVC Code / Name	Class / GL Acct	Task	/ Co	/ Org	Actv/ Unit	Bill Ind	Document Number	Transaction Date	Period End Date	Reg / OT	Hours / Quantity	Effort Rate	Effort Amount
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	6/9/2008	6/13/2008	R	0.30	3.0144	28.55
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	6/9/2008	6/13/2008	R	1.45	3.0144	90.40
001323 Turner, Kyle T.	30	****	00	0110003	13	B	001323	6/9/2008	6/13/2008	R	1.00	3.0144	50.79
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	6/11/2008	6/13/2008	R	0.50	3.0144	47.57
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	6/16/2008	6/20/2008	R	0.20	3.0144	19.02
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	6/19/2008	6/20/2008	R	1.10	3.0144	104.66
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	6/30/2008	7/4/2008	R	0.20	3.0144	19.02
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	7/1/2008	7/4/2008	R	3.10	3.0144	294.93
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	7/1/2008	7/4/2008	R	2.70	3.0144	168.32
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	7/2/2008	7/4/2008	R	1.00	3.0144	95.13
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	7/2/2008	7/4/2008	R	0.30	3.0144	18.69
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	7/3/2008	7/4/2008	R	0.90	3.0144	85.61
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	7/3/2008	7/4/2008	R	0.50	3.0144	31.17
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	7/7/2008	7/11/2008	R	0.20	3.0144	19.02
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	7/8/2008	7/11/2008	R	0.40	3.0144	24.93
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	7/9/2008	7/11/2008	R	1.00	3.0144	62.34
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	7/11/2008	7/11/2008	R	0.80	3.0144	76.11
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	7/16/2008	7/18/2008	R	0.70	3.0144	43.65
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	7/17/2008	7/18/2008	R	0.80	3.0144	76.11
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	7/17/2008	7/18/2008	R	1.20	3.0144	74.82
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	7/21/2008	7/25/2008	R	0.50	3.0144	31.17
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	7/22/2008	7/25/2008	R	5.30	3.0144	330.38
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	7/23/2008	7/25/2008	R	2.00	3.0144	124.68
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	7/24/2008	7/25/2008	R	0.60	3.0144	37.41
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	7/25/2008	7/25/2008	R	0.30	3.0144	18.69
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	7/28/2008	8/1/2008	R	2.00	3.0144	124.68
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	7/29/2008	8/1/2008	R	3.80	3.0144	236.87
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	8/1/2008	8/1/2008	R	0.40	3.0144	24.93
001293 Steiner, Paula	99	****	00	0110003	99	B	001293	8/4/2008	8/8/2008	R	0.40	3.0144	24.93
000962 Krause, Timothy C.	99	****	00	0110004	99	B	000962	8/5/2008	8/8/2008	R	5.00	3.0144	475.67
001293 Steiner, Paula	99	****	00	0110003	99	B	001293	8/5/2008	8/8/2008	R	0.60	3.0144	37.41
000962 Krause, Timothy C.	99	****	00	0110004	99	B	000962	8/6/2008	8/8/2008	R	1.50	3.0144	142.70
001293 Steiner, Paula	99	****	00	0110003	99	B	001293	8/6/2008	8/8/2008	R	0.40	3.0144	24.93
000962 Krause, Timothy C.	99	****	00	0110004	99	B	000962	8/7/2008	8/8/2008	R	13.00	3.0144	1,236.75
001293 Steiner, Paula	99	****	00	0110003	99	B	001293	8/7/2008	8/8/2008	R	14.00	3.0144	872.73
000962 Krause, Timothy C.	99	****	00	0110004	99	B	000962	8/8/2008	8/8/2008	R	5.50	3.0144	523.24
001293 Steiner, Paula	99	****	00	0110003	99	B	001293	8/8/2008	8/8/2008	R	7.50	3.0144	467.53
001293 Steiner, Paula	99	****	00	0110003	99	B	001293	8/11/2008	8/15/2008	R	2.40	3.0144	149.60
001293 Steiner, Paula	99	****	00	0110003	99	B	001293	8/12/2008	8/15/2008	R	0.10	3.0144	6.24
001293 Steiner, Paula	99	****	00	0110003	99	B	001293	8/13/2008	8/15/2008	R	0.20	3.0144	12.48
001293 Steiner, Paula	99	****	00	0110003	99	B	001293	8/14/2008	8/15/2008	R	0.85	3.0144	52.99
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	9/23/2008	9/26/2008	R	2.00	3.0144	190.27
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	9/23/2008	9/26/2008	R	1.75	3.0144	109.09
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	9/24/2008	9/26/2008	R	2.25	3.0144	140.26
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	9/25/2008	9/26/2008	R	8.00	3.0144	761.08
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	9/26/2008	9/26/2008	R	1.00	3.0144	95.13
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	9/26/2008	9/26/2008	R	0.20	3.0144	12.48
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	9/29/2008	10/3/2008	R	1.00	3.0144	95.13
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	9/29/2008	10/3/2008	R	0.30	3.0144	18.69

NTH Consultants, Ltd.
Project Detail Charges

EVC Code / Name	Class / GL Acct	Task	/ Co	/ Org	Actv/ Unit	Bill Ind	Document Number	Transaction Date	Period End Date	Reg / OT	Hours / Quantity	Effort Rate	Effort Amount
Project : 74080272 - CIG-Seepage Meter													
Phase : 00 - Pond Seepage Meter													
Labor													
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	9/30/2008	10/3/2008	R	1.00	3.0144	95.13
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	9/30/2008	10/3/2008	R	2.20	3.0144	137.16
001271 Rogers, Stephanie A	55	****	00	0110003	25	B	001271	10/1/2008	10/3/2008	R	0.75	3.0144	36.32
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	10/1/2008	10/3/2008	R	1.50	3.0144	93.51
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	10/3/2008	10/3/2008	R	5.75	3.0144	358.44
001323 Turner, Kyle T.	30	****	00	0110003	13	B	001323	10/3/2008	10/3/2008	R	4.00	3.0144	203.17
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	10/6/2008	10/10/2008	R	0.30	3.0144	28.55
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	10/6/2008	10/10/2008	R	1.40	3.0144	87.27
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	10/7/2008	10/10/2008	R	0.50	3.0144	31.17
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	10/16/2008	10/17/2008	R	0.50	3.0144	47.57
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	10/28/2008	10/31/2008	R	1.30	3.0144	123.68
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	10/30/2008	10/31/2008	R	0.25	3.0144	15.58
001271 Rogers, Stephanie A	55	****	00	0110003	25	B	001271	10/31/2008	11/7/2008	R	0.75	3.0144	36.32
001293 Steiner, Paula	30	****	00	0110003	12	B	001293	10/31/2008	10/31/2008	R	0.05	3.0144	3.10
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	11/10/2008	11/14/2008	R	1.40	3.0144	133.18
001293 Steiner, Paula	99	****	00	0110003	99	B	001293	11/10/2008	11/14/2008	R	1.10	3.0144	68.58
000962 Krause, Timothy C.	20	****	00	0110004	14	B	000962	11/11/2008	11/14/2008	R	1.00	3.0144	95.13
001293 Steiner, Paula	99	****	00	0110003	99	B	001293	11/11/2008	11/14/2008	R	1.70	3.0144	105.99
000962 Krause, Timothy C.	20	****	00	0007200	14	B	000962	1/5/2009	1/9/2009	R	1.50	3.0144	142.70
001293 Steiner, Paula	99	****	00	0007200	99	B	001293	1/5/2009	1/9/2009	R	0.30	3.0144	18.69
001293 Steiner, Paula	99	****	00	0007200	99	B	001293	1/8/2009	1/9/2009	R	2.60	3.0144	162.08
001293 Steiner, Paula	99	****	00	0007200	99	B	562	1/9/2009	1/9/2009	R	0.00	0.0000	-180.77
000691 Baird, Mary Jo	55A	****	00	0007200	25	B	000691	1/13/2009	1/16/2009	R	0.50	3.0144	33.34
000962 Krause, Timothy C.	20	****	00	0007200	14	B	000962	1/13/2009	1/16/2009	R	1.50	3.0144	142.70
001293 Steiner, Paula	99	****	00	0007200	99	B	001293	1/13/2009	1/30/2009	R	0.50	3.0144	31.17
001293 Steiner, Paula	99	****	00	0007200	99	B	001293	1/14/2009	1/30/2009	R	0.40	3.0144	24.93
001271 Rogers, Stephanie A	55	****	00	0007100	25	B	001271	1/23/2009	1/23/2009	R	0.25	3.0144	12.12
001293 Steiner, Paula	99	****	00	0007200	99	B	001293	1/23/2009	1/30/2009	R	0.70	3.0144	43.65
000962 Krause, Timothy C.	99	****	00	0007200	99	B	000962	12/28/2009	1/1/2010	R	0.50	3.0144	45.19
000962 Krause, Timothy C.	99	****	00	0007200	99	B	000962	12/29/2009	1/1/2010	R	0.50	3.0144	45.19
000962 Krause, Timothy C.	99	****	00	0007200	99	B	000962	12/30/2009	1/1/2010	R	6.00	3.0144	542.23
000245 Burns, Richard L.	99	****	00	0006200	99	B	000245	1/4/2010	1/8/2010	R	3.00	3.0144	447.28
000962 Krause, Timothy C.	99	****	00	0007200	99	B	000962	1/4/2010	1/8/2010	R	4.50	3.0144	406.67
001051 Williams Dibra, April L.	99	****	00	0006200	99	B	001051	1/4/2010	1/8/2010	R	2.00	3.0144	109.91
000962 Krause, Timothy C.	99	****	00	0007200	99	B	000962	1/5/2010	1/8/2010	R	6.00	3.0144	542.23
000962 Krause, Timothy C.	99	****	00	0007200	99	B	000962	1/7/2010	1/8/2010	R	5.50	3.0144	497.04
000197 Madigan, Janis	99	****	00	0006200	99	B	000197	1/7/2010	1/8/2010	R	0.75	3.0144	46.60
000962 Krause, Timothy C.	99	****	00	0007200	99	B	000962	1/8/2010	1/8/2010	R	0.50	3.0144	45.19
000245 Burns, Richard L.	99	****	00	0006200	99	B	000245	1/11/2010	1/15/2010	R	1.00	3.0144	149.09
000962 Krause, Timothy C.	99	****	00	0006200	99	B	000962	1/12/2010	1/15/2010	R	1.00	3.0144	90.37
000197 Madigan, Janis	99	****	00	0006200	99	B	000197	1/12/2010	1/15/2010	R	0.50	3.0144	31.08
000197 Madigan, Janis	99	****	00	0006200	99	B	000197	1/28/2010	1/29/2010	R	2.00	3.0144	31.08
000245 Burns, Richard L.	99	****	00	0006200	99	B	000245	1/27/2010	1/29/2010	R	2.00	3.0144	149.09
000962 Krause, Timothy C.	99	****	00	0006200	99	B	000962	1/26/2010	1/29/2010	R	3.00	3.0144	90.37
001051 Williams Dibra, April L.	99	****	00	0006200	99	B	001051	1/20/2010	1/22/2010	R	1.50	3.0144	109.91
001051 Williams Dibra, April L.	99	****	00	0006200	99	B	001051	1/21/2010	1/22/2010	R	3.00	3.0144	109.91
									Labor Total		219.30		17,021.22

NTH Consultants, Ltd.
Project Detail Charges

EVC Code / Name	Class / GL Acct	Task	/ Co	/ Org	Actv/ Unit	Bill Ind	Document Number	Transaction Date	Period End Date	Reg / OT	Hours / Quantity	Cost Rate	Cost Amount
Project : 74080272 - CIG-Seepage Meter													
Phase : 00 - Pond Seepage Meter													
Expense													
Subcontractors													
Soil and Water Engineering	5200	****	00	0110004		B	056682	9/5/2008	9/5/2008			0.0000	4,184.02
								Account 5200 Total					**4,184.02**
Per Unit Expenses													
Equipment	5300	****	00	0110004	122	B	16875	9/5/2008	9/5/2008		1.00	31.5000	31.5000
Company Vehicle	5300	****	00	0110004	971	B	16148	6/13/2008	6/20/2008		47.00	0.3900	18.3300
Company Vehicle	5300	****	00	0110004	971	B	16542	8/1/2008	8/1/2008		72.00	0.3900	28.0800
Company Vehicle	5300	****	00	0110004	971	B	17247	8/8/2008	10/24/2008		156.00	0.3900	60.8400
								Account 5300 Total			**276.00**		**138.75**
Field Supplies													
Thomas Redmer Group LLC	5450	****	00	0110004		B	054650	6/20/2008	6/20/2008			0.0000	1,194.66
								Account 5450 Total					**1,194.66**
Postage/shipping													
Federal Express	5460	****	00	0007200		B	059476	1/23/2009	1/23/2009			0.0000	20.48
								Account 5460 Total					**20.48**
Nonbillable Project Expenses													
Krause, Timothy C. Miles from Lansing office to Home Depot and back	5499	****	00	0110004		N	ER00112107	8/5/2008	8/15/2008				3.5100
Krause, Timothy C. Purchase of equipment to construct the items necessary to run the test	5499	****	00	0110004		N	ER00112107	8/5/2008	8/15/2008				42.0700
Krause, Timothy C. Miles from Lansing office to Home Depot and back	5499	****	00	0110004	809NCB	N	ER00112107	8/5/2008	8/15/2008		6.00		0.0000
Krause, Timothy C. Miles in excess of daily commute to pickup NTH pickup in Grand Rapids	5499	****	00	0110004		N	ER00112107	8/6/2008	8/15/2008				26.3300
Krause, Timothy C. Miles in excess of daily commute to pickup NTH pickup in Grand Rapids	5499	****	00	0110004	809NCB	N	ER00112107	8/6/2008	8/15/2008		45.00		0.0000
Krause, Timothy C. Purchase of equipment to construct the items necessary to conduct the test	5499	****	00	0110004		N	ER00112107	8/7/2008	8/15/2008				85.2200
Krause, Timothy C. Purchase of equipment to construct the items necessary to conduct the test	5499	****	00	0110004		N	ER00112107	8/7/2008	8/15/2008				0.7600
Krause, Timothy C. Purchase of equipment to construct the items necessary to conduct the test	5499	****	00	0110004		N	ER00112107	8/7/2008	8/15/2008				23.0700
Steiner, Paula Hair dryer to dry seepage meter mirror.	5499	****	00	0110004		N	ER00111521	7/23/2008	7/25/2008				9.5200
Steiner, Paula Mileage to Menards and back to Lansing office.	5499	****	00	0110004		N	ER00111521	7/23/2008	7/25/2008				9.6500
Steiner, Paula Pipe and wood supplies for seepage meter	5499	****	00	0110004		N	ER00111521	7/23/2008	7/25/2008				89.1400
Steiner, Paula Mileage to Menards and back to Lansing office.	5499	****	00	0110004	809NCB	N	ER00111521	7/23/2008	7/25/2008		16.50		0.0000
Steiner, Paula Ball valves, foam board, t-posts,eye bolts, and screws for seepage meter	5499	****	00	0110004		N	ER00111737	7/29/2008	8/8/2008				49.5900
Steiner, Paula Mileage from Lansing office to Middleville to Sand Creek Dairy (Hastings) and back to Lansing.	5499	****	00	0110004		N	ER00111887	8/7/2008	8/8/2008				77.2200

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Project : 74080272 - CIG-Seepage Meter													
Phase : 00 - Pond Seepage Meter													
<u>Expense</u>													
Nonbillable Project Expenses													
Steiner, Paula Mileage from Lansing office to Middleville to Sand Creek Dairy (Hastings) and back to Lansing,	5499	****	00	0110004	809NCB	N	ER00111887	8/7/2008	8/8/2008		132.00	0.0000	0.0000
Steiner, Paula Mileage from Lansing to Sand Creek Dairy (Hastings) and back.	5499	****	00	0110004		N	ER00111887	8/8/2008	8/8/2008			0.0000	59.6700
Steiner, Paula Mileage from Lansing to Sand Creek Dairy (Hastings) and back.	5499	****	00	0110004	809NCB	N	ER00111887	8/8/2008	8/8/2008		102.00	0.0000	0.0000
									Account 5499 Total		301.50		479.75
									Expense Total		577.50		6,017.66
									Phase 00 Total		207.80 (Hı		23,038.88
									Project 74080272 Total		207.80 (Hı		23,038.88
									Pond Seepage Meter Total		207.80 (Hı		23,038.88
									Report Total		207.80 (Hı		23,038.88