BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the matter of an incident at 3441 Chestnut Avenue in Kansas City, Missouri.	)))	Case No. GS-2003-0468

MISSOURI GAS ENERGY'S RESPONSE TO INVESTIGATION REPORT

Come now Missouri Gas Energy ("MGE"), a division of Southern Union Company, by and through counsel, and respectfully states as follows:

1. On June 2, 2004, the Staff filed its Investigation Report ("Report") herein. By order dated June 15, 2004, the Commission directed MGE to file its response to the Report no later than August 2, 2004.

2. The Staff makes a number of recommendations in its Report. Those recommendations as well as MGE's response (shown in italics) are as follows:

1. The Staff recommends that MGE develop a new form that can properly document the evaluation of an excavation near a cast iron main in accordance with Subsection (13)(Z), to be used in addition to the record of daily excavation inspections that are conducted in accordance with Subsection (12)(I).

MGE's Response: The new form developed by MGE to document the evaluation of an excavation near a cast iron main in accordance with Subsection (13)(Z), to be used in addition to the record of daily excavation inspections conducted in accordance with Subsection (12)(I), is attached hereto as Appendix 1.

2. The Staff recommends that MGE update its O&M Standards related to cast iron mains to incorporate the provisions of Case No. GO-2002-0050, the new form developed in response to Staff Recommendation #1, and other appropriate provisions.

MGE's Response: MGE has updated its O&M Standards as recommended by the Staff. See Appendix 2 attached hereto.

3. The Staff recommends that MGE provide training for the new form and O&M Standards developed in response to Staff Recommendations #1 and #2.

MGE's Response: Training of MGE personnel on the new form (Appendix 1) and the updated O&M Standard will be completed by September 1, 2004.

4. The Staff recommends that MGE provide the Staff with an annual report listing the excavations evaluated under Subsection (13)(Z) by date, the excavations requiring replacement or protection under Subsection (13)(Z), and the date that the replacement or protection was completed. The Staff recommends that this annual report be submitted in conjunction with the annual report that is submitted to the Staff for the replacement programs in Case No. GO-2002-0050.

MGE's Response: MGE will include the requested information in the annual report it submits to the Staff in Case No. GO-2002-0050.

WHEREFORE, MGE respectfully submits this response to the Staff Investigation Report.

Respectfully submitted,

/s/ Robert J. Hack

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Attorney for Missouri Gas Energy, a division of Southern Union Company

Certificate of Service

I hereby certify that copies of the foregoing have been mailed, hand-delivered, transmitted by facsimile or e-mailed on August 2, 2004, to:

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/s/ Robert J. Hack

Form 317-18 (07-04)

DAILY EXCAVATION OBSERVATION

Draft 2

Date _____ Employees I.D. _____

Town _____ County _____

Address _____ Type of Job _____

Excavating Company _____ Contact Person _____

Type of Equipment used for Excavation _____ Phone _____

Type of Excavation: _____Trenching _____ Boring _____ Augering _____ Other

Monitoring Required ☐ Yes ☐ No

Date / Time	Observer	Conditions Found	Contact Name

PIPE INFORMATION:

Facility Reported On: ☐ Main ☐ Service

Pipe Size_____Pipe Material _____ MAOP _____

PIPE CONDITION (If exposed):

Coating Type: ☐ Mill ☐ Tape ☐ Other _____ CoatingCondition ☐ Good ☐ Poor

Corrosion: ☐ None ☐ Light ☐ Moderate ☐ Heavy Note: If Heavy a 318-5D must be filled out

Pipe Depth _____ P/S Read _____

Location and Length of Exposed Pipe: _____

Couplings Exposed? ☐ Yes ☐ No Location(s) _____

Bell Joints Exposed? ☐ Yes ☐ No Location(s)

SOIL INFORMATION:

Soil: ☐ Clay ☐ Sand ☐ Rock ☐ Sewage ☐ Cinders ☐ Other _____

Ground Water Infiltration ☐ Yes ☐ No

PIPE SUPPORT & BACKFILL

Support Method: _____ Compaction Method _____

Pipe susceptible to undermining? ☐ Yes ☐ No

OBSERVED: ☐ Yes ☐ No PLEASE COMPLETE THE FOLLOWING:

Was Pipe Left Firmly Supported? ☐ Yes ☐ No Was Main Padded ☐ Yes ☐ No

Was Pipe Undermined? ☐ Yes ☐ No Length of Pipe Undermined:

Parallel Excavation

Distance of Main to Edge of Cut: _____ FT. _____ IN., Excavation Depth _____

Excavation Width: _____ ft., Length of Pipe in Angle of Repose: _____ ft, (approximately)

N

COMMENTS: _____

318-5D Generated: ☐ Yes ☐ No

Date Completed _____ Signature _____

TABLE OF CONTENTS

1. Applicable Codes and Regulations

1.1. This Standard meets the requirements of the Federal, Pipeline Safety Regulations, Sections 192.489, 192.614, 192.621, 192.753, and 192.755; and Missouri 4 CSR240-40.030 (9)(U)(12)(I)(N)(13)(Y)(Z).

2. General

2.1. Leakage Control

2.1.1. Leaks on cast iron mains shall be analyzed to determine the geographical areas of concern. Those areas of concern should be prioritized for either replacement or repair using the following criteria:

- Leaks on hand and their classification.
- Maintenance history.
- History of breaks.
- Nominal diameter and operating pressure.
- Public areas of wall-to-wall paving (P&P).

2.1.2. Other factors included in the evaluation are:

- The Company priority to replace small diameter cast iron main;
- The number of bare steel unprotected services within the area of concern;

- History of third-party damage or adjacent excavation;
- Soil subsidence;
- The Company Cast Iron Replacement Program.

2.1.3. The evaluation and prioritizing of the areas of concern shall determine those mains which are to be replaced.

2.2. Breaks

2.2.1. A record of cast iron breaks shall be maintained at the local operating office for the life of the facility.

2.3. Graphitization

2.3.1. Every cast iron main exposure by Company forces shall include a visual inspection to determine if graphitization is present. Conditions found shall be documented.

- If general graphitization is found to a degree where a fracture might result (Refer to Paragraph 3.4.4), an inspection shall be extended completely around the circumference of the pipe and extended in each direction until sound material is found. Segments of cast iron main shall be repaired or replaced when graphitization is found to a degree where leakage might result.

3. Methods of Repair

3.1. Bell joints shall be repaired or maintained in accordance with the following.

3.1.1. Each caulked cast iron bell and spigot joint subject to pressures of 25 psig or more shall be reinforced and sealed with mechanical clamps, Miller E-10, ALH Series 6, or other approved encapsulation that provides reinforcement and meets the requirements of 192.753 and Missouri 4 CSR 240-40.030 13 (Y).

3.1.2. Whenever a caulked cast iron bell and spigot joint which is subject to pressures less than 25 psig is exposed by Company forces for any reason, the joint shall be sealed and/or encapsulated, unless the joint is not leaking and the main is scheduled for replacement within one year.

3.1.3. Anytime a bell is split, broken or cracked, the bell should be removed and the pipe replaced.

3.1.4. If it is not feasible to remove and replace the bell, a bell joint encasement sleeve or encapsulation shall be used.

3.2. Encapsulation of Bell Joints

3.2.1. Follow the detailed manufacturer's instructions when installing any encapsulant.

3.2.2. Miller Safety Seal E-10 and ALH Series 6 Encapsulants are the preferred repair method for cast iron mains 6 inch and larger, bell and mechanical joint leaks. They also may be used to repair flanges and end caps. These encapsulants also provide restraint to movement and may be used where joint reinforcement is required.

3.2.3. Miller E-10 and ALH Series 6 encapsulants are also recommend for 4-inch cast iron main repairs that are not scheduled for replacement.

3.2.4. ALH Series 4 encapsulants do not provide reinforcement, but may be used as a encapsulant to repair cast iron mains that operate below 25 psig.

3.2.5. Although approved for use, Avonseal Two is the least desirable sealant material due to the difficulty in heating the material at the job site. Avonseal Two shall not be used where reinforcement is required.

3.3. Bell Joint Clamps

3.3.1. Follow the detailed manufacturer's instructions when installing mechanical clamps.

3.3.2. As an alternative to encapsulants, cast iron bell joints may be repaired by the use of Company-approved bell joint clamps. These clamps provide restraint to movement and may be used where reinforcement is required.

3.4. Full-Circle Clamps

3.4.1. Follow the detailed manufacturer's instructions when installing any full-circle clamp.

3.4.2. The use of full-circle clamps is recommend to repair cast iron mains for the following applications:

- Corrosion pitting
- Tap holes
- Longitudinal cracks
- Localized graphitization

3.4.3. When a full-circle clamp is used to repair a longitudinal crack in a cast iron main, a small hole (1/8 inch) may be drilled with an air or hand drill prior to the repair being made. This will eliminate further splitting or cracking.

3.4.4. A full-circle clamp may be used to repair a circumference crack in a cast iron main if lateral support is not required.

3.5. Sleeves

3.5.1. Follow the detailed manufacturer's instructions when installing any sleeve.

3.5.2. The use of split sleeves to repair cast iron is another alternative to consider. Split sleeves may be used to repair circumference cracks and provide lateral support to the main.

3.5.3. The Dresser style 226 sleeve is an alternative repair procedure for bell joint leaks. This style sleeve may also be used to encase a compression coupling found to be leaking. The Dresser style 80 sleeve contains a threaded tap hole and is generally used where large tap connections are required.

3.5.4. Apply cathodic protection to any steel sleeve installed.

3.6. Splits, cracks, or breaks that occur on cast iron pipe shall be handled in accordance with the following.

3.6.1. Cast Iron Mains should be evaluated for replacement under the guidelines as set forth in Section 2.0 of this Standard.

3.6.2. A break that does not justify replacement after the evaluation outlined above may be repaired as follows:

- The section of pipe may be removed and replaced with a section of steel or plastic pipe or the damage may be repaired with an approved sleeve or encapsulant.
- If the split or crack is longitudinal, a small hole may be drilled at each end of the split or crack with an air or hand drill prior to the repair being made to eliminate further splitting or cracking, and the area clamped using a full-circle clamp or split sleeve.

3.6.3. When the pipe is not replaced, a coupon sample shall be taken from the section of pipe in which the break occurred and analyzed for graphitization.

3.6.4. An instrument leak survey shall be performed (for approximately 200 feet over the main) in each direction from the location in which the break occurred.

4. Protecting Cast Iron Mains

4.1. Mains in Areas of Street Improvements

4.1.1. Projects involving resurfacing only normally will only require the repair of leaks detected within the bounds of the project.

4.1.2. When the main size is less than 6 inches and major street improvements are planned, the main shall be analyzed for replacement. If the main size is 6 inches or greater and conflicts do not exist with the proposed construction, the main should be analyzed for the rehabilitation of all joints.

4.2. When construction is known to occur adjacent to cast iron mains or when a segment of cast iron main is disturbed, exposed, or erosion has occurred in the area, the following shall be considered.

4.2.1. Cast iron mains shall be supported, replaced, or removed from service as required in areas of construction activity.

4.2.2. Cast iron mains shall be protected against damage in:

- Areas of earth movement
- Area having known underground water leaks or sewer failures that could undermine pipe support.
- Areas were cast iron pipe may be subjected to vibration from heavy construction equipment, trains, trucks, buses or blasting.
- Impact forces of vehicles.
- Pending excavations near the pipeline.
- Other known forces that may subject the pipeline to external stresses.

4.3. During the excavation of a cast iron main by Company or contract personnel, or when it is known that other parties are excavating around cast iron mains and the excavation results in disturbance of earth supporting the cast iron, proper action shall be taken to assure that the piping is not subjected to possible damaging forces. On-site observation shall include the analysis of the following:

4.3.1. The amount (length) of pipe earth support disturbed.

4.3.2. The possibility of earth movement such as that caused by ditch wall caving, etc., which may cause the pipe to be abnormally loaded or moved.

4.3.3. Consider how the excavation will be backfilled and the provisions for proper backfill material and compaction.

4.4. Any excavation and backfill involving cast iron pipe must be accomplished such that the end result will avoid having the pipe:

4.4.1. Resting on any unyielding structure.

4.4.2. Supporting another structure.

4.4.3. Supported by improper backfill.

4.4.4. Subjected to excavation backfill settlement.

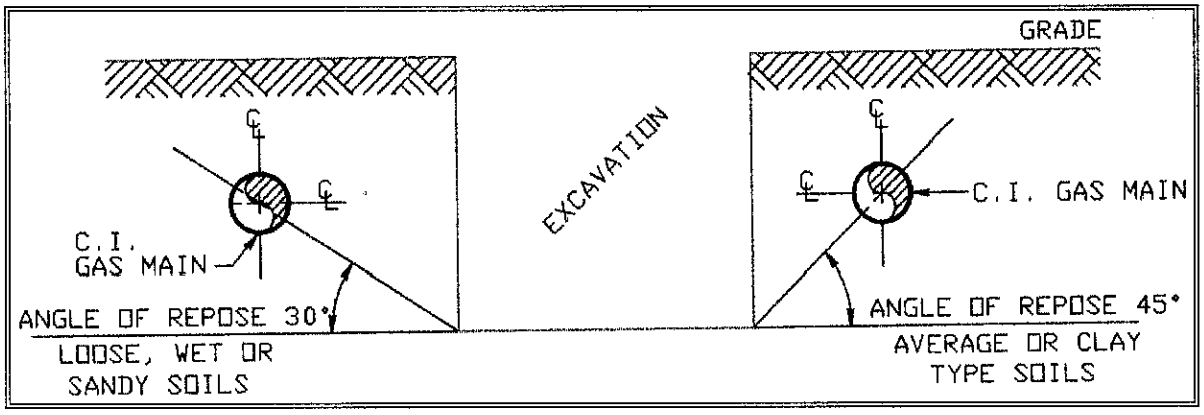
4.5. Consideration shall be given to the replacement of cast iron pipe in areas of extensive excavation, in areas where known earth slides occur, or where knowledge is obtained that such is likely.

4.5.1. The known undermining of cast iron pipe in areas of water main breaks or sewer leaks may require replacement. It may be necessary to remove a section of cast iron pipe from service in areas of construction activity to eliminate the possibility of a break and replace the main after the construction has been completed.

4.6. The following considerations shall be made when replacing cast iron main:

4.6.1. Mains 8 inches and smaller in nominal diameter shall be replaced (a minimum section 10 feet in length) when 1/2 or more of the pipe diameter lies above the line of the angle of repose (45 degrees for clay soils). The angle of repose varies with different soil types and must be determined of each project. When silt, water, or loose sandy soils are encountered the angle of repose shall be flattened to as much as a 2-to-1 slope or approximately 30 degrees (see Exhibit 1).

EXHIBIT 1



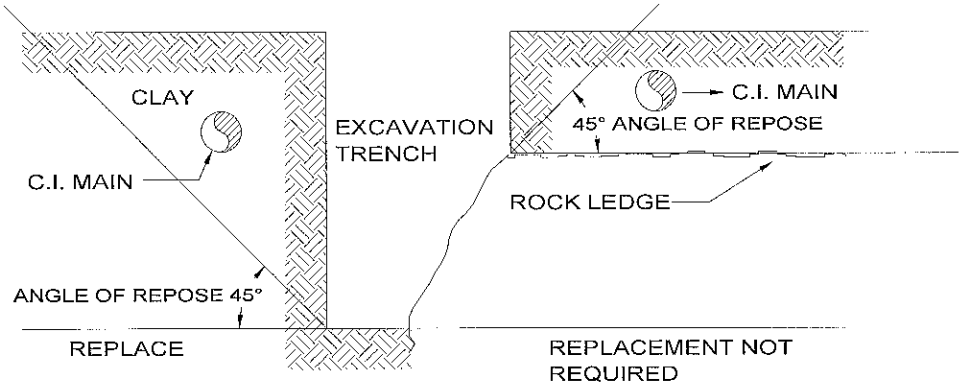
4.6.2. The main shall be replaced for a minimum distance of 10 feet in each direction beyond the limits of the exposure.

- Mains that are greater than 8 inches in nominal diameter shall have appropriate steps taken to provide permanent protection for the disturbed segment from damage that might result from external loads.

- Replacement may not be required for parallel excavations if the pipe lies within the angle of repose defined above for a length less than ten times the nominal diameter, not to exceed six feet regardless of the pipe diameter.

4.6.3. Where there is evidence of a rock ledge beneath the main, the angle of repose shall be determined from the top of the exposed rock. (See Exhibit 2.)

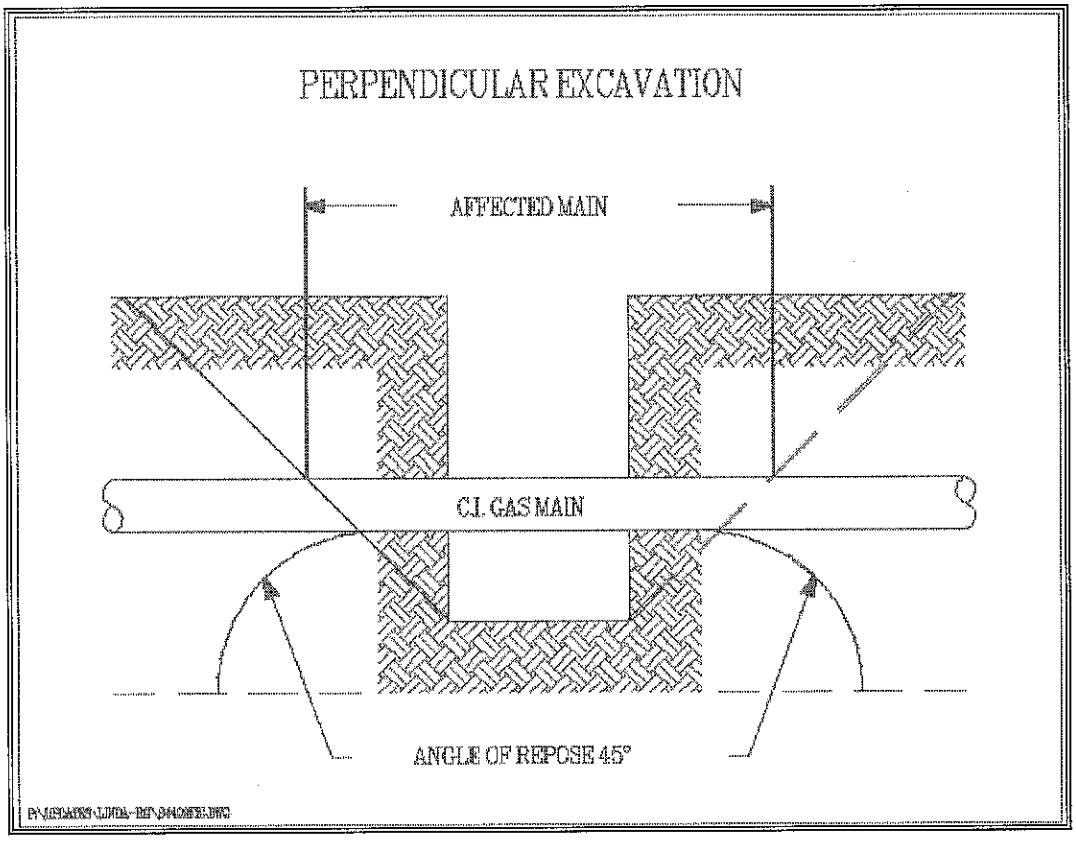
EXHIBIT 2



4.6.4. For perpendicular or angled excavations -- when the support beneath the pipe is removed for a length less than ten times the nominal diameter not exceeding six feet, support of the cast iron is required.

- If the exposure is greater than ten times the nominal diameter, or if a bell joint or sleeve are known to be within the angle of repose, the main shall be replaced.
- When a section of main is perpendicular to an excavation and is removed, consideration shall be given to block the ends of the cast iron to restrict any movement.

EXHIBIT 3



4.7. If questions arise concerning the care being taken by the excavator, or if obtaining proper backfill and resulting support is questionable, additional considerations for protection or replacement shall be taken.

4.8. Care should be taken when cutting out and capping a section of cast iron main. The section should be blocked to eliminate the possibility of movement relating to unknown locations of bell joints or couplings that may be adjacent to the excavation.

5. Testing

5.1. All repairs and/or replacement of cast iron main shall be tested.

5.1.1. Tie-ins or other repairs where air pressure tests are not feasible shall be leak tested using a soap solution at the normal operating pressure. The results shall be documented.

5.2 Unless the "area of concern" of a repaired Class 1 or 2 leak is cleared at the time of repair, a follow-up inspection shall be made within one week of the repair to assure that the leakage has been eliminated.

- Clearing the "area of concern" upon completion and repair of a leak or the repair of a reclassified leak shall include a thorough check of the area to determine if all leakage has been cleared. If all indications of leakage are clear after the excavation has been filled, no further recheck will be required. The results of such checks shall be indicated on the Work Report.

- If indications suggest that the leakage has not yet cleared, the leak shall require further appropriate action based on its classification.

6. Long Term Cast Iron Replacement Program

6.1 MGE will replace a minimum of 5 miles of Cast Iron Main each year targeting for replacement segments for which breakage history currently exists. Replacement criteria shall be as follows:

- On an ongoing basis, MGE will keep a current record of cast iron breaks (excluding those caused by third party damage) and plot them on a mapping system.
- All break records (other than third party damage) will be utilized for tracking purposes.
- Any new break (other than third party damage) after July 1, 2001, within 500 feet of a previously recorded break triggers a minimum replacement of 500 feet of main within five years of the discovery date of the new break.
- Any additional break on a segment of pipe targeted for replacement will accelerate the completion date to within 24 months of the discovery date of the additional break, or five years from the original trigger date, whichever causes the replacement to be completed sooner.
- MGE shall collect a coupon at every cast iron main break (excluding third party damage).
- Each coupon shall be cleaned and a caliper used to determine wall thickness and thickness of the grahitization to compute percent of graphitization.
- Cast iron mains exceeding the following percentage of graphitization shall be scheduled for replacement of approximately 500 feet within 24 months. Six inch and smaller 50%, Eight inch and greater 75%.
- Additional emphasis on replacement will be determined by blasting, excavations, and angle of repose adjacent to Cast Iron mains. Cast Iron mains prone to breakage will be evaluated for replacement rather than repair work. Cast Iron Mains in areas of public improvements and urban

renewals will be evaluated for replacement. Cast Iron Mains 6 inch and smaller will be evaluated for replacement of 500 feet. 8 inch and larger will follow the guidelines in this Standard.

- In addition to replacing Cast Iron Mains MGE will repair a minimum of 400 leaking bell joints through Encapsulation or similar process annually on mains not targeted for replacement until there are no leaks remaining to be repaired through this process
- MGE will continue to do an annual leak survey on Cast Iron Mains 4 inch and smaller.
- MGE will continue to do a semi-annual leak survey of Cast Iron Mains in Business Districts.

7.0 EVALUATION FORM FOR EXCAVATIONS:

Form 317-18 (07-04) DAILY EXCAVATION OBSERVATION — Draft 2

Date		Employees I.D.	
Town		County	
Address		Type of Job	
Excavating Company		Contact Person	
Type of Equipment used for Excavation		Phone	

Type of Excavation: _____Trenching _____ Boring _____ Augering _____ Other

Monitoring Required ____ Yes ____ No

Date / Time	Observer	Conditions Found	Contact Name

PIPE

INFORMATION:

Facility Reported On: ☐ Main ☐ Service

Pipe Size | Pipe Material | MAOP

PIPE CONDITION (If exposed):

Coating Type: ☐ Mill ☐ Tape ☐ Other | CoatingCondition ☐ Good ☐ Poor

Corrosion: ☐ None ☐ Light ☐ Moderate ☐ Heavy | Note: If Heavy a 318-5D must be filled out

Pipe Depth | P/S Read

Location and Length of Exposed Pipe:

Couplings Exposed? ☐ Yes ☐ No | Location(s)

Bell Joints Exposed? ☐ Yes ☐ No | Location(s)

SOIL INFORMATION:

Soil: ☐ Clay ☐ Sand ☐ Rock ☐ Sewage ☐ Cinders ☐ Other

Ground Water Infiltration ☐ Yes ☐ No

PIPE SUPPORT & BACKFILL

Support Method: | Compaction Method

Pipe susceptible to undermining? Yes No

OBSERVED: Yes No PLEASE COMPLETE THE FOLLOWING:

Was Pipe Left Firmly Supported? Yes No Was Main Padded Yes No

Was Pipe Undermined? Yes No Length of Pipe Undermined:

Parallel Excavation

Distance of Main to Edge of Cut: FT. IN., Excavation Depth

Excavation Width: ft., Length of Pipe in Angle of Repose: ft, (approximately)

N

COMMENTS:

318-5D Generated:	Yes	No	
Date Completed		Signature	