

# Appendix J

## Pipeline Excavation Logs

## URS Corporation

## EXCAVATION LOG

<b>PROJECT:</b> Niagara Falls Storage Site (Lewiston, NY) BOP Field Investigation		<b>EXCAVATION ID:</b> PE-1
<b>CLIENT/OWNER:</b> USACE	<b>JOB NUMBER:</b> 11176781.00004	
<b>DATE STARTED:</b> 11/28/2012	<b>URS GEOLOGIST:</b> [REDACTED]	
<b>DATE COMPLETED:</b> 11/29/2012	<b>URS HEALTH PHYSICIST:</b> [REDACTED]	
<b>CONTRACTOR:</b> Russo Development	<b>RUSSO OPERATOR &amp; LABORER:</b> [REDACTED]	
<b>EQUIPMENT:</b> John Deere 200 LC excavator, support truck and trailer, trench box (20'L x 8'D x 5'W), aluminum catwalk		
<b>LOCATION:</b> Near southeastern corner of IWCS		
<b>PURPOSE:</b> Expose and plug 10" former water line		
<b>CORNER COORDINATES:</b> (NE Cor.) N - 1171040.654, E - 1041163.304, Elev. 315.22; (NW Cor.) N - 1171034.110, E - 1041152.833, Elev. 316.34; (SW Cor.) N - 1171010.043, E - 1041171.347, Elev. 317.53;		
(SE Cor.) N - 1171017.648, E - 1041181.896, Elev. 317.61		
<b>FINAL EXCAVATION DIMENSIONS:</b> ~31' long x 12' wide x 16' maximum depth under pipe		
DEPTH (FT)	VERTICAL PROFILE DESCRIPTION	
1	0 - 1.5' below ground surface (bgs): FILL (ML/CL) - Brown silty clay loam moist, friable, granular structure, some grass, many fine roots with trace rounded gravel	
	1.5' - 10.5' bgs: Reddish brown SILTY CLAY (CL), trace rounded gravel and cobbles, moist, stiff, slightly plastic, blocky structure, trace distinct orange and gray mottles	
5	From 5' bgs downward - trace gray silty-fine sandy partings (<1/16")	
10		
	10.5' - 16.0' bgs: Pinkish to brownish gray SILTY CLAY (CH), moist, medium stiff, very plastic, sticky, trace rounded gravel; a yellowish brown fine-coarse sandy parting ( $\leq 1/8"$ ; moist, but not wet). Pipe found at 14'. Some black to dark brown more loamy material in area above the pipe.	
15	No groundwater in excavation.	
	Maximum depth 16' bgs.	

**URS Corporation****EXCAVATION LOG**

<b>PROJECT:</b> Niagara Falls Storage Site (Lewiston, NY) BOP Field Investigation		<b>EXCAVATION ID:</b> PE-1
<b>CLIENT/OWNER:</b> USACE	<b>JOB NUMBER:</b> 11176781.00004	
<b>DATE STARTED:</b> 11/28/2012	<b>URS GEOLOGIST:</b>	
<b>DATE COMPLETED:</b> 11/29/2012	<b>URS HEALTH PHYSICIST:</b>	
<b>CONTRACTOR:</b> Russo Development	<b>RUSSO OPERATOR &amp; LABORER:</b>	
<p><b>COMMENTS:</b> Trench was excavated in a northwest-southeast direction. Outer portion of trench was benched with a 4' wide x 1.7'-4.5' high. The trench box was installed in a 23' long x 4.2' wide x 7' deep trench. A 10" former water line (PIPE 1) was encountered at ~14' bgs. The area beneath the pipe was excavated to 16' deep to collect a soil sample from beneath the pipe and to encase the pipe in concrete.</p> <p>One 11" OD (10"ID) cast iron pipe (PIPE 1) crossed the trench in a southwest-northeast orientation.</p> <p>No bedding material was around the pipe. The pipe appeared to be backfilled with native silty clay soils.</p> <p>PID readings on excavated soils were 0 ppm; no visual or olfactory signs of contamination.</p> <p>A brass saddle clamp and valve assembly was installed on the pipe to enable the collection of a water sample and to control pipeline dewatering. PIPE 1 was under gravity pressure. ~1,625 gallons of water were pumped from PIPE 1 to lower the head below the top of the pipe.</p> <p>A square opening was then cut into the top of the pipe. A sediment sample was collected from the pipe interior and the interior was then filled with a Speed Crete Red Line concrete/bentonite mixture. The pipe was then encased in 1.5 yd<sup>3</sup> of concrete to prevent liquid migration along the outside of the pipe.</p> <p>Air quality in excavation with Multi-Rae instrument: CO = 0 ppm, VOCs = 0 ppm, H<sub>2</sub>S = 0 ppm, LEL = 0%, O<sub>2</sub> = 20.9%</p> <p>Monitoring of pipe air quality with Multi-Rae instrument: CO = 2 ppm, VOCs = 0 ppm, H<sub>2</sub>S = 0 ppm, LEL = 4 %, O<sub>2</sub> = 20.7%</p> <p>The excavation and excavated soils were scanned with a 2" NaI detector. Radiation measurements were within expected (e.g., ambient) values.</p> <p>Soil sample beneath PIPE 1 ID= PE1 SB1 15.0-15.5-0121</p> <p>PIPE 1 water sample ID= PE1 PIPE1 14.0-14.5-0122</p> <p>PIPE 1 sediment sample ID= PE1 PIPE1 1SED-0123</p> <p>Soils from the excavation were stockpiled on plastic. Upon completion of the pipeline plugging activities, the excavation was backfilled with the excavated soils in the order in which they were removed. The soils were placed back into the excavation in 1'-2' lifts and compacted with the excavator bucket.</p>		
		<b>Page 2 of 2</b>

## INFORMATION FOR SAMPLES COLLECTED AT EXCAVATION PE-1

SAMPLE ID	COLLECTION DATE/TIME	SAMPLE DEPTH (feet bgs)	MATRIX	ANALYTICAL PARAMETERS	QA/QC	SAMPLE DESCRIPTION
PE1SB115.0-15.5-0121	11/28/2012 13:00	15.0 - 15.5	Soil	List 1	None	Soil sample from beneath PIPE 1; pinkish gray silty clay (moist, medium stiff, very plastic); PID = 0.0 ppm, no odor, no visible signs of contamination
PE1PIPE114.0-14.5-0122 and PE1PIPE114.0-14.5F-0122	11/28/2012 13:52	14.0 - 14.5 (inside pipe)	Liquid	List 2	None	Liquid sample from inside PIPE 1; clear, no noticeable sheen, slight decaying organic material odor (i.e., methane/H <sub>2</sub> S)
PE1PIPE1SED-0123	11/29/2012 09:20	inside pipe	Sediment	Limited volume (<2oz.) - iso-U/iso-Th only	None	Sediment sample from around inside of PIPE 3; 3 small pieces of hard black scale, wet on outer surface, no odor, botryoidal texture on outer surface; PID = 0.0 ppm

Notes: List 1 Analytical Parameters =

VOCs; SVOCs; Pesticides; PCBs; TAL Metals; Total U; gamma spec/iso-U/iso-Th

List 2 Analytical Parameters =

Unfiltered: VOCs; SVOCs; Pesticides; PCBs; TAL Metals; Total U; Anions; Alkalinity; TDS; Ra-226; Ra-228; iso-U/iso-Th  
 Filtered: TAL Metals; Total U; Ra-226; Ra-228; iso-U/iso-Th



**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

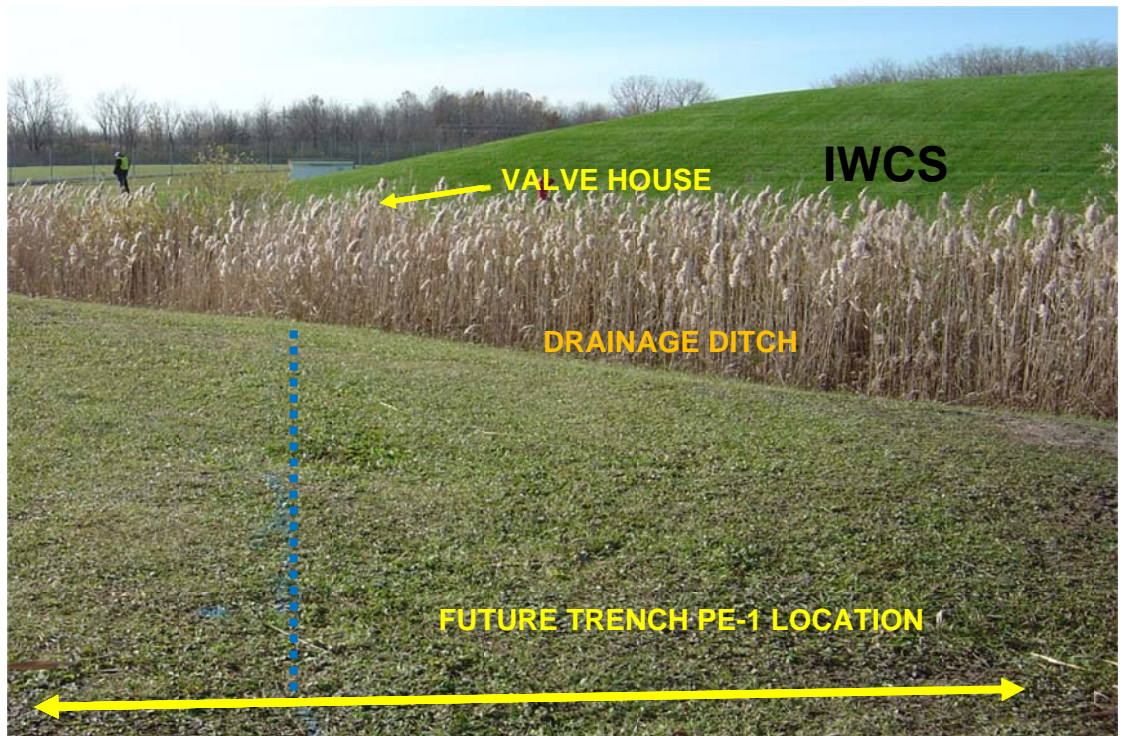
**Job Number:**  
11176781.00004

**Photo No.**  
PE1-1

**Date:**  
11/7/2012

**Description:**

A southwestward view from just inside the IWCS fenceline near the southeast corner of the IWCS (EU 10) showing the geophysical survey markout (blue line) for the suspected water line at location PE-1.



**Photo No.**  
PE1-2

**Date:**  
11/27/2012

**Description:**

A northward view showing location PE-1 just before excavation activities commenced.





**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

**Job Number:**  
11176781.00004

**Photo No.**  
PE1-3

**Date:**  
11/28/2012

**Description:**

A southeastward view of the equipment set up at location PE-1 during excavation of the trench.

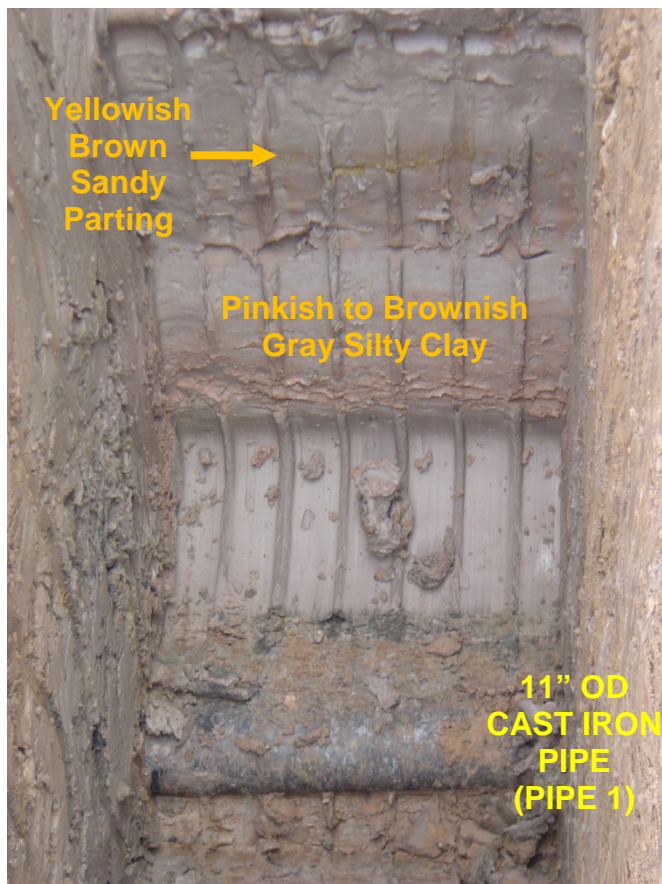


**Photo No.**  
PE1-4

**Date:**  
11/28/2012

**Description:**

A northwestward view of the bottom of trench PE-1 showing the pipe encountered and the surrounding soils.





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(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

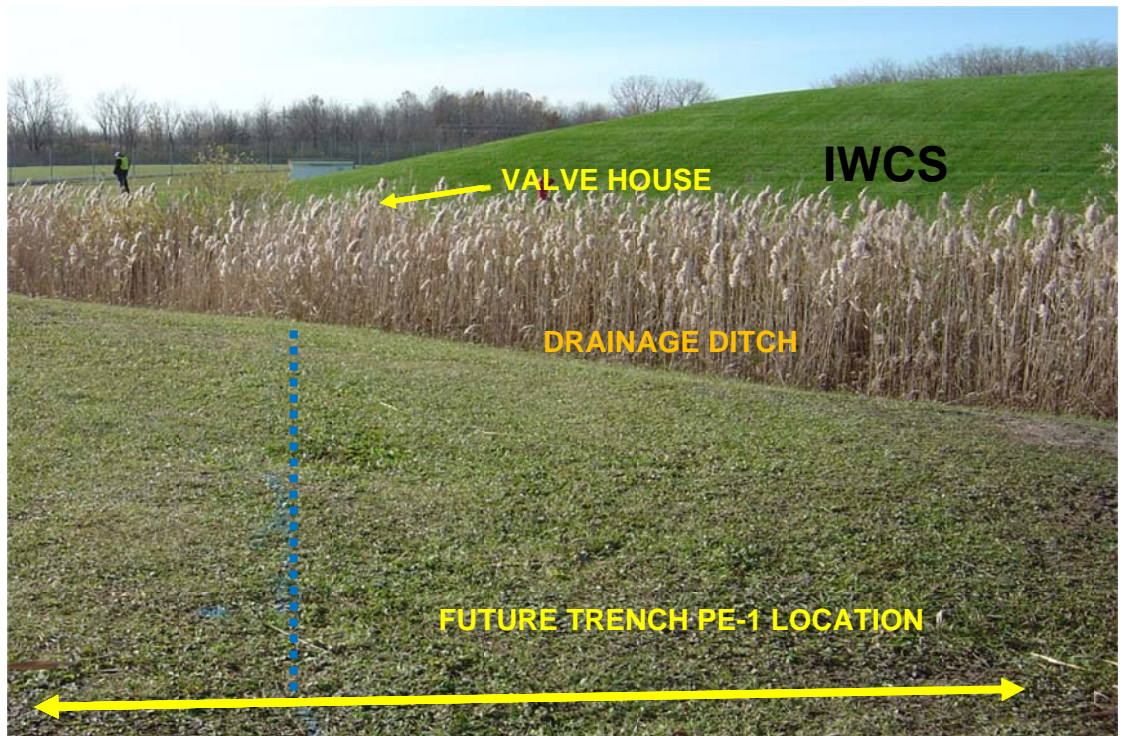
**Job Number:**  
11176781.00004

**Photo No.**  
PE1-1

**Date:**  
11/7/2012

**Description:**

A southwestward view from just inside the IWCS fenceline near the southeast corner of the IWCS (EU 10) showing the geophysical survey markout (blue line) for the suspected water line at location PE-1.



**Photo No.**  
PE1-2

**Date:**  
11/27/2012

**Description:**

A northward view showing location PE-1 just before excavation activities commenced.





**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

**Job Number:**  
11176781.00004

**Photo No.**  
PE1-3

**Date:**  
11/28/2012

**Description:**

A southeastward view of the equipment set up at location PE-1 during excavation of the trench.

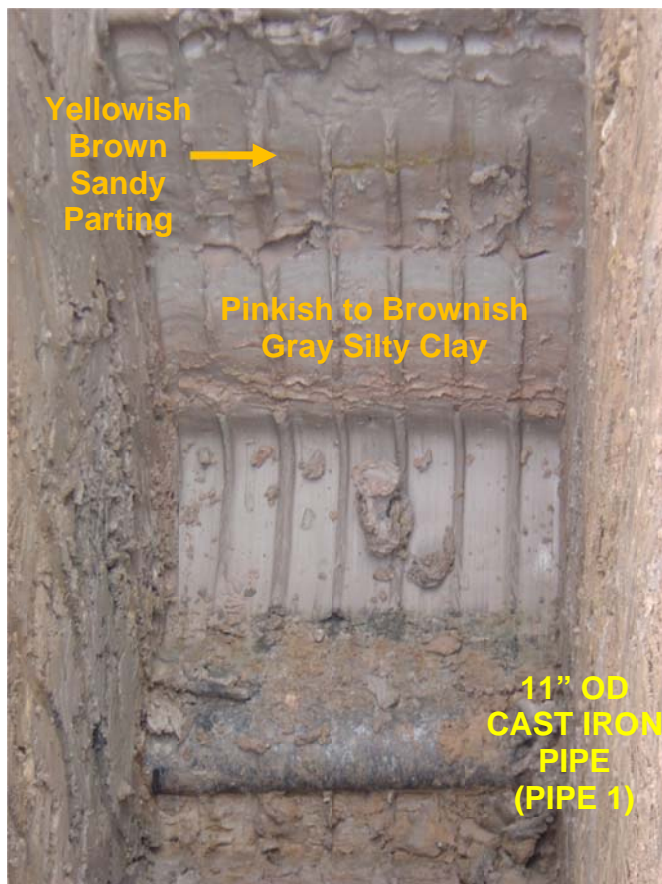


**Photo No.**  
PE1-4

**Date:**  
11/28/2012

**Description:**

A northwestward view of the bottom of trench PE-1 showing the pipe encountered and the surrounding soils.





**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

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**Excavation Contractor:** Russo Development

**Job Number:**  
11176781.00004

**Photo No.**  
PE1-5

**Date:**  
11/28/2012

## Description:

A view of materials excavated from PE-1 showing the pinkish to brownish gray very plastic silty clay with yellowish brown sandy parting (center of photo) and overlying reddish brown silty clay with gray silty-fine sandy partings (lower center left corners of photo) encountered at location PE-1.



**Photo No.**  
PE1-6

**Date:**  
11/29/12

## Description:

A southeastward view of the inside of trench PE-1 showing PIPE 1, which was encountered at ~14' below ground surface. A brass saddle clamp with valve was installed on the pipe to evaluate if the contents were under pressure: the contents of PIPE 1 were under pressure and ~1625 gallons of water were pumped from PIPE 1 to lower the head enough to permit sealing of the pipe.





**Project: Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation**

**Client: USACE**

**Excavation Contractor: Russo Development**

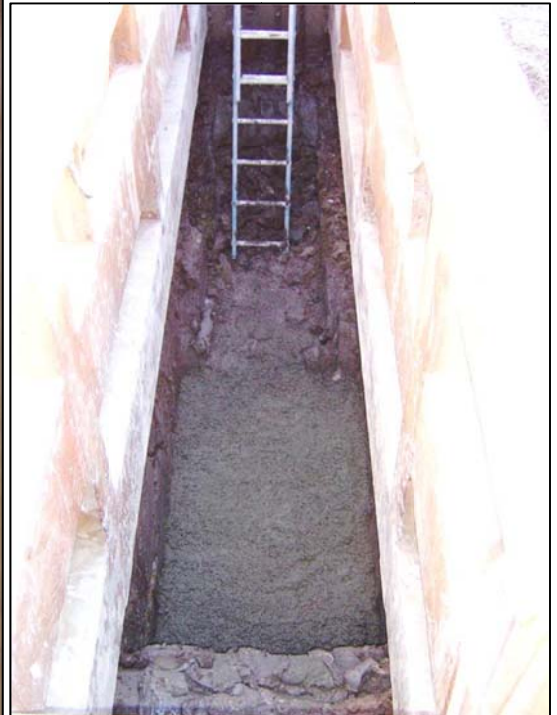
**Job Number:  
11176781.00004**

**Photo No.**  
PE1-7 &  
PE1-8

**Date:**  
11/29/2012

**Description:**

A southeastward view of PE-1 after PIPE1 was cut open and the interior was being filled with Speed Crete Red Line concrete (left) to prevent liquid migration within the pipe. Afterward, this pipe was encased in 1.5 yds<sup>3</sup> of concrete to prevent liquid migration along the outside of the pipes (right). Top of concrete over pipe was brought up to ~13' bgs.



**Photo No.**  
PE1-9

**Date:**  
11/29/2012

**Description:**

A west-northwestward view of trench PE-1 after it had been backfilled with the previously excavated soils. Soils were placed back into the excavation in 1'-2' lifts and compacted with the excavator bucket. The 4 corners of the excavation were marked with wooden stakes and later surveyed.



## URS Corporation

## EXCAVATION LOG

<b>PROJECT:</b> Niagara Falls Storage Site (Lewiston, NY) BOP Field Investigation		<b>EXCAVATION ID:</b> PE-2
<b>CLIENT/OWNER:</b> USACE	<b>JOB NUMBER:</b> 11176781.00004	
<b>DATE STARTED:</b> 11/20/2012	<b>URS GEOLOGIST:</b>	
<b>DATE COMPLETED:</b> 11/27/2012	<b>URS HEALTH PHYSICIST:</b>	
<b>CONTRACTOR:</b> Russo Development	<b>RUSSO OPERATOR &amp; LABORER:</b>	
<b>EQUIPMENT:</b> John Deere 200 LC excavator, support truck and trailer, trench box (20'L x 8'D x 5'W), aluminum catwalk		
<b>LOCATION:</b> Near northeastern corner of EU 2, between N Street and chain link fence, just west of Campbell Street		
<b>PURPOSE:</b> Expose and plug 3 former water lines		
<b>CORNER COORDINATES:</b> (NE Cor.) N - 1173230.231, E - 1041507.531, Elev. 318.85; (NW Cor.) N - 1173230.555, E - 1041483.799, Elev. 317.57; (SW Cor.) N - 1173226.302, E - 1041483.193, Elev. 317.68;		
(SE Cor.) N - 1173226.626, E - 1041507.427, Elev. 319.05		
<b>FINAL EXCAVATION DIMENSIONS:</b> ~21.5' long x 4.5' wide x 9.5' maximum depth under 3 pipes		
<b>DEPTH (FT)</b>	<b>VERTICAL PROFILE DESCRIPTION</b>	
1	0 - 1.0' below ground surface (bgs): FILL/REWORKED MATERIAL (ML) - Dark brown silty loam, moist, friable, granular structure, some grass, many fine roots with trace rounded to subrounded gravel and cobbles	
3	1.0' - 3.0' bgs: Brown to reddish brown SILTY CLAY (CL), trace rounded gravel and cobbles, moist, stiff, slightly plastic, blocky structure, trace orange mottles	
5	3.0' - 9.5' bgs: Reddish brown SILTY CLAY (CL) slightly moist, stiff to very stiff, slightly plastic, blocky structure, trace rounded gravel, gray silty partings ( $\leq 1/16"$ ), and yellowish brown fine sand lenses (slightly moist).	
9	No groundwater in excavation.	
	Maximum depth 9.5' bgs.	
<p>Plan View</p>		<p>Cross Section</p>

**URS Corporation****EXCAVATION LOG**

<b>PROJECT:</b> Niagara Falls Storage Site (Lewiston, NY) BOP Field Investigation		<b>EXCAVATION ID:</b> PE-2
<b>CLIENT/OWNER:</b> USACE	<b>JOB NUMBER:</b> 11176781.00004	
<b>DATE STARTED:</b> 11/20/2012	<b>URS GEOLOGIST:</b>	
<b>DATE COMPLETED:</b> 11/27/2012	<b>URS HEALTH PHYSICIST:</b>	
<b>CONTRACTOR:</b> Russo Development	<b>RUSO OPERATOR &amp; LABORER:</b>	

**COMMENTS:** Trench was oriented in an east-west direction.

Three cast iron pipes, from west to east: 4" OD [PIPE 1]; 6" OD [PIPE 2]; and 8" OD [PIPE 3] in a north-south orientation encountered at a depth of 8 feet.

PID readings on excavated soils were 0 ppm. Generally no visual or olfactory signs of contamination. However, there was a thin layer of dark gray to black, oily smelling soil immediately around PIPE 3 (this soil was sampled).

No bedding around PIPES 1-3. Pipes appeared to be backfilled with native silty clay soils.

Brass saddle clamps with valves were installed on the pipes to enable the collection of water samples and to control pipeline dewatering.

- PIPE 1 was under gravity pressure. ~525 gallons of water were pumped from PIPE 1 to lower the head below the top of the pipe.
- PIPE 2 was under gravity pressure. ~300 gallons of water were pumped from PIPE 2 to lower the head below the top of the pipe.
- PIPE 3 was under gravity pressure. ~1,550 gallons of water were pumped from PIPE 3 to lower the head below the top of the pipe.

A square opening was then cut into the top of each pipe. Following the collection of sediment samples from the pipe interior, each pipe was filled with a Speed Crete Red Line concrete/bentonite mixture. Afterward, the pipes were encased in 2 yd<sup>3</sup> of concrete-bentonite mixture to prevent liquid migration along the outside of the pipes.

Air quality in excavation (with Multi-Rae instrument): CO = 0 ppm, VOCs = 0 ppm, H<sub>2</sub>S = 0 ppm, LEL = 0%, O<sub>2</sub> = 20.9%

The excavation and excavated soils were scanned with a 2" NaI detector. Radiation measurements were within expected (e.g., ambient) values.

Soil sample beneath PIPE 1 ID= PE2 SB1 9.0-9.5-0114  
 Soil sample beneath PIPE 2 ID= PE2 SB2 9.0-9.5-0115  
 Soil sample beneath PIPE 3 ID= PE2 SB3 9.0-9.5-0116  
 PIPE 1 water sample ID= PE2 PIPE1 8.2-8.4-0117  
 PIPE 2 water sample ID= PE2 PIPE2 8.3-8.6-0119  
 PIPE 3 water sample ID= PE2 PIPE3 8.3-8.7-0118  
 PIPE 3 sediment sample ID= PE2 PIPE3 SED-0120

Soils from the excavation were stockpiled on plastic. Upon completion of the pipeline plugging activities, the excavation was backfilled with the excavated soils in the order in which they were removed. The soils were placed back into the excavation in 1'-2' lifts and compacted with the excavator bucket.



## INFORMATION FOR SAMPLES COLLECTED AT EXCAVATION PE-2

SAMPLE ID	COLLECTION DATE/TIME	SAMPLE DEPTH (feet bgs)	MATRIX	ANALYTICAL PARAMETERS	QA/QC	SAMPLE DESCRIPTION
PE2SB19.0-9.5-0114	11/20/2012 10:58	9.0 - 9.5	Soil	List 1	None	Soil sample from beneath PIPE 1; reddish brown silty clay, trace rounded gravel, black silty partings, and orange mottles (moist, stiff, plastic); PID = 0.0 ppm, no odor
PE2SB29.0-9.5-0115	11/20/2012 10:50	9.0 - 9.5	Soil	List 1	None	Soil sample from beneath PIPE 2; reddish brown silty clay, trace rounded gravel, black silty partings, and orange mottles (moist, stiff, plastic); PID = 0.0 ppm, no odor
PE2SB39.0-9.5-0116	11/20/2012 10:54	9.0 - 9.5	Soil	List 1	None	Soil sample from beneath PIPE 3; reddish brown silty clay (moist, stiff, plastic), trace rounded gravel, yellowish brown fine sandy parting, gray to black silty material with slight oily odor around pipe; PID = 0.0 ppm; sample biased toward black silty material
PE2PIPE18.2-8.4-0117 and PE2PIPE18.2-8.4F-0117	11/20/2012 11:48	8.2 - 8.4 (inside pipe)	Liquid	List 2	None	Liquid sample from inside PIPE 1; clear, no noticeable sheen, slight decaying organic material odor (i.e., methane/H2S)
PE2PIPE28.3-8.6-0119 and PE2PIPE28.3-8.6F-0119	11/20/2012 13:00	8.3 - 8.6 (inside pipe)	Liquid	List 2	None	Liquid sample from inside PIPE 2; clear, no noticeable sheen, slight decaying organic material odor (i.e., methane/H2S)
PE2PIPE38.3-8.7-0118 and PE2PIPE38.3-8.7F-0118	11/20/2012 12:25	8.3 - 8.7 (inside pipe)	Liquid	List 2	None	Liquid sample from inside PIPE 3; clear, no noticeable sheen or odor
PE2PIPE3SED-0120	11/20/2012 16:00:00 PM	inside pipe	Sediment	Limited volume - gamma spec/iso-U/iso-Th only	None	Sediment sample from around inside of PIPE 3; hard clumps of black scale, wet on outer surface, no odor, botryoidal texture on outer surface; PID = 0.0 ppm

Notes: List 1 Analytical Parameters =

VOCs; SVOCs; Pesticides; PCBs; TAL Metals; Total U; gamma spec/iso-U/iso-Th

List 2 Analytical Parameters =

Unfiltered: VOCs; SVOCs; Pesticides; PCBs; TAL Metals; Total U; Anions; Alkalinity; TDS; Ra-226; Ra-228; iso-U/iso-Th  
 Filtered: TAL Metals; Total U; Ra-226; Ra-228; iso-U/iso-Th

**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

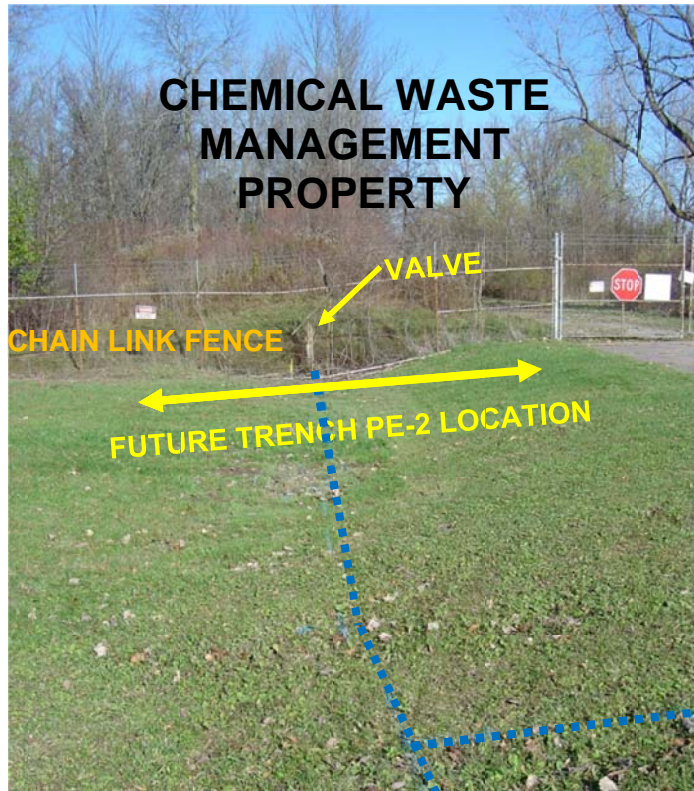
**Job Number:**  
11176781.00004

**Photo No.**  
PE2-1

**Date:**  
11/8/2012

**Description:**

An northward view from "N" Street (northeast corner of EU 2) showing the geophysical survey markouts (blue lines) for suspected water lines near location PE-2. The chain link fence separates the NFSS (to the south) and Chemical Waste Management (to the north) properties.



**Photo No.**  
PE2-2

**Date:**  
11/20/2012

**Description:**

A northward view from "N" Street (northeast corner of EU 2) showing location PE-2 just before excavation activities commenced.





**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

**Job Number:**  
11176781.00004

**Photo No.**  
PE2-3

**Date:**  
11/20/2012

**Description:**

A northeastward view of the equipment set up at location PE-2 during excavation of the trench.

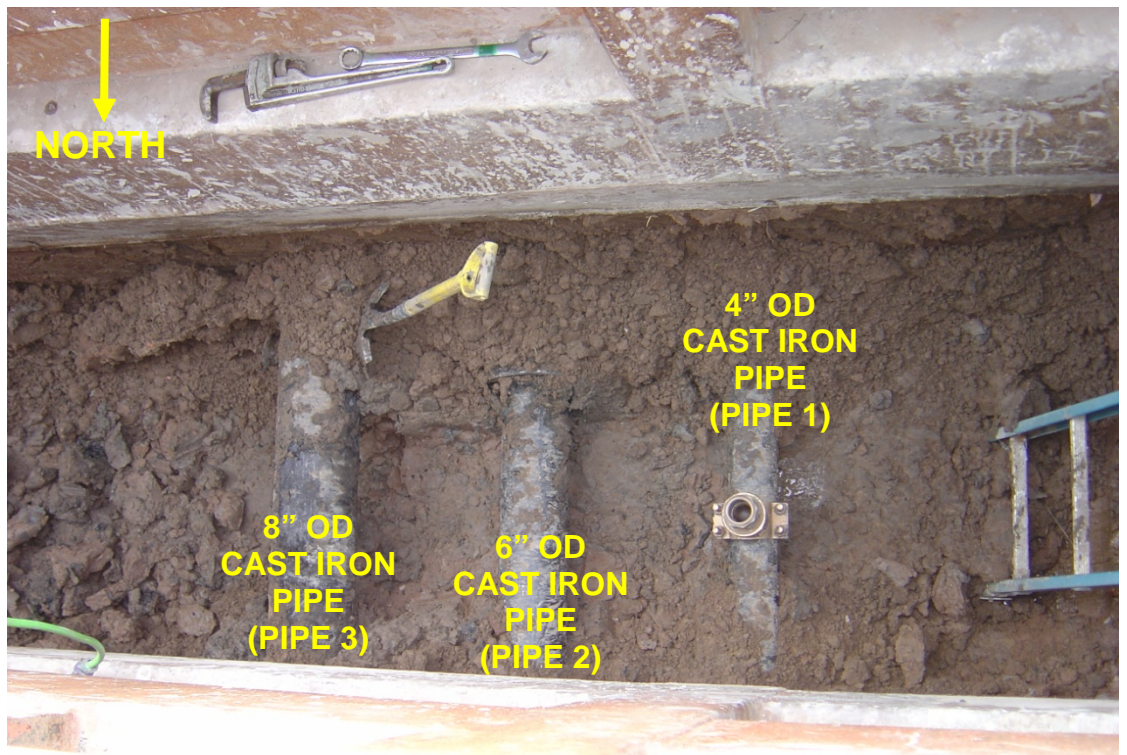


**Photo No.**  
PE2-4

**Date:**  
11/20/2012

**Description:**

A view of the bottom of trench PE-2 showing the 3 pipes encountered. Tops of pipes were at ~8' below ground surface (bgs). Brass saddle clamps with valves were installed on the pipes to evaluate if the contents were under pressure: contents of PIPE 1 were under pressure (~525 gallons of water were pumped from PIPE 1 to lower the head enough to permit sealing of the pipe); contents of PIPE 2 were under pressure (~300 gallons of water were pumped from PIPE 2 to lower the head enough to permit sealing of the pipe); and contents of PIPE 3 were under pressure (~1,550 gallons of water were pumped from PIPE 3 to lower the head enough to permit sealing of the pipe).





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(Lewiston, NY) BOP Field Investigation**

**Client: USACE**

**Excavation Contractor: Russo Development**

**Job Number:  
11176781.00004**

**Photo No.**  
PE2-5

**Date:**  
11/20/2012

**Description:**

A view of the dark brown silty loam surficial soil (center of photo) and underlying brown silty clay (upper right and lower left corners of photo) encountered at location PE-2.



**Photo No.**  
PE2-6

**Date:**  
11/20/2012

**Description:**

A view of the reddish brown silty clay (upper portion of photo) encountered at location PE-2. Note gray silty partings (center of photo) and yellowish brown fine sandy lenses (lower half of photo) encountered in the reddish brown silty clay. The fine sandy lenses were slightly moist, but did not produce water.





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**Client: USACE**

**Excavation Contractor: Russo Development**

**Job Number:  
11176781.00004**

**Photo No.**  
PE2-7 &  
PE2-8

**Date:**  
11/21/2012

**Description:**

An eastward view of PE-2 after PIPE1 – PIPE3 were cut open and the interiors were filled with Speed Crete Red Line concrete (left) to prevent liquid migration within the pipes. The open window in PIPE 3 was cut to verify that the pipe was adequately sealed. Afterward, these pipes were encased in 2 yds<sup>3</sup> of concrete-bentonite mixture to prevent liquid migration along the outside of the pipes (right); the open window in PIPE3 was also filled by this concrete. Top of concrete-bentonite mixture over pipes was brought up to ~7' bgs.



**Photo No.**  
PE2-9

**Date:**  
11/27/2012

**Description:**

A westward view of trench PE-2 after it had been backfilled with the previously excavated soils. Soils were placed back into the excavation in 1'-2' lifts and compacted with the excavator bucket. The 4 corners of the excavation were marked with wooden stakes and later surveyed.



## URS Corporation

## EXCAVATION LOG

<b>PROJECT:</b> Niagara Falls Storage Site (Lewiston, NY) BOP Field Investigation		<b>EXCAVATION ID:</b> PE-3
<b>CLIENT/OWNER:</b> USACE	<b>JOB NUMBER:</b> 11176781.00004	
<b>DATE STARTED:</b> 11/13/2012	<b>URS GEOLOGIST:</b> [REDACTED]	
<b>DATE COMPLETED:</b> 11/27/2012	<b>URS HEALTH PHYSICIST:</b> [REDACTED]	
<b>CONTRACTOR:</b> Russo Development	<b>RUSSO OPERATOR &amp; LABORER:</b> [REDACTED]	
<b>EQUIPMENT:</b> John Deere 200 LC excavator, support truck and trailer, trench box (20'L x 8'D x 5'W), aluminum catwalk		
<b>LOCATION:</b> Near northeastern corner of EU 12, between Castle Garden Road and chain-link fence		
<b>PURPOSE:</b> Expose and plug 3 former water lines		
<b>CORNER COORDINATES:</b> (NE Cor.) 1171793.309, E - 1042527.718, Elev. 317.66; (NW Cor.) 1171793.328, E - 1042523.851, Elev. 317.70; (SW Cor.) N - 1171743.028, E - 1042523.348, Elev. 318.16; (SE Cor.) N - 1171743.317, E - 1042527.966, Elev. 317.72		
<b>FINAL EXCAVATION DIMENSIONS:</b> ~50' long x 4.2' wide x 11' deep		
DEPTH (FT)	VERTICAL PROFILE DESCRIPTION	
1	0 - 2.5' below ground surface (bgs): FILL/REWORKED MATERIAL (ML to GM) - Dark brown silty loam, moist, friable, granular structure, some grass, many fine roots with trace to some angular to subangular gray sand/gravel/cobble mix (gray, subangular, vesicular slag-like pieces are a minor component of this mix).	
5	2.5' - 5.0' bgs: Brown SILTY CLAY (CL), trace rounded gravel, moist, stiff, slightly plastic, blocky structure, some distinct orange mottles.	
	5.0' - 11.0' bgs: Reddish brown SILTY CLAY (CL), trace rounded gravel, moist, stiff to medium stiff, plastic, blocky structure.	
	Four pipes were found at a depth of ~6.5' bgs.	
10	Maximum depth 11.0' bgs	

**URS Corporation****EXCAVATION LOG**

<b>PROJECT:</b> Niagara Falls Storage Site (Lewiston, NY) BOP Field Investigation		<b>EXCAVATION ID:</b> PE-3
<b>CLIENT/OWNER:</b> USACE	<b>JOB NUMBER:</b> 11176781.00004	
<b>DATE STARTED:</b> 11/13/2012	<b>URS GEOLOGIST:</b>	
<b>DATE COMPLETED:</b> 11/27/2012	<b>URS HEALTH PHYSICIST:</b>	
<b>CONTRACTOR:</b> Russo Development	<b>RUSSO OPERATOR &amp; LABORER:</b>	

**COMMENTS:** Trench was oriented in a north-south direction.

PID readings on excavated soils were 0 ppm, no visual or olfactory signs of contamination.

Four cast iron pipes were found, from north to south: 10" ID [PIPE 1]; 10" ID [PIPE 2]; 12" ID [PIPE 3]; and 36" ID [PIPE 4]. All pipes crossed the trench in an east-west orientation. No bedding material was found around PIPES 1-3. The pipes appeared to be backfilled with native silty clay soils. The southern 36" ID pipe had some angular gravel in a clay matrix beneath the pipe and wooden cribbing pieces around the pipe.

A small amount of groundwater seeped into the north end of the excavation, appearing to originate from around PIPES 1-3 and/or their backfill soils.

The tops of all pipes were encountered at ~6.5' below ground surface.

Brass saddle clamps with valves were installed on the pipes to enable the collection of water samples and control pipe dewatering.

- PIPE 1 released some gas, the water in the pipe was not under pressure.
- Pipe 2 was not under pressure.
- PIPE 3 was under gravity pressure. ~450 gallons of water were pumped from the pipe to lower the head below the top of the pipe.
- PIPE 4 was under gravity pressure. ~1800 gallons of water pumped from the pipe 4 with no significant decrease in head.

Following dewatering/collection of water samples, square openings were cut into the tops of the pipes. Sediment samples were collected from PIPE 1, 2, and 3. The pipe interiors were then filled with Speed Crete Red Line concrete/bentonite mixture. Afterward, the pipes were encased in 3 yd<sup>3</sup> of concrete/bentonite mixture to prevent liquid migration along the outside of the pipes.

Following the collection of a soil sample from beneath the pipe, the area below and around the sides of PIPE 4 was filled with 2.5 yds<sup>3</sup> of concrete/bentonite mixture to prevent liquid migration along the outside of the pipe. Later, following unsuccessful attempts to dewater the pipe, a window was scored into the top of the pipe with a chop saw and the window was broken with the excavator bucket and the inside of the pipe was immediately filled with 6.5 yds<sup>3</sup> of concrete/bentonite mixture.

Soils from the excavation were stockpiled on plastic. Upon completion of the pipeline plugging activities, the excavation was backfilled with the excavated soils in the order in which they were removed. The soils were placed back into the excavation in 1'-2' lifts and compacted with the excavator bucket.

Soil sample beneath PIPE 1 ID= PE3 SB1 8.0-8.5-0101  
 Soil sample beneath PIPE 2 ID= PE3 SB2 8.0-8.5-0102  
 Soil sample beneath PIPE 3 ID= PE3 SB3 8.0-8.5-0104  
 Soil sample beneath PIPE 4 ID= PE3 SB4 10.0-11.0-0110  
 PIPE 1 water sample ID= PE3 PIPE1 7.0-7.5-0103  
 PIPE 2 water sample ID= PE3 PIPE2 7.0-7.5-0105  
 PIPE 3 water sample ID= PE3 PIPE3 7.0-7.5-0106  
 PIPE 4 water sample ID= PE3 PIPE4 7.0-7.5-0111  
 PIPE 1 sediment sample ID= PE3 PIPE1 SED-0107  
 PIPE 2 sediment sample ID= PE3 PIPE2 SED-0108  
 PIPE 3 sediment sample ID= PE3 PIPE3 SED-0109

The excavation and excavated soils were scanned with a 2" NaI detector. Radiation measurements were within expected (e.g., ambient) values.

## INFORMATION FOR SAMPLES COLLECTED AT EXCAVATION PE-3

SAMPLE ID	COLLECTION DATE/TIME	SAMPLE DEPTH (feet bgs)	MATRIX	ANALYTICAL PARAMETERS	QA/QC	SAMPLE DESCRIPTION
PE3SB18.0-8.5-0101	11/13/2012 14:10	8.0 - 8.5	Soil	List 1	None	Soil sample from beneath PIPE 1; dark brown to dark gray silty clay, trace rounded gravel (moist to wet, medium stiff, slightly plastic); PID = 0.0 ppm, no odor
PE3SB28.0-8.5-0102	11/13/2012 14:20	8.0 - 8.5	Soil	List 1	None	Soil sample from beneath PIPE 2; dark brown to dark gray silty clay, trace rounded gravel (moist to wet, medium stiff, slightly plastic); PID = 0.0 ppm, no odor
PE3SB38.0-8.5-0104 and PE3SB38.0-8.5D-9101	11/13/2012 15:20	8.0 - 8.5	Soil	List 1	Duplicate	Soil sample from beneath PIPE 3; dark brown to reddish brown silty clay, trace rounded gravel (moist to wet, medium stiff, slightly plastic); PID = 0.0 ppm, no odor
PE3SB410-11-0110	11/15/2012 09:45	10.0 - 11.0	Soil	List 1	MS/MSD	Soil sample from beneath PIPE 4; brown to reddish brown silty clay (moist, stiff, plastic), trace rounded gravel, common distinct orange mottles, some areas of dark brown to black silty loam with fine roots; PID = 0.0 ppm, no odor
PE3PIPE17.0-7.5-0103 and PE3PIPE17.0-7.5F-0103	11/13/2012 15:10	7.0 - 7.5 (inside pipe)	Liquid	List 2	None	Liquid sample from inside PIPE 1; clear to slightly yellowish, no noticeable sheen or odor
PE3PIPE27.0-7.5-0105 and PE3PIPE27.0-7.5F-0105	11/13/2012 15:50	7.0 - 7.5 (inside pipe)	Liquid	List 2	None	Liquid sample from inside PIPE 2; clear, no noticeable sheen or odor
PE3PIPE37.0-7.5-0106 PE3PIPE37.0-7.5F-0106 PE3PIPE37.0-7.5D-9102 PE3PIPE37.0-7.5FD-9102	11/14/2012 09:30	7.0 - 7.5 (inside pipe)	Liquid	List 2	Duplicate	Liquid sample from inside PIPE 3; clear, no noticeable sheen or odor
PE3PIPE46.6-7.0-0111 and PE3PIPE46.6-7.0F-0111	11/15/2012 10:55	6.6 - 7.0 (inside pipe)	Liquid	List 2	None	Liquid sample from inside PIPE 4; clear, no noticeable sheen or odor
PE3PIPE1SED-0107	11/14/2012 11:30	inside pipe	Sediment	Limited volume - Total U and gamma spec/iso-U/iso-Th only	None	Sediment sample from bottom of PIPE 1; dark gray silt-clay size sediment, wet, slight decaying organic material odor (i.e., methane/H <sub>2</sub> S)
PE3PIPE2SED-0108	11/14/2012 11:55	inside pipe	Sediment	Limited volume - gamma spec/iso-U/iso-Th only	None	Sediment sample from around inside of PIPE 2; hard clumps of black scale, wet on outer surface, no odor, botryoidal texture on outer surface
PE3PIPE3SED-0109	11/14/2012 13:55	inside pipe	Sediment	List 1	None	Sediment sample from bottom of PIPE 3; black silt-clay size sediment, wet, slight petroleum hydrocarbon odor, slight sheen, inky/sticky/staining; PID = 0.0 ppm

Notes: List 1 Analytical Parameters =

VOCs; SVOCs; Pesticides; PCBs; TAL Metals; Total U; gamma spec/iso-U/iso-Th

List 2 Analytical Parameters =

Unfiltered: VOCs; SVOCs; Pesticides; PCBs; TAL Metals; Total U; Anions; Alkalinity; TDS; Ra-226; Ra-228; iso-U/iso-Th

Filtered: TAL Metals; Total U; Ra-226; Ra-228; iso-U/iso-Th



**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

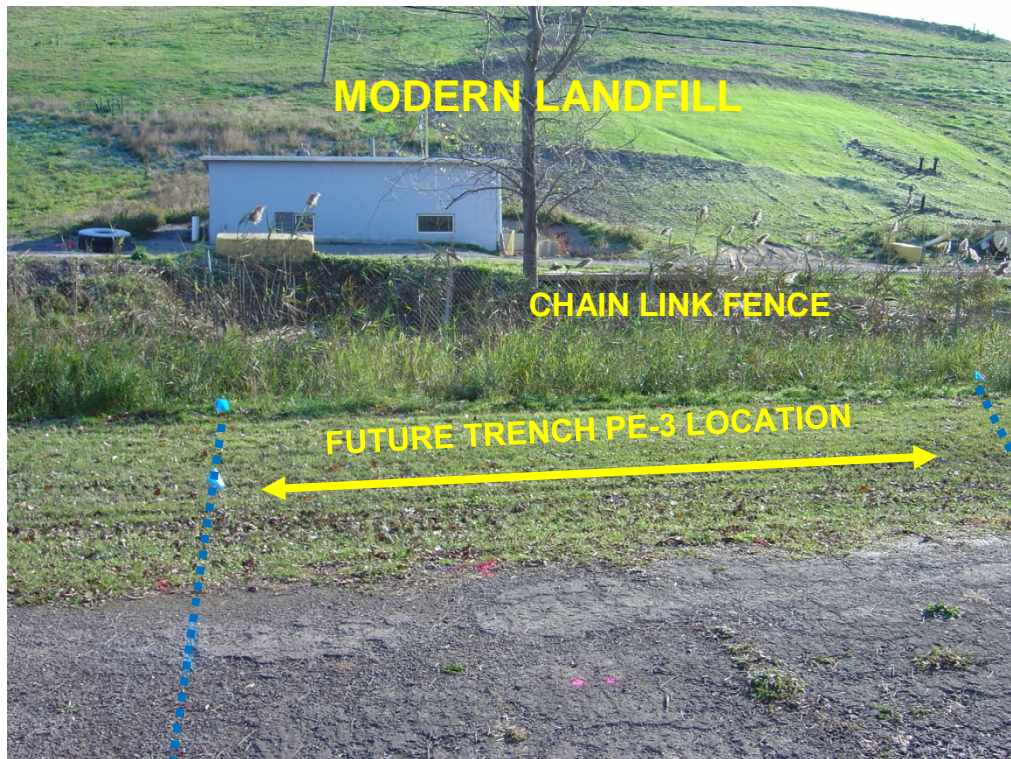
**Job Number:**  
11176781.00004

**Photo No.**  
PE3-1

**Date:**  
11/8/2012

**Description:**

An eastward view from the asphalt access road on the east side of EU 12 showing the geophysical survey markouts (2 blue lines/blue flags) for suspected water lines at location PE-3. The chain link fence separates the NFSS and Modern Landfill properties; Modern Landfill is the mound in the background.



**Photo No.**  
PE3-2

**Date:**  
11/13/2012

**Description:**

A southward view from the asphalt access road on the east side of EU 12 showing location PE-3 just before excavation activities commenced. Modern Landfill is in the left center portion of the photo.





**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

**Job Number:**  
11176781.00004

**Photo No.**  
PE3-3

**Date:**  
11/8/2012

**Description:**

A view of the west sidewall at the north end of trench PE-3; approximately 6' total trench depth. The strata are labeled on the photo.

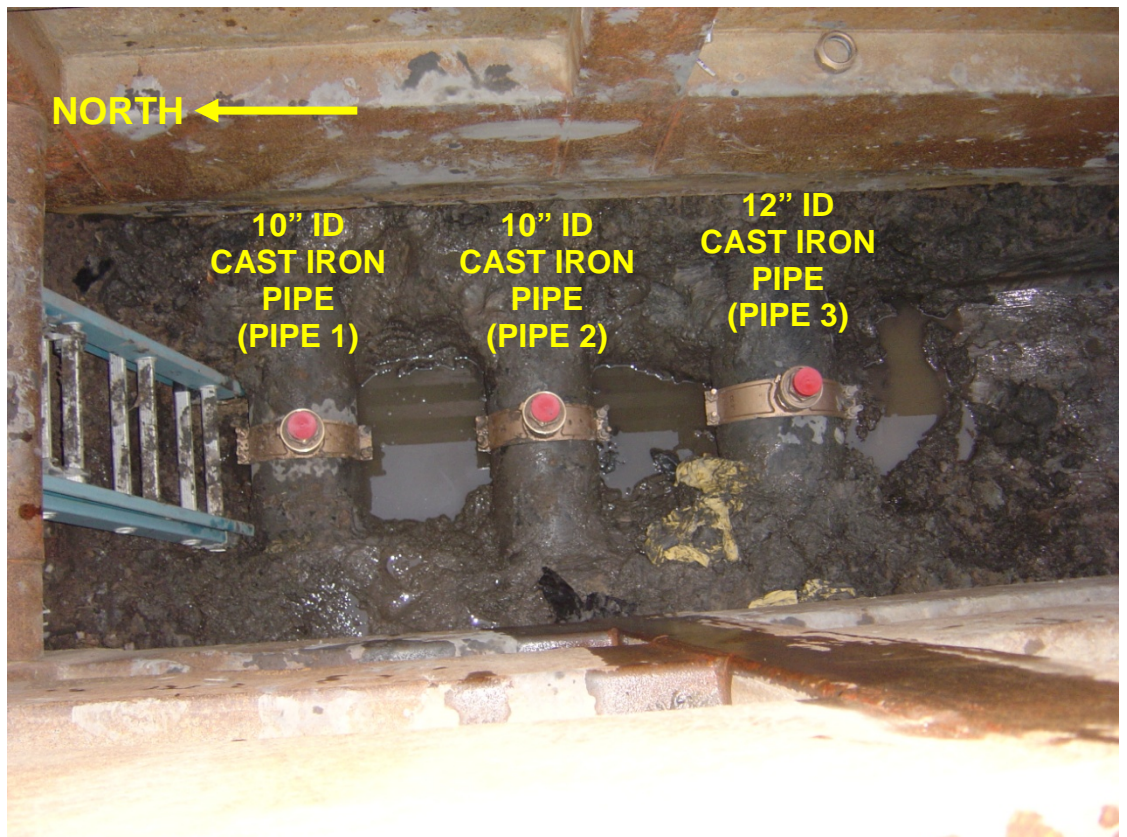


**Photo No.**  
PE3-4

**Date:**  
11/13/2012

**Description:**

A view of the bottom of the north end of trench PE-3 showing the 3 pipes encountered. Tops of pipes were at ~6.5' below ground surface (bgs). Brass saddle clamps with valves were installed on the pipes to evaluate if the contents were under pressure: PIPE 1 contained some gas under pressure, but liquid contents did not flow out of pipe; contents of PIPE 2 were not under pressure; and contents of PIPE 3 were under pressure (~450 gallons of water were pumped from PIPE 3 to lower the head enough to permit sealing of the pipe).





**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

**Job Number:**  
11176781.00004

**Photo No.**  
PE3-5

**Date:**  
11/14/2012

**Description:**

Sample PE3PIPE2SED,  
hard black scale  
collected from the inside  
of PIPE 2.



**Photo No.**  
PE3-6

**Date:**  
11/13/12

**Description:**

A southward view of the  
equipment set up at  
location PE-3 during  
excavation of the north  
end of the trench.





**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

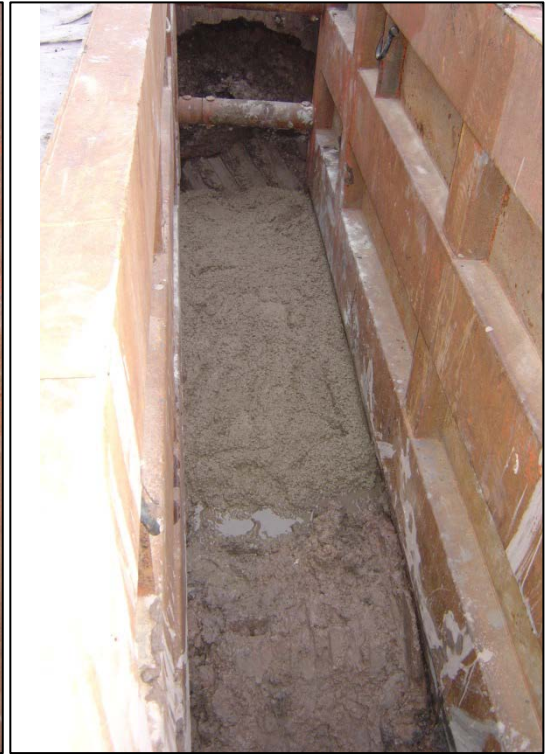
**Job Number:**  
11176781.00004

**Photo No.**  
PE3-7 &  
PE3-8

**Date:**  
11/14/2012

**Description:**

A northward view of the north end of trench PE-3 after PIPE1 – PIPE3 were cut open and the interiors were filled with Speed Crete Red Line concrete and bricks (left) to prevent liquid migration within the pipes. Afterward, these pipes were encased in 3 yds<sup>3</sup> of concrete-bentonite mixture to prevent liquid migration along the outside of the pipes (right). Top of concrete-bentonite mixture over pipes was brought up to ~5' bgs.



**Photo No.**  
PE3-9

**Date:**  
11/14/2012

**Description:**

A southward view of the south end of trench PE3 showing the excavation of the 36" ID pipe (PIPE 4). The top of the pipe was encountered at ~6.5' bgs.





**Project: Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation**

**Client: USACE**

**Excavation Contractor: Russo Development**

**Job Number:  
11176781.00004**

**Photo No.**  
PE3-10

**Date:**  
11/19/2012

**Description:**

Top of PIPE 4 after the areas below and around the pipe had been filled with 2.5 yds<sup>3</sup> of concrete-bentonite mixture on 11-16-2012 to prevent liquid migration along the outside of the pipe. A window was scored into the top of the pipe on 11-19-2012. The excavator later broke the window as a concrete conveyor truck filled the inside and top of PIPE 4 with 6.5 yds<sup>3</sup> of concrete. The top of concrete over PIPE 4 was brought up to ~3.4' bgs.



**Photo No.**  
PE3-11

**Date:**  
11/27/2012

**Description:**

A southward view from the asphalt access road of trench PE-3 after it had been backfilled with the previously excavated soils. Soils were placed back into the excavation in 1'-2' lifts and compacted with the excavator bucket. The 4 corners of the excavation were marked with wooden stakes and later surveyed.



## URS Corporation

## EXCAVATION LOG

<b>PROJECT:</b> Niagara Falls Storage Site (Lewiston, NY) BOP Field Investigation		<b>EXCAVATION ID:</b> PE-4
<b>CLIENT/OWNER:</b> USACE	<b>JOB NUMBER:</b> 11176781.00004	
<b>DATE STARTED:</b> 12/11/2012	<b>URS GEOLOGIST:</b>	
<b>DATE COMPLETED:</b> 12/12/2012	<b>URS HEALTH PHYSICIST:</b>	
<b>CONTRACTOR:</b> Russo Development	<b>RUSO OPERATOR &amp; LABORER:</b>	
<b>EQUIPMENT:</b> John Deere 200 LC excavator, support truck and trailer, trench box (20'L x 8'D x 5'W), aluminum catwalk		
<b>LOCATION:</b> Near southeastern corner of EU 5, between O Street and chain link fence		
<b>PURPOSE:</b> Expose and plug 4 former water lines		
<b>CORNER COORDINATES:</b> (NE Cor.) N - 1172607.014, E - 1044047.332, Elev. 320.83; (NW Cor.) N - 1172608.167, E - 1044008.329, Elev. 319.83; (SW Cor.) N - 1172603.832, E - 1044008.514, Elev. 319.84;		
(SE Cor.) N - 1172601.449, E - 1044046.548, Elev. 319.74		
<b>FINAL EXCAVATION DIMENSIONS:</b> ~34' long x 4.5' wide x 8.3' deep		
DEPTH (FT)	VERTICAL PROFILE DESCRIPTION	
1	0 - 1.5' below ground surface (bgs): FILL/REGRADED MATERIAL (ML/CL) - Brown silty clay loam, moist, friable, granular structure, some grass, many fine roots, trace rounded gravel.	
	1.5' - 2.5' bgs: Grayish brown to yellowish brown to brown SILTY CLAY (CL), moist, medium stiff, plastic, platy to blocky structure, some orange and gray mottles, trace rounded gravel and cobbles.	
	2.5' - 8.3' bgs: Reddish brown SILTY CLAY (CL), moist, stiff to medium stiff, plastic, blocky structure, trace rounded gravel and cobbles.	
5	Three pipes found at ~6' bgs; one 36" pipe found at 3.8' bgs. Trace to some fine sand beneath pipes.	
	No groundwater in excavation.	
8	Maximum depth 8.3' bgs.	
Plan View		Cross Section

**URS Corporation****EXCAVATION LOG**

<b>PROJECT:</b> Niagara Falls Storage Site (Lewiston, NY) BOP Field Investigation		<b>EXCAVATION ID: PE-4</b>
<b>CLIENT/OWNER:</b> USACE	<b>JOB NUMBER:</b> 11176781.00004	
<b>DATE STARTED:</b> 12/11/2012	<b>URS GEOLOGIST:</b>	
<b>DATE COMPLETED:</b> 12/12/2012	<b>URS HEALTH PHYSICIST:</b>	
<b>CONTRACTOR:</b> Russo Development	<b>RUSSO OPERATOR &amp; LABORER:</b>	

**COMMENTS:** Trench was oriented in an east-west direction.

PID readings on excavated soils were 0 ppm, no visual or olfactory signs of contamination.

Four cast iron pipes, from west to east: 8" ID [PIPE 1]; 10" ID [PIPE 2]; 12" ID [PIPE 3]; and 36" ID [PIPE 4] crossed the trench in an north-south orientation. PIPE 1 had some concrete encasement around hubs (former repair?).

PIPEs 1 through 3 were found at a depth of ~6.2' bgs. PIPE 4 was found at a depth of ~ 3.8' bgs.

No bedding material was found around the pipes. The pipes appeared to have been backfilled with native silty clay soils, although a trace to some fine sand was noted beneath the pipes (former leveling agent?).

Brass saddle clamps with valves were installed on the pipes to enable collection of water samples and to control pipeline dewatering.

- PIPE 1 was under gravity pressure. ~425 gallons of water were pumped from PIPE 1 to lower the head below the top of the pipe. No sediment in pipe.
- PIPE 2 was under gravity pressure. ~525 gallons of water were pumped from PIPE 2 to lower the head below the top of the pipe.
- PIPE 3 was under gravity pressure. ~725 gallons of water were pumped from PIPE 3 to lower the head below the top of the pipe. No sediment in pipe.
- PIPE 4 was not under gravity pressure and no pumping was necessary at this location. The inside and areas around PIPE 4 were filled with 7 yds<sup>3</sup> of concrete. No sediment in pipe.

A square opening was cut into the top of each pipe. A sediment sample was collected from PIPE 2; no sediment was in the other pipes. The pipes were then with a Speed Crete Red Line concrete/bentointe mixture. Afterward, the pipes were encased in 2.5 yd<sup>3</sup> of concrete-bentonite mixture to prevent liquid migration along the outside of the pipes.

Soils from the excavation were stockpiled on plastic. Upon completion of the pipeline plugging activities, the excavation was backfilled with the excavated soils in the order in which they were removed. The soils were placed back into the excavation in 1'-2' lifts and compacted with the excavator bucket.

Soil sample beneath PIPE 1 ID= PE4 SB1 7.0-5.5-0168  
 Soil sample beneath PIPE 2 ID= PE4 SB2 7.0-7.5-0169  
 Soil sample beneath PIPE 3 ID= PE4 SB3 7.0-7.5-0170  
 Soil sample beneath PIPE 4 ID= PE4 SB4 7.1-7.6-0176  
 PIPE 1 water sample ID= PE4 PIPE1 6.4-7.0-0173  
 PIPE 2 water sample ID= PE4 PIPE2 6.4-7.0-0172  
 PIPE 3 water sample ID= PE4 PIPE3 6.4-7.0-0171  
 PIPE 4 water sample ID= PE4 PIPE4 4.5-6.8-0175  
 PIPE 2 sediment sample ID= PE4 PIPE2 SED-0174

The excavation and excavated soils were scanned with a 2" NaI detector. Radiation measurements were within expected (e.g., ambient) values.

## INFORMATION FOR SAMPLES COLLECTED AT EXCAVATION PE-4

SAMPLE ID	COLLECTION DATE/TIME	SAMPLE DEPTH (feet bgs)	MATRIX	ANALYTICAL PARAMETERS	QA/QC	SAMPLE DESCRIPTION
PE4SB17.0-7.5-0168	12/11/2012 10:20	7.0 - 7.5	Soil	List 1	None	Soil sample from beneath PIPE 1; brown to reddish brown silty clay, trace subrounded to subangular gravel, common distinct orange and gray mottles (moist to wet, medium stiff, very plastic); PID = 0.0 ppm, no odor
PE4SB27.5-8.0-0169	12/11/2012 10:40	7.5 - 8.0	Soil	List 1	None	Soil sample from beneath PIPE 2; brown to reddish brown silty clay, trace to some fine sand, trace subrounded to subangular gravel, common distinct orange and gray mottles (moist, stiff, plastic); PID = 0.0 ppm, no odor
PE4SB37.5-8.0-0170	12/11/2012 10:30	7.5 - 8.0	Soil	List 1	None	Soil sample from beneath PIPE 3; brown to reddish brown silty clay, trace to some fine sand, trace subrounded to subangular gravel, common distinct orange and gray mottles (moist, stiff, plastic); PID = 0.0 ppm, no odor
PE4SB47.1-7.6-0176	12/12/2012 12:45	7.1 - 7.6	Soil	List 1	None	Soil sample from beneath PIPE 4; yellowish brown to grayish brown to brown to reddish brown silty clay (slightly moist to moist, stiff, slightly plastic to very plastic), trace subrounded gravel; PID = 0.0 ppm, no odor
PE4PIPE16.4-7.0-0173 and PE4PIPE16.4-7.0F-0103	12/11/2012 13:42	6.4 - 7.0 (inside pipe)	Liquid	List 2	None	Liquid sample from inside PIPE 1; clear, no noticeable sheen, filtered sample had a slight sulphury odor
PE4PIPE26.4-7.2-0172 and PE4PIPE26.4-7.2F-0172	12/11/2012 13:03	6.4 - 7.2 (inside pipe)	Liquid	List 2	None	Liquid sample from inside PIPE 2; clear, no noticeable sheen or odor
PE4PIPE36.4-7.4-0171 and PE4PIPE36.4-7.4F-0171	12/11/2012 12:07	6.4 - 7.4 (inside pipe)	Liquid	List 2	None	Liquid sample from inside PIPE 3; initially grayish with slight sulphury odor (4L unfiltered aliquot for iso U/iso Th/Ra-228 analysis), then became clear with no odor; no noticeable sheen
PE4PIPE44.5-6.8-0175 PE4PIPE44.5-6.8F-0175 PE4PIPE44.5-6.8D-9118 PE4PIPE44.5-6.8DF-9118	12/12/2012 10:35	4.5 - 6.8 (inside pipe)	Liquid	List 2	Duplicate	Liquid sample from inside PIPE 4; some fine rust particulates initially, then became clear; no noticeable sheen or odor
PE4PIPE2SED-0174	12/11/2012 14:19	inside pipe	Sediment	List 1	None	Sediment sample from around inside of PIPE 2; hard clumps of black scale, appears to be some silver and gold colored metallic slivers in the black scale matrix, wet on outer surface, no odor, botryoidal texture on outer surface

Notes: List 1 Analytical Parameters =

VOCs; SVOCs; Pesticides; PCBs; TAL Metals; Total U; gamma spec/iso-U/iso-Th

List 2 Analytical Parameters =

Unfiltered: VOCs; SVOCs; Pesticides; PCBs; TAL Metals; Total U; Anions; Alkalinity; TDS; Ra-226; Ra-228; iso-U/iso-Th

Filtered: TAL Metals; Total U; Ra-226; Ra-228; iso-U/iso-Th



**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

**Job Number:**  
11176781.00004

**Photo No.**  
PE4-1

**Date:**  
12/7/2012

**Description:**

A southwestward view from the asphalt access road ("O" Street) near the southeast corner of EU 5 showing the geophysical survey being conducted to locate suspected water lines at location PE-4 (blue line shows approximate location of group of 3 pipes). The chain link fence separates the NFSS and Modern Landfill properties; Modern Landfill is the mound in the background.



**Photo No.**  
PE4-2

**Date:**  
12/11/2012

**Description:**

An eastward view of the equipment set up at location PE-4 during excavation of the west end of the trench.





**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

**Job Number:**  
11176781.00004

**Photo No.**  
PE4-3

**Date:**  
12/11/2012

## Description:

A view of the bottom of the west end of trench PE-4 showing the 3 pipes encountered. Tops of pipes were at ~6.2-6.3' below ground surface (bgs). Brass saddle clamps with valves were installed on the pipes to evaluate if the contents were under pressure: contents of PIPE 1 were under pressure (~425 gallons of water were pumped from PIPE 1 to lower the head enough to permit sealing of the pipe); contents of PIPE 2 were under pressure (~525 gallons of water were pumped from PIPE 2 to lower the head enough to permit sealing of the pipe); and contents of PIPE 3 were under pressure (~725 gallons of water were pumped from PIPE 3 to lower the head enough to permit sealing of the pipe).



**Photo No.**  
PE4-4

**Date:**  
12/11/2012

## Description:

Sample PE4PIPE2SED, hard black scale collected from the inside of PIPE 2.





**Project: Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation**

**Client: USACE**

**Excavation Contractor: Russo Development**

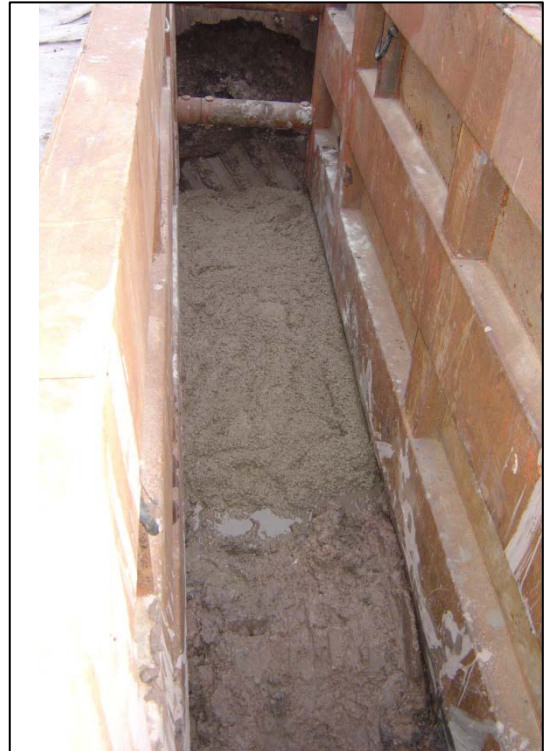
**Job Number:  
11176781.00004**

**Photo No.**  
PE4-5 &  
PE4-6

**Date:**  
12/11/2012

**Description:**

An eastward view of the west end of trench PE-4 after PIPE1 – PIPE3 were cut open and the interiors were filled with Speed Crete Red Line concrete (left) to prevent liquid migration within the pipes. Afterward, these pipes were encased in 2.5 yds<sup>3</sup> of concrete-bentonite mixture to prevent liquid migration along the outside of the pipes (right). Top of concrete-bentonite mixture over pipes was brought up to ~5' bgs.



**Photo No.**  
PE4-7

**Date:**  
12/12/12

**Description:**

A northward view of the east end of trench PE4 showing the excavated 36" ID pipe (PIPE 4). The top of the pipe was encountered at ~3.8' bgs. The contents of the pipe were not under pressure and no pumping was necessary at this location. Pipe cutting and sampling activities were performed with soils excavated to ~4' bgs. Soils were subsequently excavated to ~8.3 bgs (this view) to permit sealing around and under the pipe with concrete-bentonite mixture.





**Project: Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation**

**Client: USACE**

**Excavation Contractor: Russo Development**

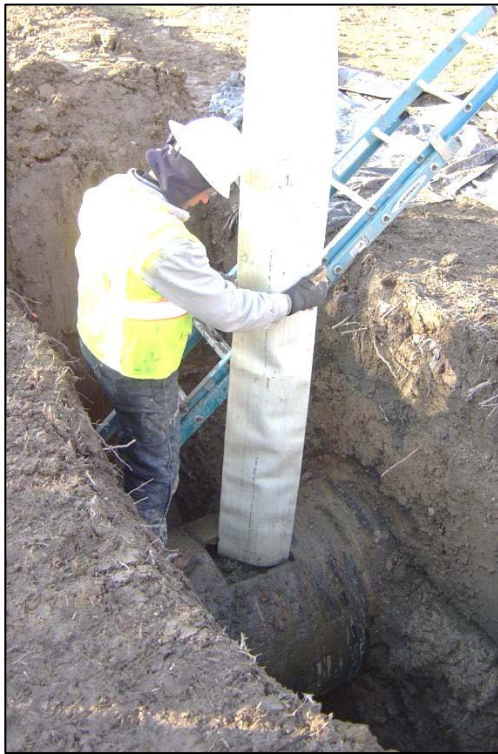
**Job Number:  
11176781.00004**

**Photo No.**  
PE4-8 &  
PE4-9

**Date:**  
12/14/2012

**Description:**

A northwestward view of the east end of trench PE-4 while PIPE4 is being filled with a concrete-bentonite mixture (left) from a concrete conveyor truck to prevent liquid migration within the pipe. Afterward, the pipe was encased in the concrete-bentonite mixture to prevent liquid migration along the outside of the pipe (right). A total of 7 yds<sup>3</sup> of concrete-bentonite mixture were used to fill the interior and to cover PIPE 4. Top of concrete-bentonite mixture over pipes was brought up to ~2' bgs.



**Photo No.**  
PE4-10

**Date:**  
12/12/2012

**Description:**

A westward view of trench PE-4 after it had been backfilled with the previously excavated soils. Soils were placed back into the excavation in 1'-2' lifts and compacted with the excavator bucket. The 4 corners of the excavation were marked with wooden stakes and later surveyed.



## URS Corporation

## EXCAVATION LOG

<b>PROJECT:</b> Niagara Falls Storage Site (Lewiston, NY) BOP Field Investigation		<b>EXCAVATION ID:</b> PE-5
<b>CLIENT/OWNER:</b> USACE	<b>JOB NUMBER:</b> 11176781.00004	
<b>DATE STARTED:</b> 12/13/2012	<b>URS GEOLOGIST:</b>	
<b>DATE COMPLETED:</b> 12/14/2012	<b>URS HEALTH PHYSICIST:</b>	
<b>CONTRACTOR:</b> Russo Development	<b>RUSSO OPERATOR &amp; LABORER:</b>	
<b>EQUIPMENT:</b> John Deere 200 LC excavator, support truck and trailer, trench box (20'L x 8'D x 5'W), aluminum catwalk		
<b>LOCATION:</b> Near northwestern corner of EU 6, just south of chain link fence		
<b>PURPOSE:</b> Expose and plug 4 former water lines		
<b>CORNER COORDINATES:</b> (NE Cor.) N - 1173434.137, E - 1044050.111, Elev. 319.29; (NW Cor.) 1173433.455, E - 1043998.279, Elev. 319.35; (SW Cor.) N - 1173422.203, E - 1043998.990, Elev. 319.15; (SE Cor.) N - 1173422.233, E - 1044049.696, Elev. 319.65		
<b>FINAL EXCAVATION DIMENSIONS:</b> ~48' long x 12.5' wide x 8.5' deep		
<b>DEPTH (FT)</b>	<b>VERTICAL PROFILE DESCRIPTION</b>	
1	0 - 1.0' below ground surface (bgs): FILL/REWORKED MATERIAL (ML/CL) - Dark brown clay loam, moist, friable, granular structure, some grass, many fine to large roots, trace rounded gravel	
	1.0' - 2.0' bgs: Grayish brown to yellowish brown to brown SILTY CLAY (CL), moist, medium stiff, plastic, blocky structure, some orange and gray mottles, trace rounded gravel	
	2.0' - 8.5' bgs: Reddish brown SILTY CLAY (CL), slightly moist, stiff to hard, slightly plastic, blocky structure, trace rounded gravel and cobbles and gray silty-fine sandy partings	
5		
	No groundwater was encountered in the excavation.	
	Maximum depth 8.5' bgs	

Plan View

Cross Section

~ NOT TO SCALE ~

**URS Corporation****EXCAVATION LOG**

<b>PROJECT:</b> Niagara Falls Storage Site (Lewiston, NY) BOP Field Investigation		<b>EXCAVATION ID:</b> PE-5
<b>CLIENT/OWNER:</b> USACE	<b>JOB NUMBER:</b> 11176781.00004	
<b>DATE STARTED:</b> 12/13/2012	<b>URS GEOLOGIST:</b>	
<b>DATE COMPLETED:</b> 12/14/2012	<b>URS HEALTH PHYSICIST:</b>	
<b>CONTRACTOR:</b> Russo Development	<b>RUSSO OPERATOR &amp; LABORER:</b>	

**COMMENTS:** Trench was oriented in an east-west direction. The upper portion of the trench was benched (~4' wide x 2-3.3' high) to allow safe access/egress.

PID readings on excavated soils were 0 ppm, no visual or olfactory signs of contamination.

Four cast iron pipes, from west to east: 8" ID [PIPE 1], 10" ID [PIPE 2], 12" ID [PIPE 3], and 24" ID [PIPE 4] crossed the trench in a north-south orientation.

The tops of the pipes were encountered at ~5.0-5.5' bgs.

No bedding material was found around the pipes. They appeared to have been backfilled with native silty clay soils, although wood cribbing pieces and a trace to some fine sand was noted beneath the PIPES 1-3.

Brass saddle clamps with valves were installed on the pipes to enable the collection of water samples and to control pipeline dewatering.

- PIPE 1 was under gravity pressure. ~500 gallons of water were pumped from PIPE 1 to lower the head below the top of the pipe.
- PIPE 2 was not under pressure.
- PIPE 3 was under gravity pressure. ~400 gallons of water were pumped from PIPE 3 to lower the head below the top of the pipe. No sediment was present in PIPE 3.
- PIPE 4 was under gravity pressure. With USACE approval, a 15" square window was scored into the top of the pipe with a chop saw, the window was broken with the excavator bucket, and the inside of the pipe and area around the pipe was filled with 7.5 yds<sup>3</sup> of concrete to prevent liquid migration within and along the outside of the pipe.

Square openings were cut into the top of PIPES 1, 2, and 3 to enable to collection of sediment samples. The pipe interiors were then filled with a Speed Crete Red Line concrete/bentonite mixture. Afterward, these pipes were encased in 1.5 yd<sup>3</sup> of concrete-bentonite mixture to prevent liquid migration along the outside of the pipes.

Soils from the excavation were stockpiled on plastic. Upon completion of the pipeline plugging activities, the excavation was backfilled with the excavated soils in the order in which they were removed. The soils were placed back into the excavation in 1'-2' lifts and compacted with the excavator bucket.

Soil sample beneath PIPE 1 ID= PE5 SB1 6.1-6.5-0179  
 Soil sample beneath PIPE 2 ID= PE5 SB2 6.0-6.5-0181  
 Soil sample beneath PIPE 3 ID= PE5 SB3 6.0-6.5-0180  
 Soil sample beneath PIPE 4 ID= PE5 SB4 7.1-7.6-0178  
 PIPE 1 water sample ID= PE5 PIPE1 5.4-6.0-0182  
 PIPE 2 water sample ID= PE5 PIPE2 5.2-5.9-0183  
 PIPE 3 water sample ID= PE5 PIPE3 5.2-5.9-0184  
 PIPE 4 water sample ID= PE5 PIPE4 5.1-7.1-0177  
 PIPE 1 sediment sample ID= PE5 PIPE1SED-0185  
 PIPE 2 sediment sample ID= PE5 PIPE2SED-0186

The excavation and excavated soils were scanned with a 2" NaI detector. Radiation measurements were within expected (e.g., ambient) values.

## INFORMATION FOR SAMPLES COLLECTED AT EXCAVATION PE-5

SAMPLE ID	COLLECTION DATE/TIME	SAMPLE DEPTH (feet bgs)	MATRIX	ANALYTICAL PARAMETERS	QA/QC	SAMPLE DESCRIPTION
PE5SB16.1-6.5-0179	12/14/2012 9:15	6.1 - 6.5	Soil	List 1	None	Soil sample from beneath PIPE 1; reddish brown silty clay (slightly moist, hard, slightly plastic), trace angular coarse sand, subrounded gravel, and orange mottles; PID = 0.0 ppm, no odor
PE5SB26.0-6.5-0181	12/14/2012 9:20	6.0 - 6.5	Soil	List 1	None	Soil sample from beneath PIPE 2; reddish brown silty clay (slightly moist, hard, slightly plastic), trace angular coarse sand, subrounded gravel, and orange mottles; PID = 0.0 ppm, no odor
PE5SB36.0-6.5-0180	12/14/2012 9:18	6.0 - 6.5	Soil	List 1	None	Soil sample from beneath PIPE 3; reddish brown silty clay (slightly moist, hard, slightly plastic), trace angular coarse sand, subrounded gravel, and orange mottles; PID = 0.0 ppm, no odor
PE5SB47.1-7.6-0178	12/13/2012 12:30	7.1 - 7.6	Soil	List 1	None	Soil sample from beneath PIPE 4; yellowish brown to grayish brown to brown to reddish brown silty clay (slightly moist to moist, stiff, slightly plastic to very plastic), trace coarse sand and gravel, common distinct orange and gray mottles; PID = 0.0 ppm, no odor
PE5PIPE15.4-6.0-0182 and PE5PIPE15.4-6.0F-0182	12/14/2012 10:12	5.4 - 6.0 (inside pipe)	Liquid	List 2	None	Liquid sample from inside PIPE 1; initially clear, then grayish for ~5 liters (4L unfiltered aliquot for iso U/iso Th/Ra-228 analysis and 1L unfiltered aliquot for Ra-226 analysis), then clear again; slight sulphury odor throughout sampling; no noticeable sheen
PE5PIPE25.5-5.9-0183 and PE5PIPE25.5-5.9F-0183	12/14/2012 10:55	5.5 - 5.9 (inside pipe)	Liquid	List 2	None	Liquid sample from inside PIPE 2; clear, no noticeable sheen or odor
PE5PIPE35.2-5.9-0184 and PE5PIPE35.2-5.9F-0184	12/14/2012 11:45	5.2 - 5.9 (inside pipe)	Liquid	List 2	None	Liquid sample from inside PIPE 3; clear; no noticeable sheen or odor
PE4PIPE45.1-7.1-0177 and PE4PIPE45.1-7.1F-0177	12/13/2012 11:15	5.1 - 7.1 (inside pipe)	Liquid	List 2	None	Liquid sample from inside PIPE 4; clear, no noticeable sheen, slight decaying organic material odor (i.e., methane/H2S)
PE5PIPE1SED-0185	12/14/2012 12:05	inside pipe	Sediment	Limited volume - gamma spec/iso-U/iso-Th only	None	Sediment sample from around inside of PIPE 1; hard clumps of black scale, wet on outer surface, no odor, botryoidal texture on outer surface
PE5PIPE2SED-0186	12/14/2012 12:07	inside pipe	Sediment	Limited volume - gamma spec/iso-U/iso-Th only	None	Sediment sample from around inside of PIPE 2; hard clumps of black scale, wet on outer surface, no odor, botryoidal texture on outer surface

Notes: List 1 Analytical Parameters =

VOCs; SVOCs; Pesticides; PCBs; TAL Metals; Total U; gamma spec/iso-U/iso-Th

List 2 Analytical Parameters =

Unfiltered: VOCs; SVOCs; Pesticides; PCBs; TAL Metals; Total U; Anions; Alkalinity; TDS; Ra-226; Ra-228; iso-U/iso-Th

Filtered: TAL Metals; Total U; Ra-226; Ra-228; iso-U/iso-Th



**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

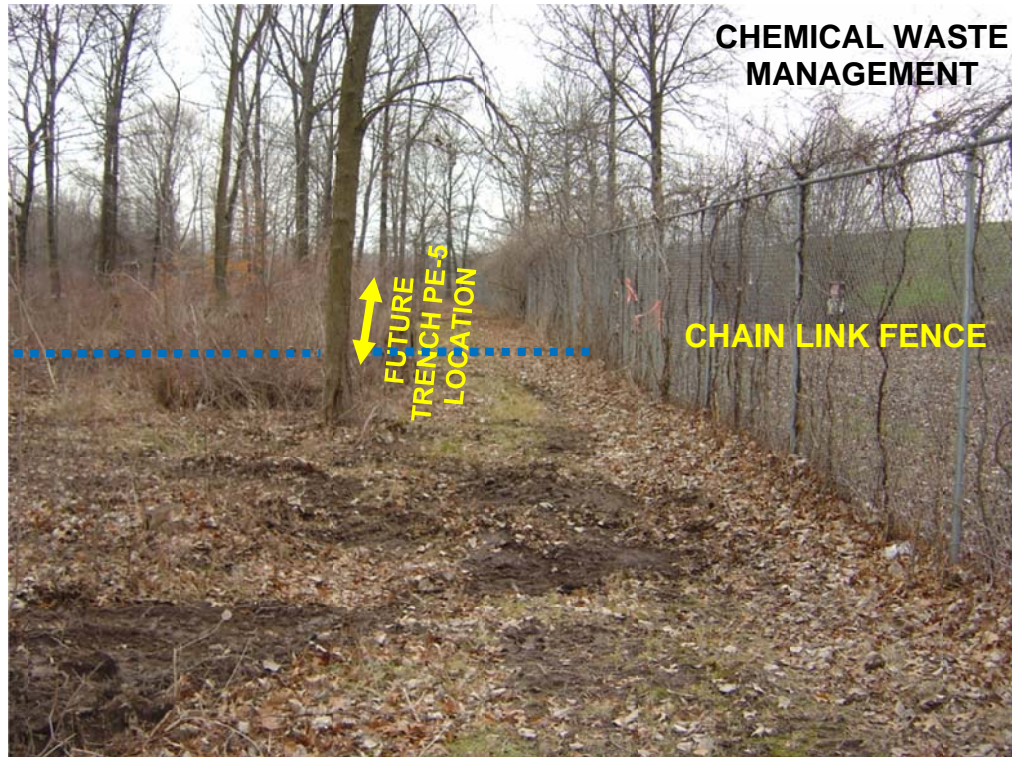
**Job Number:**  
11176781.00004

**Photo No.**  
PE5-1

**Date:**  
12/7/2012

**Description:**

A westward view along the chain link fence line separating the NFSS and Chemical Waste Management (CWM) properties; a CWM landfill is in the background behind the fence. The blue line shows the approximate location of the group of pipes at location PE-5 near the northwest corner of EU 6.



**Photo No.**  
PE5-2

**Date:**  
12/13/2012

**Description:**

A northward view from "N" Street during the construction of a gravel access road to facilitate rubber-tired vehicle access to proposed trench location PE-5. CWM landfill mound in background.





**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

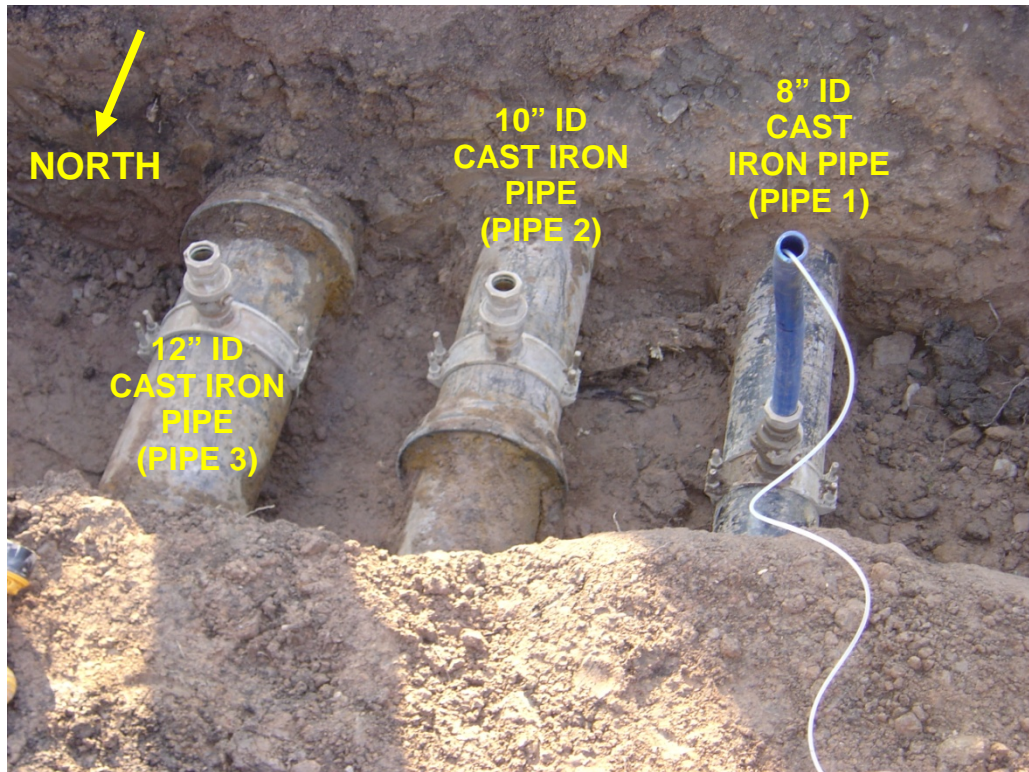
**Job Number:**  
11176781.00004

**Photo No.**  
PE5-3

**Date:**  
12/14/2012

**Description:**

A view of the bottom of the west end of test pit PE-5 showing the 3 pipes encountered. Tops of pipes were at ~5.0-5.5' below ground surface (bgs). Brass saddle clamps with valves were installed on the pipes to evaluate if the contents were under pressure: contents of PIPE 1 were under pressure (~500 gallons of water were pumped from PIPE 1 to lower the head enough to permit sealing of the pipe); contents of PIPE 2 were not under pressure; and contents of PIPE 3 were under pressure (~400 gallons of water were pumped from PIPE 3 to lower the head enough to permit sealing of the pipe).



**Photo No.**  
PE5-4

**Date:**  
12/14/2012

**Description:**

An eastward view (left) of the west end of trench PE-5 after PIPES 1 – 3 were cut open and the interiors were filled with Speed Crete Red Line concrete to prevent liquid migration within the pipes. Afterward, these pipes were encased in 1.5 yds<sup>3</sup> of concrete-bentonite mixture to prevent liquid migration along the outside of the pipes (westward view in right photo). Top of concrete-bentonite mixture over pipes was brought up to ~4' bgs.





**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

**Job Number:**  
11176781.00004

**Photo No.**  
PE5-5

**Date:**  
12/13/2012

**Description:**

An eastward view of the east end of trench PE-5 showing the excavated 24" ID pipe (PIPE 4). The top of the pipe was encountered at ~5.0' bgs. The contents of the pipe were under pressure. Pipe sampling and scoring activities were performed with soils excavated to ~4' bgs. Soils were subsequently excavated to ~8.5 bgs (this view) to permit sealing around and under the pipe with concrete-bentonite mixture.

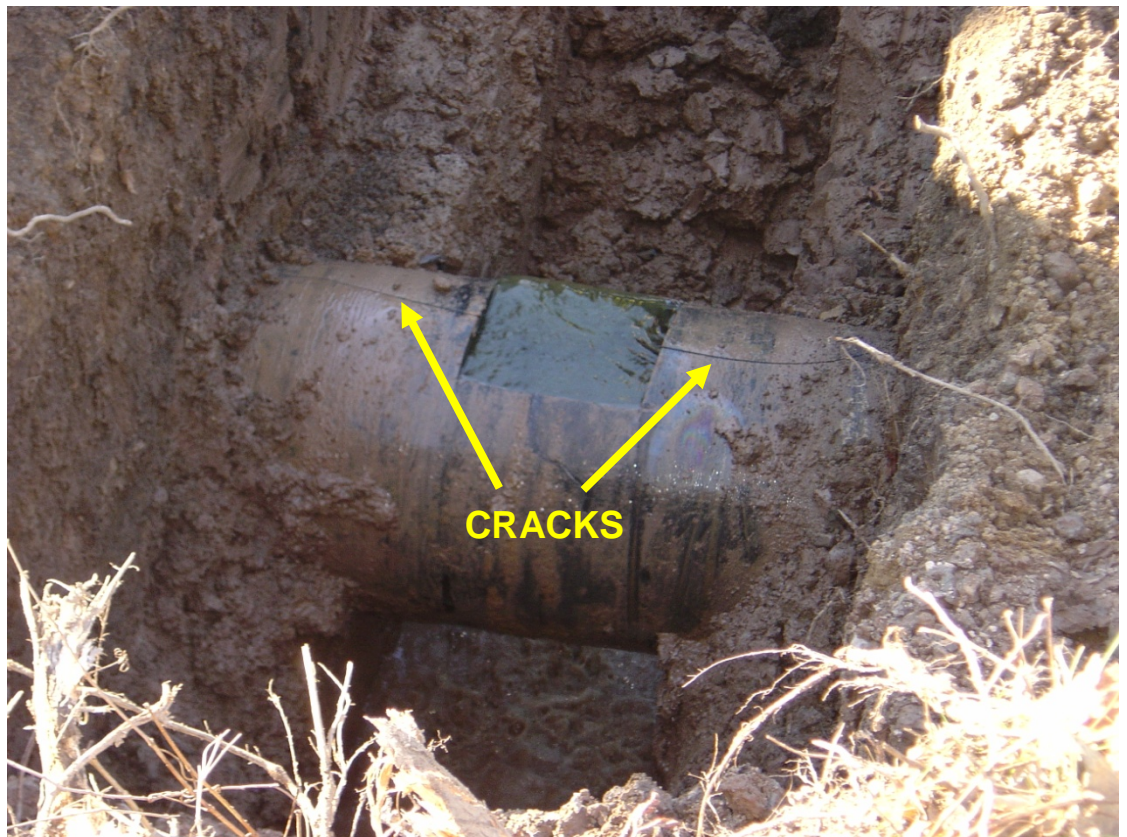


**Photo No.**  
PE5-6

**Date:**  
12/13/2012

**Description:**

A westward view of the east end of test pit PE4 showing the top of PIPE 4. Since the contents of the pipe were under pressure, a window was scored into the top of the pipe in preparation for filling the interior and areas surrounding the pipe with concrete. However, when the excavator broke the ~15" square window to permit filling the pipe with concrete, cracks developed in the top of the pipe that extended ~18" to the north and south of the window.





**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

**Job Number:**  
11176781.00004

**Photo No.**  
PE5-7  
& PE5-8

**Date:**  
12/13/2012

**Description:**

A westward view (left) of the east end of test pit PE-5 while PIPE4 is being filled with a concrete-bentonite mixture from a concrete conveyor truck to prevent liquid migration within the pipe. Afterward, the pipe was encased in the concrete-bentonite mixture to prevent liquid migration along the outside of the pipe. A total of 6 yds<sup>3</sup> of concrete-bentonite mixture were used to fill the interior and to cover PIPE 4. Top of concrete-bentonite mixture over pipes was brought up to ~4.5' bgs (right; eastward view).

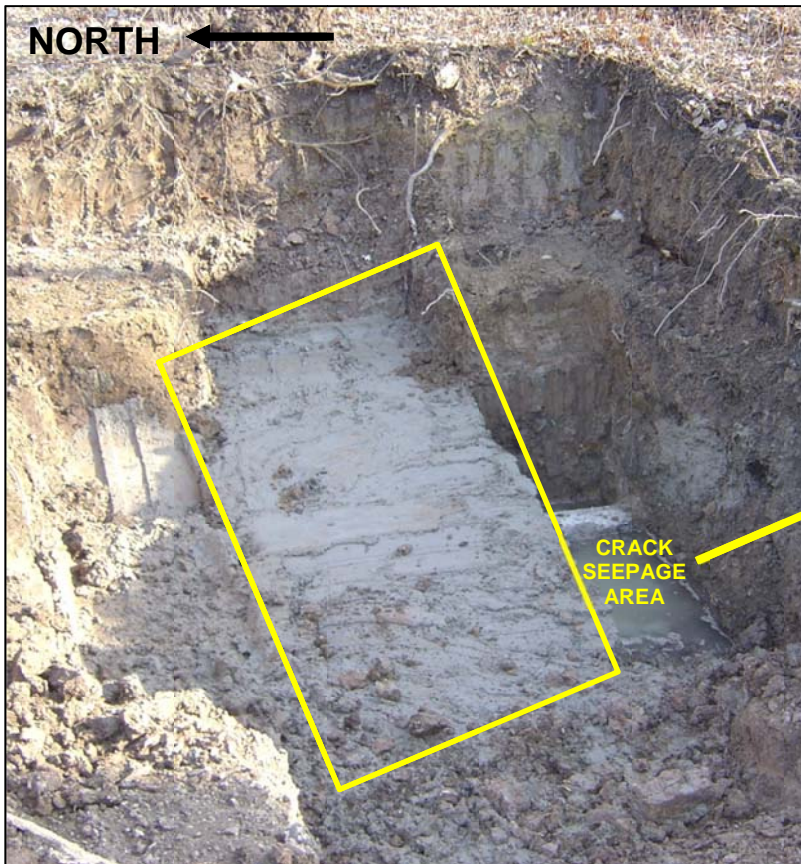


**Photo No.**  
PE5-9 &  
PE5-10

**Date:**  
12/14/2012

**Description:**

An eastward view of the east end of test pit PE-5; PIPE4 was filled and surrounded with a concrete-bentonite mixture on 12/13/2012 (yellow boxes). The areas to the north and south of this pour were excavated on 12/14/2012 to see if the cracks in the top of the pipe extended beyond the pour or were seeping; seepage was noted from a small portion of exposed crack on the south side of the pour (right side of photo). This area was excavated beyond the crack and completely around the pipe and sealed with another 1.5 yd<sup>3</sup> of concrete-bentonite mixture on 12/14/2012 (smaller right photo).



**SOUTH CRACK  
SURROUNDED  
WITH  
CONCRETE ON  
12/14/2012**





**Project: Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation**

**Client: USACE**

**Excavation Contractor: Russo Development**

**Job Number:  
11176781.00004**

**Photo No.**  
PE5-11

**Date:**  
12/14/2012

**Description:**

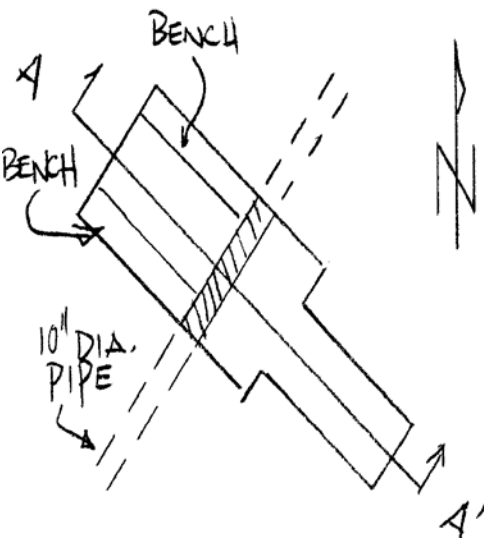
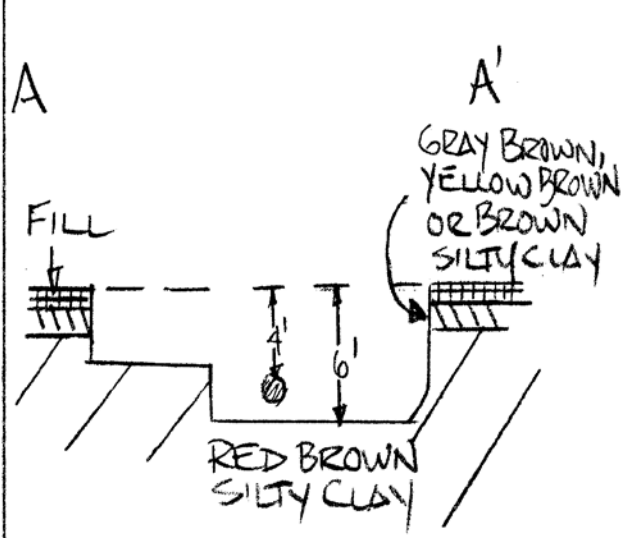
An eastward view of trench PE-5 after it had been backfilled with the previously excavated soils. Soils were placed back into the excavation in 1'-2' lifts and compacted with the excavator bucket. The 4 corners of the excavation were marked with wooden stakes and later surveyed.





## URS Corporation

## EXCAVATION LOG

<b>PROJECT:</b> Niagara Falls Storage Site (Lewiston, NY) BOP Field Investigation		<b>EXCAVATION ID:</b> PE-6
<b>CLIENT/OWNER:</b> USACE	<b>JOB NUMBER:</b> 11176781.00004	
<b>DATE STARTED:</b> 12/10/2012	<b>URS GEOLOGIST:</b>	
<b>DATE COMPLETED:</b> 12/10/2012	<b>URS HEALTH PHYSICIST:</b>	
<b>CONTRACTOR:</b> Russo Development	<b>RUSSO OPERATOR &amp; LABORER:</b>	
<b>EQUIPMENT:</b> John Deere 200 LC excavator, support truck and trailer, trench box (20'L x 8'D x 5'W), aluminum catwalk		
<b>LOCATION:</b> Near southwestern corner of EU 11, just north of chain link fence		
<b>PURPOSE:</b> Expose and plug former 10" water line		
<b>CORNER COORDINATES:</b> N - 1170519.472, E - 1040616.667, Elev. 318.58; N - 1170516.673, E - 1040613.799, Elev. 318.50; N - 1170520.986, E - 1040605.534, Elev. 318.25; N - 1170522.549, E - 1040607.419, Elev. 319.12; N - 1170532.251, E - 1040597.403, Elev. 318.49; N - 1170537.996, E - 1040603.936, Elev. 318.68; N - 1170527.920, E - 1040613.072, Elev. 318.56; N - 1170526.400, E - 1040611.038, Elev. 319.60		
<b>FINAL EXCAVATION DIMENSIONS:</b> ~22' long x 8' wide x 6' deep		
<b>DEPTH (FT)</b>	<b>VERTICAL PROFILE DESCRIPTION</b>	
1	0 - 0.75' below ground surface (bgs): FILL/REWORKED MATERIAL (SM/SW) - Dark brown to gray loamy angular fine to coarse SAND, moist to wet, many fine roots with trace angular fine gravel	
	0.75' - 2.0' bgs: Grayish brown to yellowish brown to brown SILTY CLAY (CL), moist, medium stiff, plastic, blocky structure, orange and gray mottles, trace rounded gravel and gray silty partings.	
	2' - 6' bgs: Reddish brown SILTY CLAY (CL), slightly moist to moist, very stiff to hard, slightly plastic, blocky structure, trace angular gravel, some orange and gray mottles.	
5		
	Maximum depth 6' bgs.	
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Plan View</p> </div> <div style="text-align: center;">  <p>Cross Section</p> </div> </div>		

**URS Corporation****EXCAVATION LOG**

<b>PROJECT:</b> Niagara Falls Storage Site (Lewiston, NY) BOP Field Investigation		<b>EXCAVATION ID:</b> PE-6
<b>CLIENT/OWNER:</b> USACE	<b>JOB NUMBER:</b> 11176781.00004	
<b>DATE STARTED:</b> 12/10/2012	<b>URS GEOLOGIST:</b>	
<b>DATE COMPLETED:</b> 12/10/2012	<b>URS HEALTH PHYSICIST:</b>	
<b>CONTRACTOR:</b> Russo Development	<b>RUSO OPERATOR &amp; LABORER:</b>	

**COMMENTS:** Trench was oriented in a northwest-southeast direction. The excavation was benched to enable safe access to the pipe. The trench box was not used at this location.

One 10" ID (11" OD) cast iron pipe (PIPE 1) crossed the trench in a southwest-northeast orientation. The top of the pipe was found at 4' bgs.

No bedding material was present around PIPE 1. The pipe appeared to be backfilled with native soils.

A small amount of groundwater seeped into the excavation, appearing to originate from beneath the bottom of PIPE 1.

PID readings on excavated soils were 0 ppm; no visual or olfactory signs of contamination.

A brass saddle clamp with valve was installed on the pipe to enable the collection of a water sample. PIPE 1 was

An opening was cut into the top of the pipe and a sediment sample was collected. The interior was then filled with a Speed Crete Red Line concrete/bentonite mixture. Afterward, the pipe was encased in 3 yd<sup>3</sup> of concrete/bentnite to prevent liquid migration along the outside of the pipe.

Soils from the excavation were stockpiled on plastic. Upon completion of the pipeline plugging activities, the excavation was backfilled with the excavated soils in the order in which they were removed. The soils were placed back into the excavation in 1'-2' lifts and compacted with the excavator bucket.

Soil sample beneath PIPE 1 ID= PE6 SB1 5.0-5.5-0165

PIPE 1 water sample ID= PE6 PIPE1 4.5-5.0-0166

PIPE 1 sediment sample ID= PE6 PIPE1SED-0167

The excavation and excavated soils were scanned with a 2" NaI detector. Radiation measurements were within expected (e.g., ambient) values.



## INFORMATION FOR SAMPLES COLLECTED AT EXCAVATION PE-6

SAMPLE ID	COLLECTION DATE/TIME	SAMPLE DEPTH (feet bgs)	MATRIX	ANALYTICAL PARAMETERS	QA/QC	SAMPLE DESCRIPTION
PE6SB15.0-5.5-0165 and PE6SB15.0-5.5D-9117	12/10/2012 11:20	5.0 - 5.5	Soil	List 1	Duplicate	Soil sample from beneath PIPE 1; brown to reddish brown silty clay (slightly moist to moist, stiff to very stiff, slightly plastic), common distinct orange and gray mottles, trace angular gravel , and trace tan and gray silty-fine sandy partings; PID = 0.0 ppm, no odor, no visible signs of contamination
PE6PIPE14.5-5.0-0166 and PE6PIPE14.5-5.0F-0166	12/10/2012 12:00	4.5 - 5.0 (inside pipe)	Liquid	List 2	None	Liquid sample from inside PIPE 1; clear, no noticeable sheen, slight decaying organic material odor (i.e., methane/H2S)
PE6PIPE1SED-0167	12/10/2012 12:30	inside pipe	Sediment	List 1	None	Sediment sample from around inside of PIPE 1; very hard black scale, wet on outer surface, no odor, botryoidal texture on outer surface; PID = 0.0 ppm

Notes: List 1 Analytical Parameters =

VOCs; SVOCs; Pesticides; PCBs; TAL Metals; Total U; gamma spec/iso-U/iso-Th

List 2 Analytical Parameters =

Unfiltered: VOCs; SVOCs; Pesticides; PCBs; TAL Metals; Total U; Anions; Alkalinity; TDS; Ra-226; Ra-228; iso-U/iso-Th  
 Filtered: TAL Metals; Total U; Ra-226; Ra-228; iso-U/iso-Th

**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

**Job Number:**  
11176781.00004

**Photo No.**  
PE6-1

**Date:**  
12/10/2012

**Description:**

A southwestward view from just inside the NFSS perimeter fenceline near the southwestern corner of EU 11 showing location PE-6 at the beginning of excavation activities.



**Photo No.**  
PE6-2

**Date:**  
12/10/2012

**Description:**

A north-northwestward view of the inside of trench PE-6 showing PIPE 1, which was encountered at ~4' below ground surface. A brass saddle clamp with valve was installed on the pipe to evaluate if the contents were under pressure; the contents of PIPE 1 were not under pressure and the pipe was only about half- full with water. This photo shows the pipe after the saddle clamp/valve assembly was removed. Although no bedding material was observed (the pipe appeared to be backfilled with native silty clay), some water seeped into the excavation from beneath the pipe.





**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

**Job Number:**  
11176781.00004

**Photo No.**  
PE6-3

**Date:**  
12/10/2012

**Description:**

Sample PE6PIPE1SED,  
hard black scale  
collected from the inside  
of PIPE 1.



**Photo No.**  
PE6-4

**Date:**  
12/10/2012

**Description:**

A northward view of the  
bottom of trench PE-6  
showing the pipe after  
PIPE1 was cut open and  
the interior was being filled  
with Speed Crete Red Line  
concrete to prevent liquid  
migration within the pipe.  
Afterward, this pipe was  
encased in 1.5 yds<sup>3</sup> of  
concrete to prevent liquid  
migration along the outside  
of the pipes (right). Top of  
concrete over pipe was  
brought up to ~13' bgs.





**Project:** Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation

**Client:** USACE

**Excavation Contractor:** Russo Development

**Job Number:**  
11176781.00004

**Photo No.**  
PE6-5

**Date:**  
12/10/2012

**Description:**

A northwestward view of PE-6 after PIPE1 was filled with Speed Crete Red Line concrete to prevent liquid migration within the pipe.



**Photo No.**  
PE6-6

**Date:**  
12/10/2012

**Description:**

A northwestward view of PE-6 after PIPE1 was encased in 3 yds<sup>3</sup> of concrete to prevent liquid migration along the outside of the pipe. Top of concrete over pipe was brought up to ~3.2' bgs.





**Project: Niagara Falls Storage Site  
(Lewiston, NY) BOP Field Investigation**

**Client: USACE**

**Excavation Contractor: Russo Development**

**Job Number:  
11176781.00004**

**Photo No.**  
PE6-7

**Date:**  
12/10/2012

**Description:**

A westward view of trench PE-6 after it had been backfilled with the previously excavated soils. Soils were placed back into the excavation in 1'-2' lifts and compacted with the excavator bucket. The corners of the excavation were marked with wooden stakes and later surveyed.

