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March 23, 2015

Mr. Glenn May, C.P.G.
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, NY 14203

Subject: 2014 Periodic Review Report
Scajaquada Creek Site (#915141B), Buffalo, NY

Dear Mr. May,

National Fuel Gas Distribution Corporation (National Fuel) completed construction on the remedial action for the Scajaquada Creek Site in August 2002. Since then, National Fuel has performed operations and maintenance (O&M) activities for the remedy in accordance with the 2005 O&M Plan for the site. Those activities have included preparation of semi-annual reports. In a letter dated July 9, 2009, National Fuel proposed modification to the O&M Plan, which included decreasing the frequency of O&M reporting from semi-annual to annual and decreasing the frequency of DNAPL measurements from quarterly to annually. The New York State Department of Environmental Conservation (NYSDEC) agreed upon these changes in a letter dated December 2, 2009. Because of changes in NYSDEC reporting requirements, AECOM Technical Services, Inc. (AECOM) has prepared this Periodic Review Report (PRR) on behalf of National Fuel rather than an O&M Report to meet the reporting requirements of the O&M Plan. This PRR summarizes activities that have occurred from February 2014 to February 2015. The required Institutional and Engineering Controls Certification Form is included in Attachment 1.

1.0 Introduction

The Scajaquada Creek Site is the riparian portion of the Iroquois Gas/Westwood Pharmaceutical (IG/WP) Site in a mixed industrial and residential area of Buffalo, New York. The site comprises a 1,600-foot long reach of Scajaquada Creek. Manufactured gas plant (MGP) operations were conducted on the Site from the 1890s to the 1950s and gas storage continued until 1972. Investigations indicated that soil and groundwater were impacted with chemicals associated with gas manufacturing processes and that contaminants were migrating into the creek. Remedial activities (i.e., sheet pile wall installation, sediment excavation, capping, and installation of dense non-aqueous phase liquid (DNAPL) recovery systems) have been performed since 1999 to address these impacts.

This PRR presents and evaluates the results of O&M activities performed at the site over the past year and since the remedial action was completed in 2002. The O&M activities include visual inspections of the cap, the creek banks, and the site restoration elements and maintenance checks on the northern and southern DNAPL recovery systems. Data collection during performance of these activities is presented in Attachment 2 and evaluation of the effectiveness of the remedy is presented below.

The remedial action has been operated in accordance with the provisions of the O&M Plan and engineering controls remain intact and effective except as noted below. Observations show that the cap continues to be effective in preventing human and environmental contact with contaminants related to past MGP operations. The DNAPL recovery program continues and both DNAPL recovery systems continue to function properly.

2.0 Site Overview

The Scajaquada Creek Site lies in a mixed industrial and residential area of Buffalo. The site comprises a 1,600-foot long reach of Scajaquada Creek extending from a location about 400 feet northeast of the former (abandoned) Conrail railroad bridge downstream to the West Avenue Bridge. The attached figure shows the site layout. The site comprises an area of about 2.5 acres. Much of the site is bounded by steep banks. Portions of the site are beneath the elevated I-198 Scajaquada Expressway. The Expressway is supported by concrete piers which are set in the creek bed and along the banks.

Scajaquada Creek flows through a zone of active and inactive industrial facilities upstream and downstream of the site. Untreated sewage has been observed flowing into the creek from combined sewers in upstream locations and through the outfall on the east bank of the site. The creek normally flows southwest into the Black Rock Canal of the Niagara River, approximately one-half mile downstream. When the level of the Black Rock Canal rises above the creek level, however, the flow direction at the site is reversed.

In 1996, National Fuel constructed a sheet pile wall along the eastern bank of the creek, adjacent to the IG/WP property. The sheet pile wall was an initial component of the remedial action. National Fuel conducted the sediment remedial design in 1997/1998 and received approval for the design in June 1998. Remedial excavation and capping was started in July 1998 and completed in May 1999. Installation and startup of the southern DNAPL recovery system was completed in June 1999. Installation and startup of the northern DNAPL recovery system was completed in August 2002. In summary, the components of the selected remedy include:

- Installation of a sheet pile wall across the 70-foot width of the creek close to West Avenue. Approximately 450 linear feet of steel sheet piling was installed along the east bank of the creek.
- Excavation of the creek bottom and off-site disposal of 18,976 cubic yards of contaminated sediment and debris. The overall goal of excavation was to remove sediments with concentrations of PAHs greater than 50 mg/kg within the site boundary, taking into account the physical limitations at the site.
- Capping of the creek bottom resulted in a horizontal barrier along the 1,600 foot reach of Scajaquada Creek. The cap consists of geosynthetic clay liner (GCL), angular sand, geotextile, and anchoring stone.
- Installation of two DNAPL recovery systems near the West Avenue Bridge and the Conrail railroad bridge.
- Implementation of an O&M Plan as an institutional control to verify and ensure the performance of the remedial systems.

No significant changes have been made to the remedy since remedy selection.

In 2010, National Fuel identified damage to the sediment cap armor layer along the sheet pile wall on the east bank of the river. In order to address this damage, in August and September 2011, National Fuel completed repairs to the cap's armor stone protective layer. The re-construction of the armored bank was completed using excavators stationed at the top of the bank and divers working in the creek. Work in the creek was performed under the provisions of a Protection of Waters permit (Permit No. 9-1402-00813/00003) issued by NYSDEC and an approval by the United States Army Corps of Engineers to perform the work under the provisions of Nationwide Permit No. 3. A more detailed description of the work was provided in the 2011 PRR.

3.0 Evaluate Remedy Performance, Effectiveness, and Protectiveness

The overall goal of the remedial work at the Scajaquada Creek Site was to provide a remedy which:

- Was protective of human health and the environment
- Did not damage structures or properties
- Was financially practicable.

The objectives of the excavation operation were to remove the required sediments without releasing contaminants outside of the work area. The remedy integrated removal and isolation technologies to achieve this goal.

Preventing human contact with the impacted material was addressed by excavating sediments from the creek; capping areas where impacted material was left in place; and providing protection for workers. The effectiveness of the remedial action in meeting these objectives is evaluated by performing an annual inspection to verify that engineering controls remain intact and that site use has not changed. The results of this year's inspection have identified locations where minor repairs to the cap will be required. These locations are shown on the figure. Even though some damage was observed, the cap remains intact and the remedy continues to be effective and protective.

Preventing leaching of impacted material to the site was addressed by installing a sheet pile wall; capping areas where impacted material was left in place; and installing two DNAPL recovery systems. The effectiveness of the remedial action in meeting these objectives is evaluated by performing an annual visual inspection on the cap and the recovery systems. As described above, the site inspection found that engineering controls, including the sediment cap and DNAPL recovery systems, remain intact and effective.

DNAPL volumes have been collected from June 24, 1999 through April 23, 2014. These data are presented in Attachment 2. Up until last year, DNAPL flow in the Southern System reduced from the original flows at system startup, approximately 4.4 gallons per day (gpd), to about 0.8 gpd, although there is variability from year to year. DNAPL was pumped at a rate of 0.6 gpd this year. The original flow at startup from the northern DNAPL recovery system was approximately 0.17 gpd, but from 2009 through 2011, there was no measureable flow of DNAPL. During the 2013 and 2014 measurement events, Northern System flow was measured as 0.06 gpd.

4.0 O&M Plan Compliance Report

The components of the O&M program for the Scajaquada Creek Site include inspections of the cap and DNAPL recovery systems, maintenance checks on the DNAPL recovery systems, maintenance and repair of engineering controls, field observations and reporting. Details of this program are described in the February 8, 2005 O&M Plan and a letter from NYSDEC dated December 2, 2009 approving changes in the O&M program. This report summarizes O&M activities performed at the site from February 2014 through February 2015.

O&M activities completed from February 2014 through February 2015 include:

- An annual site inspection performed on April 28, 2014
- Operation of the DNAPL recovery system
- Inspections of the DNAPL recovery system and sediment cap.

Constructed Sediment Cap Observations

A site inspection was conducted on April 28, 2014 by Thomas P. Clark, P.E. of AECOM. Site photographs are included in Attachment 3. During the inspection, eight small areas where geotextile fabric was visible or maintenance is required were identified. The locations, designated 1 through 8, are shown on the figure. They include the following:

- Location #1 – Visible geotextile fabric near the entrance to the bike path on the west side of the creek. See Photo 1.
- Location #2 – Visible geotextile fabric near gate in fence. See Photo 2.
- Location #3 – Areas on the east bank which were disturbed during armor repair in 2010 and where vegetation is not fully established. Erosion control blanket installed in 2010 is still in place. No erosion was observed. See Photo 3.
- Location #4 – Exposed geotextile fabric near highway piling. No photo available.
- Location #5 – Exposed geotextile fabric near Conrail bridge. See Photo 4.
- Location #6 – Exposed geotextile fabric in several areas on west bank. See Photo 5.
- Location #7 – Exposed geotextile fabric in location where previous repair was made. See Photo 6.
- Location #8 – Exposed geotextile fabric. No photo available.

Repairs to the armor stone on the east side of Scajaquada Creek made in 2011 were intact and effective. Erosion control fabric installed in this area during construction remains in place and has prevented bank erosion.

During installation of the geocell in September 2011, NAPL was observed seeping through one of the construction lift holes in the sheeting of the sheetpile wall. NYSDEC was notified of the seep on September 8, 2011. The construction lift hole with the NAPL seep along with the adjacent construction lift hole were originally sealed with hydraulic cement. National Fuel has completed a more permanent closure by screwing steel plates over the holes. A photograph is provided in Attachment 3.

DNAPL Recovery Systems Operations

The northern and southern DNAPL recovery systems were checked monthly by National Fuel staff between February 2014 and February 2015. During these visits the automatic timer was adjusted to maximize the flow of DNAPL while minimizing the flow of groundwater, and tubing was advanced or replaced as needed to optimize the performance of the system's peristaltic pump.

The southern DNAPL recovery system was observed to function properly during the period of this report. Maintenance activities performed on the southern DNAPL recovery system during this period included the following:

- February 2, 2014 Issues with fan
- March 20, 2014 Reset clock to Daylight Savings Time
- May 5, 2014 Changed on time to 3:00 pm and off at 4:00 pm
- June 6, 2014 Changed run time. On at 3:00 pm and off at 3:30 pm
- December 14, 2014 Advanced tubing and changed clock to Standard Time.

The northern DNAPL recovery system was observed to function properly during the period of this report except as noted below. Maintenance activities performed on the northern DNAPL recovery system during this period included the following:

- February 20, 2014 Issues with fan
- March 20, 2014 Reset clock to Daylight Savings Time
- May 15, 2014 Changed on time to 3:00 pm and off at 4:00 pm
- June 19, 2014 Changed run time. On at 3:00 pm and off at 3:30 pm
- December 11, 2014 Advanced tubing and changed clock to Standard Time.

On April 24, 2014, DNAPL level measurements were taken in the northern and southern DNAPL recovery systems. Based on those measurements 22 gallons were recovered by the northern DNAPL recovery system and 222 gallons were collected by the southern DNAPL recovery system from the time the tank was last emptied May 23, 2013. Volumes were calculated by taking measurements in the tanks with an oil/water interface probe. The volumes of DNAPL recovered to date were determined to be approximately 2,103 gallons by the southern DNAPL recovery system and 436 gallons by the northern DNAPL recovery system. Note that last year, total DNAPL recovery in the southern system was reported to be 1,606 gallons. That value was incorrect because of a math error. The correct value was 1,881 gallons. DNAPL recovery system monitoring logs are included in Attachment 2.

Conclusions

The O&M program at the Scajaquada Creek Site is being implemented in accordance with the provisions of the O&M Plan. The results of the site inspection indicate that engineering and institutional controls continue to be effective in meeting remedial objectives. Cap repair activities are required in order to ensure that the effectiveness continues. National Fuel will prepare a plan to repair the locations identified in this report. The plan will be submitted to NYSDEC for review before it is implemented. Permitting authorities will be consulted to see if permits are required to complete the work.

5.0 Overall PRR Conclusions and Recommendations

As discussed above, the O&M program is being implemented in accordance with the provisions of the O&M Plan, including the July 2009 modification. The results of the site inspection indicate that engineering and institutional controls remain intact and continue to be effective in meeting remedial objectives. Cap repair activities are required in order to ensure that the effectiveness continues. The results of system monitoring and maintenance show that the northern and southern DNAPL recovery systems continue to operate as designed.

Please call me with questions at 978-905-2161.

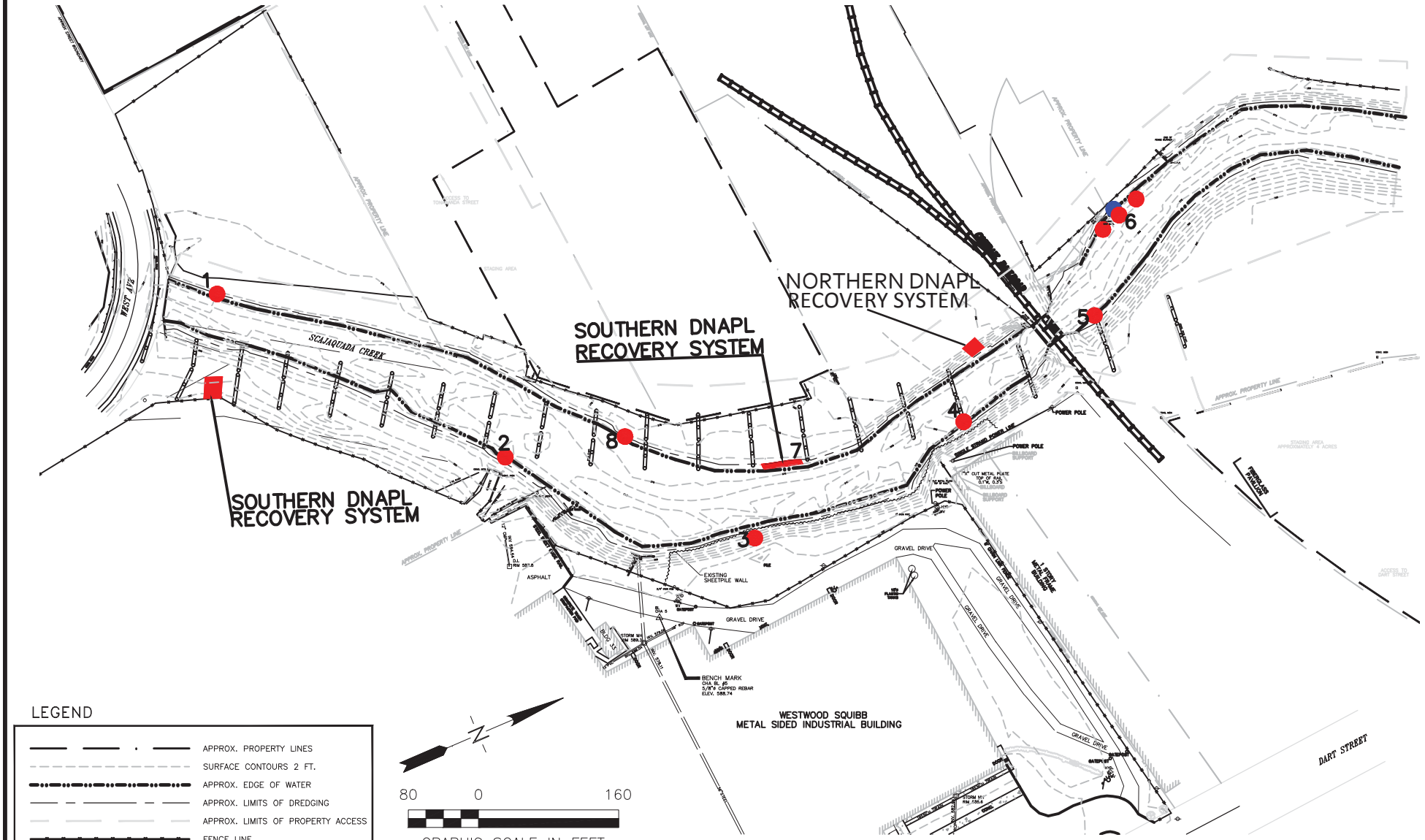
Regards,

Thomas P. Clark, P.E.
Senior Engineer

Attachments:

Figure
Attachment 1 – Institutional and Engineering Controls Certification Form
Attachment 2 – System Monitoring Logs
Attachment 3 – Photographs

CC: B. Sadowski – NYSDEC, Buffalo
K. Hoelscher, T. Alexander – National Fuel
K. Hogan – PLHB&B



Topographic and bathymetric surveys conducted by Clough, Harbor & Assoc. September, 12-18, 1995. Existing elevations of sediment may vary from contours shown as some change may have occurred between 1995 and present. All elevations are referenced to International Great Lakes Datum (IGLD).

AECOM

NATIONAL FUEL GAS
SCAJAQUADA CREEK SITE
60137321.750

SITE LAYOUT
SCAJAQUADA CREEK
BUFFALO, NEW YORK

DATE: 03/16/2014 | DRWN: | **FIGURE**

Attachment 1

Institutional and Engineering Controls Certification Form

Enclosure 2
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Site Management Periodic Review Report Notice
Institutional and Engineering Controls Certification Form

Site Details **Box 1**

Site No. 915141B

Site Name NFG - Iroquois Gas/Westwood Pharm. Riparian

Site Address: Scajaquada Creek, Upstream of West Ave. Bridge Zip Code: 14213
City/Town: Buffalo
County: Erie
Site Acreage: 2.5

Reporting Period: February 15, 2014 to February 15, 2015

	YES	NO
1. Is the information above correct?	☒	☐
If NO, include handwritten above or on a separate sheet.		
2. Has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment during this Reporting Period?	☐	☒
3. Has there been any change of use at the site during this Reporting Period (see 6NYCRR 375-1.11(d))?	☐	☒
4. Have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property during this Reporting Period?	☐	☒
If you answered YES to questions 2 thru 4, include documentation or evidence that documentation has been previously submitted with this certification form.		
5. Is the site currently undergoing development?	☐	☒

Box 2

	YES	NO
6. Is the current site use consistent with the use(s) listed below? Commercial and Industrial	☒	☐
7. Are all ICs/ECs in place and functioning as designed?	☒	☐

IF THE ANSWER TO EITHER QUESTION 6 OR 7 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

_____ _____
Signature of Owner, Remedial Party or Designated Representative Date

SITE NO. 915141B **Box 3**

Description of Institutional Controls

Parcel	Owner	Institutional Control
	No Owner	O&M Plan Monitoring Plan

In March 1994, a Record of Decision (ROD) was issued for this site. The remedial action at this site was completed between 1996 and 2002 and included: (1) installation of the sheet pile wall along the eastern bank of Scajaquada Creek; (2) excavation of contaminated sediment and debris; (3) construction of a cap along a 1,600 foot reach of the creek; and (4) installation of two DNAPL recovery systems. There is no SBL identification for this parcel as it is a New York State waterway.

Box 4

Description of Engineering Controls

Parcel	Engineering Control
	Subsurface Barriers Cover System

Engineering controls for this site include: (1) the stream bed cap that consists of a geosynthetic clay liner overlain by sand, geotextile and anchoring stone; and two DNAPL recovery systems to extract DNAPL from the substrata of the creek. Post-closure maintenance of the cap, creek banks and DNAPL recovery systems are required to ensure long term effectiveness of the remedy.

Box 5

Periodic Review Report (PRR) Certification Statements

1. I certify by checking "YES" below that:

   a) the Periodic Review report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

   b) to the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and the information presented is accurate and compete.

YES	NO
X	☐

2. If this site has an IC/EC Plan (or equivalent as required in the Decision Document), for each Institutional or Engineering control listed in Boxes 3 and/or 4, I certify by checking "YES" below that all of the following statements are true:

   (a) the Institutional Control and/or Engineering Control(s) employed at this site is unchanged since the date that the Control was put in-place, or was last approved by the Department;

   (b) nothing has occurred that would impair the ability of such Control, to protect public health and the environment;

   (c) access to the site will continue to be provided to the Department, to evaluate the remedy, including access to evaluate the continued maintenance of this Control;

   (d) nothing has occurred that would constitute a violation or failure to comply with the Site Management Plan for this Control; and

   (e) if a financial assurance mechanism is required by the oversight document for the site, the mechanism remains valid and sufficient for its intended purpose established in the document.

YES	NO
X	☐

IF THE ANSWER TO QUESTION 2 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

_____ _____

Signature of Owner, Remedial Party or Designated Representative — Date

IC CERTIFICATIONS
SITE NO. 915141B

Box 6

SITE OWNER OR DESIGNATED REPRESENTATIVE SIGNATURE

I certify that all information and statements in Boxes 1,2, and 3 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I Jay Wiesch at 6363 Main St,
print name print business address

am certifying as Remedial party (Owner or Remedial Party)

for the Site named in the Site Details Section of this form.

Signature of Owner, Remedial Party, or Designated Representative Rendering Certification

3/30/15
Date

IC/EC CERTIFICATIONS

Box 7

Professional Engineer Signature

I certify that all information in Boxes 4 and 5 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I Thomas P. Clark (print name) at AECOM, 250 Apollo Dr., Chelmsford, MA 01824 (print business address)

am certifying as a Professional Engineer for the National Fuel Gas Distribution (Owner or Remedial Party)

Signature of Professional Engineer, for the Owner or Remedial Party, Rendering Certification

Stamp (Required for PE)

Date: 3/23/15

Attachment 2

DNAPL Recovery System Monitoring Logs

Scajaquada Creek DNAPL Recovery System Monitoring Log

SOUTHERN DNAPL RECOVERY SYSTEM

Date	Initials	Field Measurements (by OWI probe)				Calculations (total tank contents) *				Calculations (this period recovery)					Operator's Notes
		Manhole rim to top of LNAPL (ft)	Manhole rim to top of Water (ft) (estimated)	Manhole rim to top of DNAPL (ft)	Manhole rim to bottom of Tank (ft)	LNAPL (gal)	Water (gal)	DNAPL (gal)	Total (gal)	Water Increase (gal)	NAPL Increase (gal)	% NAPL	NAPL (gpd)	Total Flow (gpd)	
24-Jun-99	mrh	9.05	9.05	9.05	9.05	0	0	0	0	0	0	0%		0	90% construction complete, begin initial testing
29-Jun-99	mrh/day	6.80	6.80	9.05	9.05	0	695	0	695	695	0	0%		139	Complete initial system test, PW2003 has silt damage
23-Jul-99	mrh/day	6.80	6.80	9.05	9.05	0	695	0	695	0	0	0%		0	Recommence shakedown with peristaltic pump
30-Jul-99	day	6.34	6.34	8.95	9.05	0	806	31	837	111	31	22%	4.41	20	Shakedown, flow adjustment
26-Aug-99	jhe	5.90	5.90	8.73	9.05	0	874	99	973	68	68	50%	2.52	5	Routine system check, slow drip from tank bung noted (0.5 gpd?)
16-Sep-99	mrh/bdc	5.79	5.80	8.75	9.05	3	911	93	1007	37	-3	---		2	Significant (2 gpd?) DNAPL loss through bung drip, PW2003 reinstalled
28-Sep-99	mrh/cc	3.30	3.32	8.61	9.05	6	1633	136	1775	723	46	6%	3.86	64	Tank emptied (was full, pump off), bung replaced,
28-Sep-99	mrh/cc	9.05	9.05	9.05	9.05	0	0	0	0	0	0	0%		0	vault cleaned, flow setting reduced to 4.5
3-Oct-99	mrh	8.75	8.75	9.03	9.05	0	86	6	93	86	6	7%	1.24	19	Measurements are visual estimates only, flow setting reduced to 3.5
11-Oct-99	cc	8.75	8.75	9.03	9.05	0	86	6	93	0	0	0%		0	No flow observed, flow setting increased to 5.0
29-Oct-99	cc	6.81	6.81	8.98	9.05	0	670	22	692	584	15	3%	0.86	33	Flow setting decreased to 4.0
2-Dec-99	mrh/day	6.09	6.10	8.77	9.05	3	824	86	914	154	68	31%	2.00	7	Flow setting increased to 4.7 (24 gpd), timer installed/set for 1pm to 2pm operation
16-Dec-99	cc	---	---	---	---	---	---	---	---	---	---	---		---	Pump running but no flow, Timer reset for 3 hr per day operation
9-Mar-00	mrh/day	6.09	6.10	8.89	9.05	3	861	49	914	37	-37	---		0	PW2000 running but no flow, Peristaltic installed (2 hr/day), DNAPL thickened over time
11-Apr-00	mrh/day	4.71	4.73	8.82	9.05	6	1263	71	1340	401	25	6%	0.75	13	New peristaltic purchased/installed. Flow setting #7 (for 2 hr/day).
1-May-00	mrh/dms	4.62	4.64	8.80	9.05	6	1284	77	1368	22	6	22%	0.31	1	No flow (tubing collapsed). Repaired.
4-May-00	day/jc	4.62	4.64	8.80	9.05	6	1284	77	1368	0	0	0%		0	No flow (tubing leak). Tank emptied. System turned off.
8-May-00	mrh/jtf	9.05	9.05	9.05	9.05	0	0	0	0	0	0	0%		0	Original tubing replaced with silicon. System restarted at flow setting #3 (for 2 hr/day).
8-Jun-00	mrh/day	8.55	8.56	8.98	9.05	3	130	22	154	130	25	16%	0.80	5	Backfill settled around vault. Total depth shallow; measurements estimated. Tubing adjusted.
10-Jul-00	mrh/dms	8.10	8.11	8.90	9.05	3	244	46	293	114	25	18%	0.77	4	Tubing was worn; adjusted.
25-Aug-00	day	7.30	7.31	8.80	9.05	3	460	77	540	216	31	12%	0.67	5	Tubing adjusted.
20-Oct-00	mrh	6.25	6.26	8.64	9.05	3	735	127	865	275	49	15%	0.88	6	Tubing worn; adjusted.
30-Nov-00	mrh	5.75	5.77	8.55	9.05	6	858	154	1019	124	31	20%	0.75	4	Tubing worn; adjusted. Flow rate setting reduced from 3.0 to 1.5; timer not changed.
18-Jan-01	mrh	5.75	5.77	8.55	9.05	6	858	154	1019	0	0	---		0	Pump starts rough and sounds bad. Pump removed and sent in for repairs.
7-Feb-01	mrh/hs	5.75	5.77	8.55	9.05	6	858	154	1019	0	0	0%		0	Temporary FloJet pump installed but insufficient NPSH due to low creek elevation.
30-Mar-01	mrh	5.75	5.77	8.55	9.05	6	858	154	1019	0	0	0%		0	Peristaltic (geopump) installed, full speed, 600 rpm, system OK. NAPL is hi viscocity/settled.
10-Apr-01	mrh	5.70	5.72	8.51	9.05	6	861	167	1034	3	12	80%	1.12	1.4	3/16" id tubing replaced with 3/8" id tubing. Float switch replaced (plus relay).
18-May-01	dms/jc	5.65	5.68	8.52	9.05	9	877	164	1050	15	0	0%	0.00	0.4	Tubing worn and soft; adjusted.
30-Aug-01	mrh/hs	5.53	5.55	8.39	9.05	6	877	204	1087	0	37	100%	0.36	0.4	NAPL appears to be accumulated in well. Timer set to 3 hrs/day. Original peristaltic re-installed.
3-Oct-01	hs/jc	5.46	5.48	8.35	9.05	6	886	216	1108	9	12	57%	0.36	0.6	NAPL may still be accumulated in well. Timer increased to 4 hrs/day.
6-Nov-01	hs/jc	5.30	5.32	8.27	9.05	6	911	241	1158	25	25	50%	0.73	1.5	Additional NAPL purged from well after readings taken. Timer decreased to 3 hrs/day.

Scajaquada Creek DNAPL Recovery System Monitoring Log

SOUTHERN DNAPL RECOVERY SYSTEM

Date	Initials	Field Measurements (by OWI probe)				Calculations (total tank contents) *				Calculations (this period recovery)					Operator's Notes
		Manhole rim to top of LNAPL (ft)	Manhole rim to top of Water (ft) (estimated)	Manhole rim to top of DNAPL (ft)	Manhole rim to bottom of Tank (ft)	LNAPL (gal)	Water (gal)	DNAPL (gal)	Total (gal)	Water Increase (gal)	NAPL Increase (gal)	% NAPL	NAPL (gpd)	Total Flow (gpd)	
7-Feb-02	hs/jc	3.89	3.91	8.22	9.05	6	1331	256	1593	420	15	4%	0.17	4.7	Adjusted peristaltic tubing.
8-Mar-02	hs/jc	3.81	3.83	8.17	9.05	6	1340	272	1618	9	15	62%	0.53	0.9	Adjusted peristaltic tubing.
10-Apr-02	mrh	3.43	3.45	7.88	9.05	6	1368	361	1735	28	90	76%	2.71	3.6	Adjusted tubing. Installed piston pump for one day test (then removed). Timer increased to 4 hrs.
7-May-02	hs/jc	3.15	3.17	7.82	9.05	6	1436	380	1822	68	19	21%	0.69	3.2	Tank full.
7-May-02		9.05	9.05	9.05	9.05	0	0	0	0	---	---	---	---	---	Tank pumped out.
25-Jun-02	cd	6.00	6.02	9.02	9.05	6	926	9	942	926	15	2%	0.32	19.2	Depth's estimated. Pump set at #4, 3 hrs/day
2-Aug-02	mrh/jc	3.15	3.17	9.00	9.05	6	1800	15	1822	874	6	1%	0.16	23.2	Tank full, mostly water.
6-Sep-02	jc	3.15	3.17	9.00	9.05	6	1800	15	1822	0	0	0%	---	0.0	Tank Emptied.
6-Sep-02		9.05	9.05	9.05	9.05	0	0	0	0	0	0	---	---	---	
8-Oct-02	mrh/jc	8.98	8.98	8.98	9.05	0	0	22	22	0	22	100%	0.68	0.7	Pump removed for repair
18-Nov-02	cd	8.98	8.98	8.98	9.05	0	0	22	22	0	0	0%	---	0.0	Pump reinstalled
4-Feb-03	mrh/jc	4.32	4.32	8.95	9.05	0	1430	31	1460	1430	9	1%	0.12	18.4	Tank again full of mostly water (timer was left on manual?). Tank emptied.
4-Feb-03		9.05	9.05	9.05	9.05	0	0	0	0	---	---	---	---	---	
12-Mar-03	jc	9.00	9.00	9.00	9.05	0	0	15	15	0	15	100%	0.43	0.4	Pump running fast, so removed for evaluation/repair.
10-Apr-03	mrh/jc	9.00	9.00	9.00	9.05	0	0	15	15	0	0	0%		0.0	Pump reinstalled: runs fast/variable with no load, runs OK with flow load. Timer set to 30 min/day, speed 8.
23-Jul-03	mrh/jc	8.78	8.78	8.78	9.05	0	0	83	83	0	68	100%	0.51	0.7	Additional system checks/adjustments made by J Clark on 5/5, 5/20, 6/12, and 6/24.
23-Apr-04	mrh	8.05	8.06	8.55	9.05	3	151	154	309	151	74	33%	0.27	0.8	Additional system checks/adjustments made by NFG on 8/01, 8/06, 9/05, 9/08, 9/11, 9/17, 9/25, 10/30, 11/18.
24-Nov-04	jl,jc	7.31	7.32	8.54	9.05	3	377	157	537	225	3	1%	0.01	1.1	O/W Interface probe not acting precisely, actual DNAPL volume probably greater.
19-Apr-05	mh,jc,jl,sh	7.19	7.20	8.43	9.05	3	380	191	574	3	34	92%	0.23	0.3	Additional system checks/adjustments made by J Clark on 11/24, 1/20/2005, 3/7, 3/11, 4/12, 4/18.
27-Oct-05	mrh, jc	6.96	6.97	8.20	9.05	3	380	262	645	0	71	100%	0.37	0.4	New OWI probe, but readings inconsistent with previous readings. System checks by NFG 5/11, 6/24, 7/28, 8/25, 10/06.
22-Mar-06	mrh, jc	6.78	6.79	8.02	9.05	3	380	318	701	0	56	100%	0.38	0.4	Additional system checks by NFG 10/26/05, 12/14/05, 1/6/06, 2/24/06.
24-Oct-06	mrh, jc	4.90	4.91	7.38	9.05	3	763	516	1281	383	198	34%	0.91	2.7	Depth to NAPL reading is approximate. Additional system checks by NFG 5/11, 6/29, 7/26, 9/07.
2-Mar-07	jc, cb	3.36	3.37	7.15	9.05	3	1167	587	1757	404	71	15%	0.55	3.7	Pump turned off 3/02/07 because tank near full. Readings taken **4/25/07**. Depth to DNAPL reading is approximate.
23-Jun-07		9.05	9.05	9.05	9.05	0	0	0	0	---	---	---	---	---	Tank pumped out.
30-Oct-07	dms, jc	8.55	8.56	9.01	9.05	3	139	12	154	139	15	10%	0.06	1.2	Depth to DNAPL reading is approximate.
13-May-08	dms, jc	---	---	---	---	---	---	---	---	---	---	---	---	---	Data appears to be invalid.
25-Mar-09	jl, dz	7.90	7.91	8.90	9.05	3	306	46	355	167	34	17%	0.07	0.4	O/W interface probe is working accurately
10-Jul-09	tr, jc	7.73	7.74	8.71	9.05	3	300	105	408	300	108	27%	1.01	0.2	O/W interface probe is working accurately
6-Oct-09	tr, jc	7.23	7.24	9.04	9.05	3	556	3	562	556	6	1%	0.07	0.2	A skim of LNAPL and DNAPL were present, the thickness (not measureable) is estimated to be 0.01 ft.
21-Apr-10	tr, jc	6.30	6.31	8.40	9.05	3	645	201	849	645	188	23%	0.96	0.3	A skim of LNAPL was present, the thickness (not measureable) is estimated to be 0.01 ft.
7-Apr-11	tr, jc	5.40	5.40	8.05	9.05	0	818	309	1127	173	105	38%	0.30	0.8	A skim of LNAPL was present, the thickness (not measureable) is estimated to be 0.01 ft.
16-Jun-11	jc	9.05	9.05	9.05	9.05	0	0	0	0	---	---	---	---	---	Tank pumped out. Water and NAPL shipped offsite for disposal.
18-Apr-12	el	6.60	6.60	8.50	9.05	0	587	170	756	587	170	22%	0.55	2.5	Corrected depth to top of DNAPL and depth to bottom of tank measurements
29-Apr-13	tr, jc	6.12	6.12	8.50	9.05	0	735	170	905	148	0	0%	0	0.4	DNAPL measurement duplicated and accurate. Corrected depth to bottom of tank measurement.
23-May-13	jc	---	---	---	---	0	0	0	0	---	---	---	---	---	Tank pumped out. Water and NAPL shipped offsite for disposal.
23-Apr-14	el, jc	8.38	8.40	8.40	9.10	6	0	216	222	0	222	100%	0.66	0.7	Corrected depth to bottom of tank measurement.
									Cumulative gallons :	11,465	2,103				
										Water	NAPL				

Scajaquada Creek DNAPLRecovery System Monitoring Log

NORTHERN DNAPL RECOVERYSYSTEM

Date	Initials	Field Measurements (by OWI probe)				Calculations (total tank contents) *				Calculations (this period recovery)					Operator's Notes
		Manhole rim to top of LNAPL (ft)	Manhole rim to top of Water (ft) (estimated)	Manhole rim to top of DNAPL (ft)	Manhole rim to bottom of Tank (ft)	LNAPL (gal)	Water (gal)	DNAPL (gal)	Total (gal)	Water Increase (gal)	NAPL Increase (gal)	% NAPL	NAPL (gpd)	Total Flow (gpd)	
28-Nov-01	mrh/cd	8.89	8.89	8.89	8.89	0	0	0	0	0	0	0%	0.00	0.0	Develop well with hand operated diaphragm pump. Measurements are approximate.
7-Feb-02	hs/jc	8.62	8.62	8.85	8.89	0	71	12	83	71	12	15%	0.17	1.2	Pump well by hand.
8-Mar-02	hs/jc	8.61	8.61	8.85	8.89	0	74	12	86	3	0	0%	0.00	0.1	Pump well by hand.
10-Apr-02	mrh	8.59	8.59	8.84	8.89	0	77	15	93	3	3	50%	0.09	0.2	Pump well by hand.
7-May-02	hs/jc	8.51	8.51	8.83	8.89	0	99	19	117	22	3	12%	0.11	0.9	Hand pump not working well.
25-Jun-02	cd	8.51	8.51	8.83	8.89	0	99	19	117	0	0	0%	0.00	0.0	Hand pump not working. Discarded.
2-Aug-02	mrh/jc	8.51	8.51	8.83	8.89	0	99	19	117	0	0	0%	0.00	0.0	Begin peristaltic startup. Setting #6.5, 2hr 15 min per day
8-Oct-02	mrh/jc	7.43	7.44	8.55	8.89	3	343	105	451	244	90	27%	1.34	5.0	Additional system checks/adjustments made by J Clark on 8/15, 8/21, 8/27, 9/09, and 9/12.
4-Feb-03	mrh/jc	7.36	7.37	8.52	8.89	3	355	114	472	12	9	43%	0.08	0.2	Numbers approximate. Surface of contents frozen. Turn on heat.
10-Apr-03	mrh/jc	7.28	7.29	8.50	8.89	3	374	120	497	19	6	25%	0.10	0.4	Pumping mostly water, changed timer to 30 min/week.
23-Jul-03	mrh	7.05	7.06	8.49	8.89	3	442	124	568	68	3	4%	0.03	0.7	Additional system checks/adjustments made by J Clark on 5/5, 5/20, 6/12, and 6/24.
23-Apr-04	mrh	6.90	6.91	8.42	8.89	3	466	145	614	25	22	47%	0.08	0.2	Additional system checks/adjustments made by NFG on 8/01, 8/06, 9/05, 9/08, 9/11, 9/17, 9/25, 10/30, 11/18.
24-Nov-04	jl, jc	6.66	6.67	8.41	8.89	3	537	148	689	71	3	4%	0.01	0.3	O/W interface probe not working accurately, depth of DNAPL is estimated.
19-Apr-05	mh,jc,jl,sh	6.45	6.46	8.39	8.89	3	596	154	753	59	6	10%	0.04	0.4	Additional system checks/adjustments made by J Clark on 11/24, 1/20/2005, 3/7, 3/11, 4/12, 4/18.
26-Oct-05	mrh, jc	6.33	6.34	8.30	8.89	3	605	182	790	9	28	75%	0.15	0.2	New OWI probe, but readings inconsistent with previous readings. System checks by NFG 5/11, 6/24, 7/28, 8/25, 10/06.
22-Mar-06	mrh, jc	6.20	6.21	8.23	8.89	3	624	204	831	19	22	54%	0.15	0.3	Additional system checks by NFG 10/26/05, 12/14/05, 1/6/06, 2/24/06.
24-Oct-06	mrh, jc	5.20	5.21	7.89	8.89	3	828	309	1139	204	105	34%	0.49	1.4	Depth to NAPL reading is approximate. Additional system checks by NFG 5/11, 6/29, 7/26, 9/07.
25-Apr-07	mrh, jc	4.90	4.91	7.80	8.89	3	892	337	1232	65	28	30%	0.15	0.5	Depth to NAPL reading is approximate. Additional system checks by NFG 10/31/2006, 11/16/2006, 3/02/2007.
30-Oct-07	dms, jc	4.68	4.69	7.70	8.89	3	929	367	1300	37	31	45%	0.16	0.4	Depth to NAPL reading is approximate. Tubing changed out.
13-May-08	dms, jc	3.46	3.47	7.65	8.89	3	1291	383	1677	361	15	4%	0.08	1.9	Depth of DNAPL is estimated. Additional system checks by NFG on 1/08/08, 3/20/08 and 5/08/08. Tank pumped out.
25-Mar-09	jl, dz	8.75	8.76	8.88	8.89	3	37	3	43	34	9	20%	0.03	0.1	Data for depth to DNAPL changed to prevent table indicating a reduction in NAPL volume. Actual measurement 8.87.
8-Jun-09	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	Covered exposed fabric on the bank and on the creek bed with angular stone.
10-Jul-09	tr, jc	8.46	8.47	8.88	8.89	3	127	3	133	90	0	0%	0.00	0.8	O/W interface probe is working accurately
23-Sep-09	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	J Clark changed pum run time from 45 minutes to 30 minutes.
6-Oct-09	tr, jc	8.08	8.09	8.88	8.89	3	244	3	250	117	0	0%	0.00	1.3	A skim of LNAPL and DNAPL were present, the thickness (not measureable) is estimated to be 0.01 ft.
14-Jan-10	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	J. Clark repaired air vent hose.
24-Feb-10	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	Repaired hose.
26-Mar-10	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	Fabric visible on east side of creek.
21-Apr-10	tr, jc, tc	8.00	8.01	8.88	8.89	3	269	3	275	25	0	0%	0.00	0.1	A skim of LNAPL and DNAPL were present, the thickness (not measureable) is estimated to be 0.01 ft. Damage to armor stone observed by sheet pile wall.
21-Aug-10	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	Changed tubing.
21-Oct-10	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	Reset time.
	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	Additional checks made by J. Clark on 5/20, 6/24, 7/22, 9/16, 11/18, 12/17, and 1/27/11. No adjustments made.
7-Apr-11	tr, jc	4.27	4.28	8.88	8.89	3	1420	3	1427	1152	0	0%	0.00	3.3	A skim of LNAPL and DNAPL were present, the thickness (not measureable) is estimated to be 0.01 ft.
16-Jun-11	jc	8.89	8.89	8.89	8.89	0	0	0	0	---	---	---	---	---	Tank pumped out. NAPL and water transported to offsite treatment facility.
18-Apr-12	el, jc	8.85	8.85	8.83	8.89	0	-6	19	12	-6	19	150%	0.06	0.0	Measured water and NAPL levels. Corrected depth to top of DNAPL and depth to bottom of tank measurements.
29-Apr-13	tr, jc	2.87	2.87	8.83	8.89	0	1840	19	1859	1846	1	0%	0.00	4.9	Estimate approximately 1/2 inch DNAPL. Corrected depth to bottom of tank measurement.
23-May-13	jc	---	---	---	---	0	0	0	0	---	---	---	---	---	Tank pumped out. NAPL and water transported to offsite treatment facility.
23-Apr-14	el, jc	7.58	7.58	8.82	8.89	0	383	22	404	383	22	5%	0.06	1.2	Estimate approximately 3/4 inch DNAPL. Corrected depth to bottom of tank measurement.
									Cumulative gallons :	4931	436				
										Water	NAPL				

Attachment 3

Photographs

AECOM Environment

PHOTOGRAPHIC LOG

Client Name: National Fuel Gas Distribution Corp.	Site Location: Scajaquada Creek Former MGP Site, Buffalo, New York	Project No. 60137321

Photo No. 1	Date: 04/28/14

Direction Photo Taken:

East bank looking west

Description:

Location #1 – Disturbed armor and exposed fabric

Photo No. 2	Date: 04/28/14

Direction Photo Taken:

West bank looking east

Description:

Location # 2 – Exposed fabric

AECOM Environment

PHOTOGRAPHIC LOG

Client Name: National Fuel Gas Distribution Corp.	Site Location: Scajaquada Creek Former MGP Site, Buffalo, New York	Project No. 60137321

Photo No. 3	Date: 04/28/14

Direction Photo Taken:

West bank looking east

Description:

Location #3 – Area where vegetation is not fully established.

Photo No. 4	Date: 04/28/14

Direction Photo Taken:

West bank looking east

Description:

Location #5 – Exposed fabric

AECOM Environment

PHOTOGRAPHIC LOG

Client Name: National Fuel Gas Distribution Corp.	Site Location: Scajaquada Creek Former MGP Site, Buffalo, New York	Project No. 60137321

Photo No. 5	Date: 04/28/14

Direction Photo Taken:

Conrail bridge looking northwest

Description:

Location #6 – Disturbed armor and exposed fabric

Photo No. 6	Date: 04/28/14

Direction Photo Taken:

East bank looking west

Description:

Location #7 – Exposed fabric

AECOM Environment

PHOTOGRAPHIC LOG

Client Name: National Fuel Gas Distribution Corp.	Site Location: Scajaquada Creek Former MGP Site, Buffalo, New York	Project No. 60137321

Photo No.	Date:
7	04/28/14

Direction Photo Taken:

Bottom of east bank looking north

Description:

Armor stone repaired in 2011

Photo No.	Date:
8	04/28/14

Direction Photo Taken:

Bottom of east bank

Description:

Steel plate installed to prevent seepage.