2016 ANNUAL INSPECTION REPORT

July 2016

MILLTOWN DAM

NDI ID No. PA-00218
DEP ID No. D15-146
East Branch Chester Creek, Chester County, Pennsylvania

Prepared for:

East Goshen Township
West Chester, Pennsylvania

Prepared by:

Gannett Fleming

Excellence Delivered As Promised

GF Project No. 060466.0102

DAM INSPECTION CHECKLIST
Department of Environmental Protection
Bureau of Waterways Engineering
Division of Dam Safety

NAME OF DAM: Milltown Dam **DEP DAM NO.:** D15 - 146

LOCATION: **Municipality:** East Goshen Township **County:** Chester County

DEP CLASSIFICATION DATA: **Size:** C **Hazard:** Category 1

PHYSICAL DATA:
Type of Dam: Earth with Concrete Core **Height of Dam:** 20 FT. **Normal Pool Storage Capacity:** 114 AC-FT

ELEVATIONS:
Normal Pool: 342.2 FT.(1) **Pool at Inspection:** 342.2+ FT. **Tailwater at Inspection:** Low

DAM OWNER: East Goshen Township **OPERATOR:** East Goshen Township

ADDRESS: 1580 Paoli Pike West Chester, PA 19380

PHONE: (610) 692-7171 **FAX NO.:** (610) 692-8950 **E-MAIL ADDRESS:** rsmith@eastgoshen.org
Attn: Mr. Rick Smith

A completed and signed Dam Owners Notice Checklist is to accompany this Inspection Checklist.

PERSONS PRESENT AT INSPECTION:

Name	Title/Position	Representing
Eric C. Neast, P.E.	Project Manager	Gannett Fleming, Inc.

DATE OF INSPECTION: 07/21/2016

WEATHER: Sunny

TEMPERATURE: 90 Deg. F

The inspection documented in this report does not include an assessment of site safety as related to facility operators and the public. Hazards may exist at the site which should be addressed by the Owner.

The observations presented herein represent the condition of the dam on the date of the inspection only. The condition of a dam can change rapidly, particularly with changes in reservoir level and climatic conditions. Significantly changed conditions should be immediately reported to Gannett Fleming, Inc., and/or the Pennsylvania Department of Environmental Protection, Division of Dam Safety. Failure to do so could impact the safety of the dam and downstream population. This is to certify that the above dam has been inspected and the following are the results of this inspection.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ERIC CHARLES NEAST
ENGINEER NO. 055653-E

Eric C. Neast
Signature of Registered Professional Engineer
(P.E. Seal Required)

8-5-2016
Date

Note 1. Normal Pool elevation of 342.2 based on field survey performed by Gannett Fleming, July 2015.

Date Revised by PADEP: 1/2009

ITEM	CONDITION	COMMENTS	MONITOR	INVESTIGATE	REPAIR
EMBANKMENT: CREST					
1	Surface Cracking	None observed. Right embankment crest paved with aggregate. Left embankment crest armored with riprap (refer to Photos 1 & 6).	☐	☐	☐
2	Sinkhole, Animal Burrow	None observed.	☐	☐	☐
3	Low Area(s)	None observed. See note below.	☐	☐	☐
4	Horizontal Alignment	No deficiencies observed.	☐	☐	☐
5	Ruts and/or Puddles	None observed.	☐	☐	☐
6	Vegetation Condition	Right embankment crest paved with aggregate (refer to Photo 1). Left embankment crest armored with riprap. Woody vegetation observed on left embankment crest (refer to Photo 6).	☐	☐	☒
7	Warning Signs	One warning sign observed on swing gate at right abutment and one warning sign observed at Valve House (refer to Photos 1 and 25). Sign on swing gate contains graffiti but remains legible. See note below.	☒	☐	☒
8			☐	☐	☐
9			☐	☐	☐

Additional Comments (Refer to item number if applicable):

Item 3: Topographic survey performed by Gannett Fleming in July, 2015 indicates that the right embankment crest varies in elevation from El. 347.5 at the valve house, which is the design top of dam elevation, to El. 349.2 near Reservoir Road. The Gannett Fleming survey found the crest of the left embankment to be near the design top of dam elevation. Survey confirms normal pool at El. 342.2.

Item 6: Woody vegetation observed on left embankment crest. **Recommend** removing woody vegetation to prevent root intrusion into the embankment, eliminate cover for burrowing animals and allow visual observation of the embankment crest.

Item 7: Maintain warning sign(s) in a condition which is legible and clearly displayed to the public. **Recommend** removing graffiti from warning sign on swing gate or replacing sign. Warning sign on Valve House added since the 2015 Annual Dam Inspection. Owner reports vandalism as a recurring problem. **Recommend** monitoring area for unauthorized activities.

ITEM	CONDITION	COMMENTS	MONITOR	INVESTIGATE	REPAIR
EMBANKMENT: UPSTREAM FACE					
10	Slide, Slough, Scarp	None observed.	☐	☐	☐
11	Slope Protection	Upstream face of left and right embankments armored with riprap (refer to Photos 2 & 7). See note below.	☐	☐	☐
12	Sinkhole, Animal Burrow	None observed.	☐	☐	☐
13	Emb.-Abut. Contact	No deficiencies observed. Refer to Item 15 for vegetation condition.	☐	☐	☐
14	Erosion	None observed.	☐	☐	☐
15	Vegetation Condition	Woody vegetation observed on left and right embankments. See note below.	☐	☐	☒
16			☐	☐	☐
17			☐	☐	☐

Additional Comments (Refer to item number if applicable):

Item 11: Surface of upstream right embankment is covered with riprap which has been chinked with aggregate. Riprap on left embankment is not chinked with aggregate.

Item 15: Spotty low vegetation growth observed in right rock-lined embankment. Township reports that vegetation is controlled by spraying several times per year. Woody vegetation observed on left embankment (refer to Photo 7) and on right embankment at abutment interface (refer to Photo 24). **Recommend** removing vegetation to prevent root intrusion into the embankment, eliminate cover for burrowing animals and allow for visual observation. **Recommend** removing trees in their entirety, including the root system. Backfill voids left by root system removal with impervious earthfill, compact and replace riprap cover.

ITEM	CONDITION	COMMENTS	MONITOR	INVESTIGATE	REPAIR
EMBANKMENT: DOWNSTREAM FACE					
18	Wet Area(s) (No Flow)	None observed.	☐	☐	☐
19	Seepage	None observed.	☐	☐	☐
20	Slide, Slough, Scarp	None observed. See note below.	☐	☐	☐
21	Emb. - Abut. Contact	No deficiencies observed. Refer to Item 25 for vegetation condition.	☐	☐	☐
22	Sinkhole, Animal Burrow	Start of animal burrow observed near crest of dam (refer to Photo 5). **Recommend** backfiling hole with aggregate/riprap and monitoring embankment for additional animal activity.	☒	☐	☒
23	Erosion	None observed.	☐	☐	☐
24	Unusual Movement	None observed.	☐	☐	☐
25	Vegetation Control	Vegetation growth observed on left and right embankments. See note below.	☐	☐	☒
26			☐	☐	☐
27			☐	☐	☐

Additional Comments (Refer to item number if applicable):

Item 20: Area of riprap on downstream right embankment adjacent to spillway is slush grouted with concrete. Owner reports slush grout was placed to prevent movement of riprap (refer to Photos 14 and 37).

Item 25: Spotty low vegetation growth observed in right rock-lined embankment (refer to Photos 3 and 22). Township reports that vegetation is controlled by spraying several times per year. Woody vegetation observed on left embankment (refer to Photo 8) and on right embankment at abutment interface (refer to Photo 22). **Recommend** removing vegetation to prevent root intrusion into the embankment, eliminate cover for burrowing animals and allow for visual observation of the embankment. **Recommend** removing trees in their entirety, including the root system. Backfill voids left by root system removal with impervious earthfill, compact and replace riprap cover.

ITEM	CONDITION	COMMENTS	MONITOR	INVESTIGATE	REPAIR
EMBANKMENT: INSTRUMENTATION					
28	Piezometers/Observ. Wells	Not applicable.	☐	☐	☐
29	Staff Gauge and Recorder	Left spillway training wall painted with horizontal stripes that correspond to Emergency Action Plan event trigger levels (refer to Photo 10).	☐	☐	☐
30	Weirs	Not applicable.	☐	☐	☐
31	Survey Monuments	Not applicable.	☐	☐	☐
32	Drains	Not applicable.	☐	☐	☐
33	Low Flow Release	Not applicable.	☐	☐	☐
34	Frequency of Readings	Not applicable.	☐	☐	☐
35	Location of Records	Not applicable.	☐	☐	☐
36			☐	☐	☐
37			☐	☐	☐

Additional Comments (Refer to item number if applicable):

ITEM	CONDITION	COMMENTS	MONITOR	INVESTIGATE	REPAIR
		DOWNSTREAM AREA			
38	Abutment Leakage	None observed.	☐	☐	☐
39	Foundation Seepage	None observed. See Item 43.	☐	☐	☐
40	Slide, Slough, Scarp	None observed.	☐	☐	☐
41	Drainage System	Milltown Dam is located on and discharges to East Branch Chester Creek (refer to Photo 38). See note below.	☐	☐	☐
42	Boils	None observed.	☐	☐	☐
43	Wet Areas	Area of standing water observed at downstream edge of riprap below right embankment (refer to Photo 23). No flow observed. See note below.	☒	☐	☐
44	Reservoir Slopes	Appear to be well vegetated and stable.	☐	☐	☐
45	Access Roads	Access to dam crest is from Reservoir Road. Access route to base of downstream right embankment by a vegetated path along the downstream property. Access to left embankment restricted by private property and East Branch Chester Creek.	☐	☐	☐
46	Security Devices	Access to dam crest securred by lockable swing gate which contains a warning sign (refer to Photo 1). Access to spillway crest limited by chain-link fence at the left spillway abutment and a combination of chain-link fence and the Valve House at the right spillway abutment (refer to Photos 13 & 25). See note below.	☐	☐	☒
47	Act 91 Run-of-the-River Signs or Buoys	Act 91 Signs and Buoys not required. Warning sign added at Valve House since 2015 Annual Dam Inspection (refer to Photo 25). Township reports that boating is not permitted on Milltown Reservoir.	☐	☐	☐
48			☐	☐	☐
49			☐	☐	☐

Additional Comments (Refer to item number if applicable):

Item 41: East Branch Chester Creek flows under Route 3 approximately 600 feet downstream of Milltown Dam.

Item 43: The 2013 Annual Dam Inspection reported standing water in the same general area. Standing water appears to be due to poor surface drainage. **Recommend** continued monitoring of this area for changes in flow.

Item 46: Top support post on chain-link fence at Valve House is missing (refer to Photo 26). **Recommend** repairing fence.

ITEM	CONDITION	COMMENTS	MONITOR	INVESTIGATE	REPAIR
SPILLWAYS: CONCRETE OVERFLOW STRUCTURE					
50	Sidewalls	Delaminations and cracks throughout. See note below.	☒	☐	☒
51	Channel Floor	Concrete ogee spillway with low flow notch and apron. See note below.	☒	☐	☐
52	Unusual Movement	None observed.	☐	☐	☐
53	Approach Area	No obstructions or deficiencies observed. See note below.	☐	☐	☐
54	Weir or Control	Concrete ogee control weir with low flow notch (refer to Photo 10). See note below.	☒	☐	☐
55	Discharge Channel	East Branch Chester Creek. No obstructions observed. See note below.	☐	☐	☒
56	Boils	None observed.	☐	☐	☐
57			☐	☐	☐
58			☐	☐	☐

Additional Comments (Refer to item number if applicable):

Item 50: Hairline cracking with efflorescence observed on the vertical portions of both the left and right spillway training walls (refer to Photos 14, 15, 19 & 20). Several spalls observed near downstream end of right spillway training wall (refer to Photo 16). **Recommend** monitoring concrete for changes in condition which may require additional repairs. **Recommend** repairing spalled concrete on right spillway training wall.

Item 51: Epoxy coating on ogee spillway face installed in 2013 and repaired in 2015 (refer to Photos 17 and 21). Areas of the epoxy coating installed in 2013 observed to be pealing away from the concrete (refer to Photo 18). **Recommend** monitoring condition of epoxy coating and concrete for changes in condition that may require additional repairs.

Item 53: Upstream reservoir floor rises to meet crest of spillway. Material immediately upstream of the spillway crest was placed by design. It is noted that the reservoir is heavily silted (refer to Item 72).

Item 54: Crest and downstream face of concrete spillway low flow notch obsecured by flow. 2015 Annual Inspection reported exposed aggregate on downstream face of concrete low flow notch (refer to Photo 17 inset). **Recommend** monitoring concrete surface for deterioration that may warrant repairs.

Item 55: Rock scour protection between concrete spillway apron and concrete sill is partially dislodged and moved downstream (refer to Photos 8 and 9). Voids in riprap up to two feet in depth observed immediately downstream of concrete spillway apron. Lack of scour protection may lead to further erosion and undermining of the spillway apron and possible failure of the spillway structure itself. **Recommend** replacement of scour protection to replicate the original design intent and to protect the concrete apron from undermining.

ITEM	CONDITION	COMMENTS	MONITOR	INVESTIGATE	REPAIR
		OUTLET WORKS			
59	Intake Structure	Record drawings indicate the low level dewatering system is comprised of a 16" CIP and a 24" CIP with valving located in a Valve House at the right abutment of the spillway. See note below.	☒	☐	☐
60	Trashrack	Trashracks located on the 16" and 24" CIP intake pipes not observed due to reservoir levels.	☐	☐	☐
61	Stilling Basin	24" CIP low level dewatering pipe discharges into East Branch Chester Creek (refer to Photo 36). Scour hole approximately one foot in depth observed at 24" pipe outfall. **Recommend** addition of riprap at outfall to prevent erosion of the stream bed. Ogee spillway discharges onto rock-lined stilling basin (refer to Item 55).	☐	☐	☒
62	Primary Closure	Sluice gates (2) located on 16" and 24" CIPs entering Valve House. Leakage at 16" sluice gate reported during the 2015 Annual Dam Inspection not observed. Refer to Item 59 for additional information associated with the observed condition of the upstream sluice gates. Township reports sluice gates operated once per month.	☐	☐	☐
63	Secondary Closure	Sluice gates (2) located on 16" and 24" CIPs leaving Valve House. Downstream sluice gates reported to be inoperable (refer to Item 59).	☐	☐	☐
64	Control Mechanism	Sluice gates controlled by manual handwheels located on floorstands within the Valve House.	☐	☐	☐
65	Outlet Pipe	24" CIP low level discharge pipe. See note below.	☐	☐	☒
66	Outlet Tower	Concrete valve chamber with masonry stone Valve House (refer to Photo 25).	☐	☐	☐
67	Outlet Structure	See Item No. 66.	☐	☐	☐
68	Seepage	None observed.	☐	☐	☐
69	Unusual Movement	None observed.	☐	☐	☐
70			☐	☐	☐
71			☐	☐	☐

Additional Comments (Refer to item number if applicable):

Item 59: Sluice gates were observed on the 16" and 24" CIPs entering and leaving the Valve House (four gates total) controlled by manually operated handwheels (refer to Photos 31, 32, 33 & 34). The upstream 16" and 24" sluice gates were operated at time of inspection. Downstream gates are inoperable with the 16" gate frozen in the closed position and the 24" gate frozen in the open position. Downstream gates are not required for the operation of the low level dewatering system. East Goshen Township reports that the downstream 16" CIP has been abandoned and pluged at an unknown location downstream of the dam. Valve House constructed of masonry with lockable door and observed to be in fair condition (refer to Photos 25, and 27 through 30). Hairline cracks with efflorescense observed on exposed exterior portions of the valve chamber (refer to Photos 28, 29 & 30). Dampness with efflorescense observed in the interior downstream left corner of the concrete valve chamber (refer to Photo 34). **Recommend** monitoring the condition of the concrete valve chamber for changes in condition which may warrant repairs.

Item 65: Loss of mortar observed around frame and cover of valve manhole located immediately upstream of the discharge outlet of the 24" CIP low level dewatering system (refer to Photo 35). **Recommend** repairing mortar to keep manhole frame and cover operable and to prevent further deterioration of the structure.

ITEM	CONDITION	COMMENTS	MONITOR	INVESTIGATE	REPAIR
		RESERVOIR AREA			
72	Sedimentation	Reservoir almost completely filled with sediment. No obstructions observed directly upstream of principal spillway. See note below.	☒	☐	☐
73	Slope Stability	Relatively flat and well vegetated. Shoreline appears to be stable.	☐	☐	☐
74	Sinkholes	None observed.	☐	☐	☐
75	Fractures	None observed.	☐	☐	☐
76	Unwanted Growth	None observed.	☐	☐	☐
77	Storage Gauge	Elevations which trigger EAP actions painted on left spillway training wall (refer to Item 29). No additional storage gauges observed.	☐	☐	☐
78			☐	☐	☐
79			☐	☐	☐

Additional Comments (Refer to item number if applicable):

Item 72: Bathymetric survey performed by Gannett Fleming in July 2015 reports significant sediment build-up throughout the reservoir. **Recommend** monitoring sediment levels in the reservoir to ensure approach area to the principal spillway and low level outlet remains unobstructed.

Final Comments:

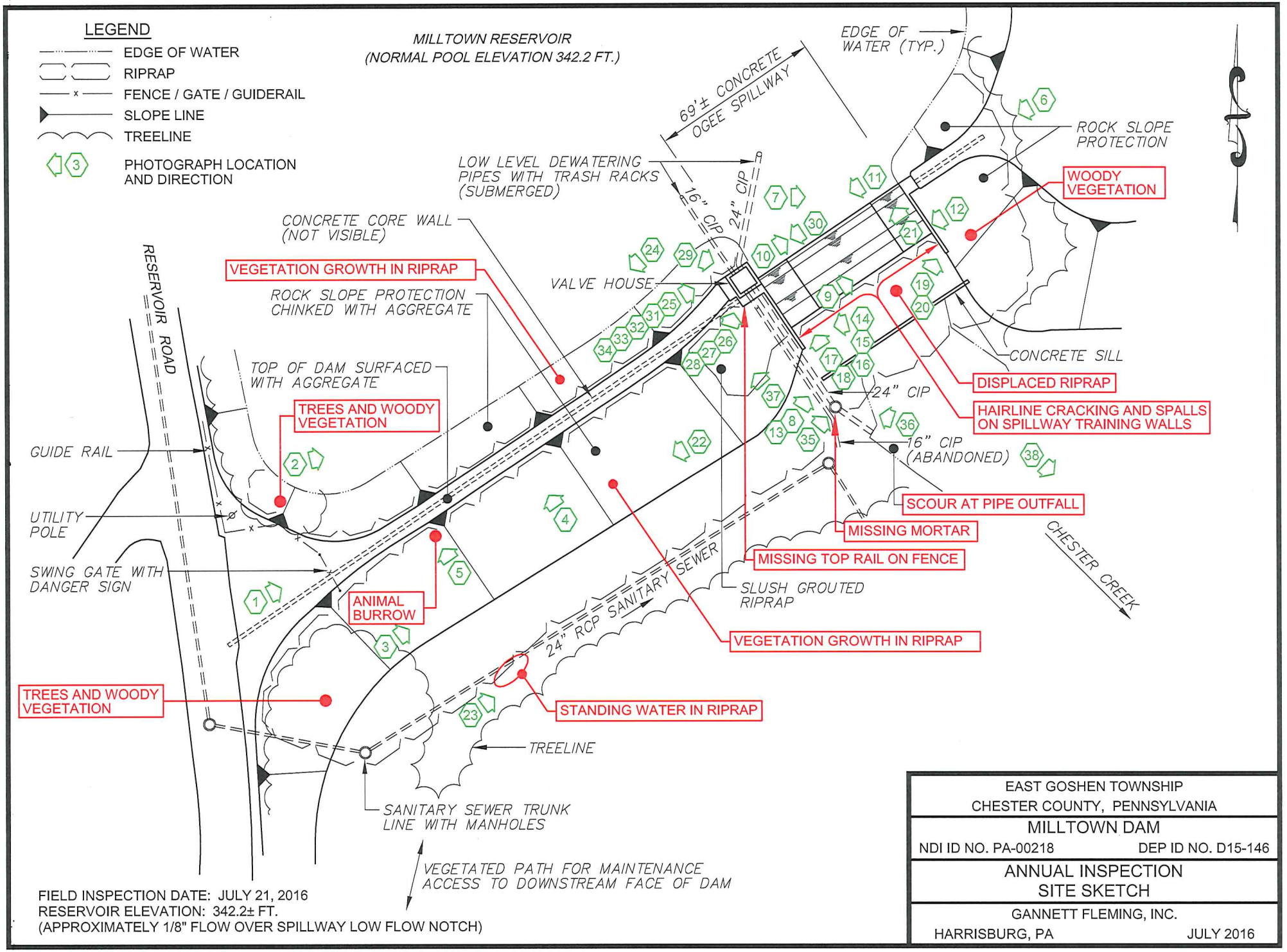
LEGEND
EDGE OF WATER
RIPRAP
FENCE / GATE / GUIDERAIL
SLOPE LINE
TREELINE
PHOTOGRAPH LOCATION AND DIRECTION
MILLTOWN RESERVOIR
(NORMAL POOL ELEVATION 342.2 FT.)
EDGE OF WATER (TYP.)
69'± CONCRETE OGEE SPILLWAY
ROCK SLOPE PROTECTION
WOODY VEGETATION
LOW LEVEL DEWATERING PIPES WITH TRASH RACKS (SUBMERGED)
16" CIP
24" CIP
CONCRETE CORE WALL (NOT VISIBLE)
VEGETATION GROWTH IN RIPRAP
ROCK SLOPE PROTECTION CHINKED WITH AGGREGATE
VALVE HOUSE
RESERVOIR ROAD
TOP OF DAM SURFACED WITH AGGREGATE
TREES AND WOODY VEGETATION
CONCRETE SILL
DISPLACED RIPRAP
HAIRLINE CRACKING AND SPALLS ON SPILLWAY TRAINING WALLS
24" CIP
16" CIP (ABANDONED)
GUIDE RAIL
UTILITY POLE
SCOUR AT PIPE OUTFALL
MISSING MORTAR
SWING GATE WITH DANGER SIGN
MISSING TOP RAIL ON FENCE
CHESTER CREEK
SLUSH GROUTED RIPRAP
24" RCP SANITARY SEWER
ANIMAL BURROW
VEGETATION GROWTH IN RIPRAP
TREES AND WOODY VEGETATION
STANDING WATER IN RIPRAP
TREELINE
SANITARY SEWER TRUNK LINE WITH MANHOLES
VEGETATED PATH FOR MAINTENANCE ACCESS TO DOWNSTREAM FACE OF DAM
FIELD INSPECTION DATE: JULY 21, 2016
RESERVOIR ELEVATION: 342.2± FT.
(APPROXIMATELY 1/8" FLOW OVER SPILLWAY LOW FLOW NOTCH)
EAST GOSHEN TOWNSHIP
CHESTER COUNTY, PENNSYLVANIA
MILLTOWN DAM
NDI ID NO. PA-00218
DEP ID NO. D15-146
ANNUAL INSPECTION
SITE SKETCH
GANNETT FLEMING, INC.
HARRISBURG, PA
JULY 2016

Photo No. 1
View of right embankment crest looking toward spillway and Valve House.
Inset shows condition of Danger Sign located on swing gate.

Photo No. 2
View of upstream slope of right embankment.

Photo No. 3
View of downstream slope of right embankment.

Photo No. 4
Typical riprap condition on downstream slope of right embankment. Note riprap has been choked with aggregate.

Photo No. 5
Start of animal burrow on downstream slope of right embankment.

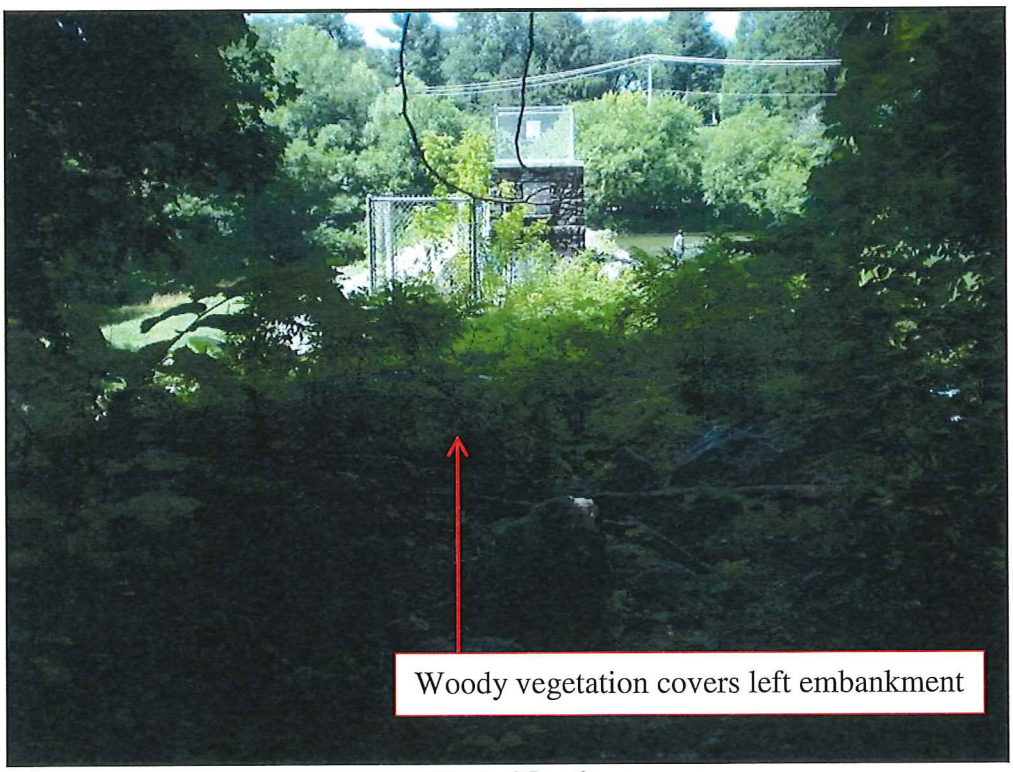

Photo No. 6
View of left embankment crest looking toward spillway. Valve House visible in top center of photograph. Note woody vegetation on left embankment.

Photo No. 7
View of upstream slope of left embankment. Note woody vegetation.

Photo No. 8
View of downstream slope of left embankment and riprap scour protection below spillway.

Photo No. 9
View of downstream end of spillway. Loss of riprap observed (up to two feet in depth).

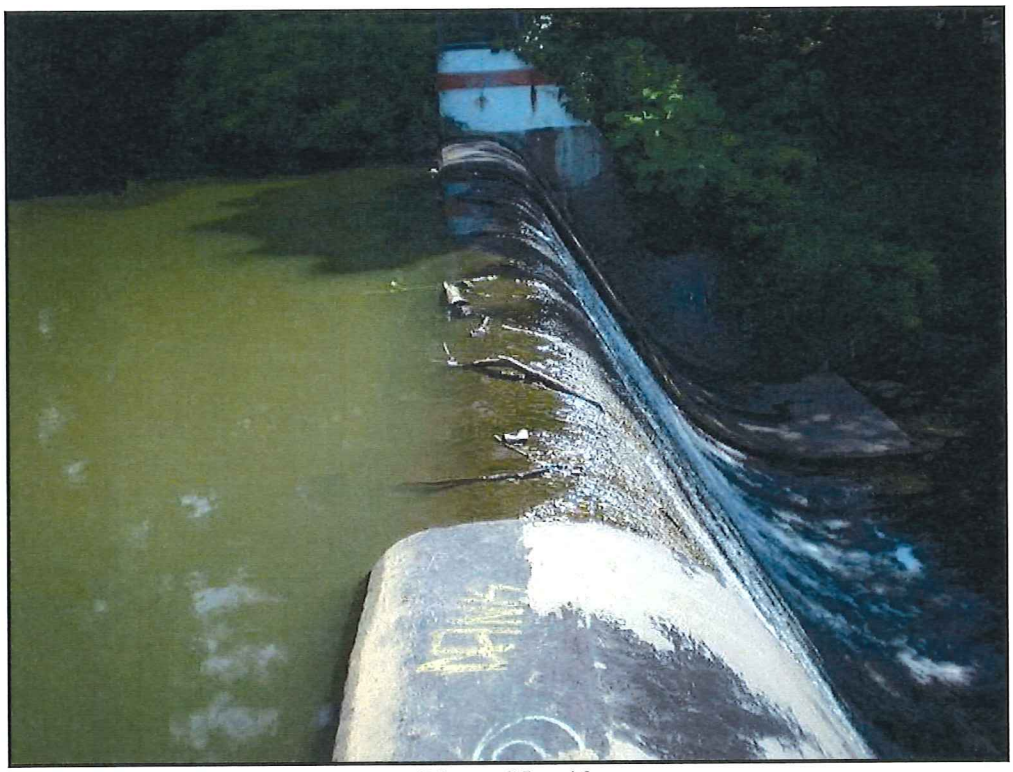

Photo No. 10
View of ogee spillway crest with low flow notch (looking towards left abutment).
Note horizontal paint markings on left spillway abutment which relate to EAP trigger elevations.

Photo No. 11
View of ogee spillway crest, right spillway training wall and Valve House.

Photo No. 12
View from left embankment looking at Valve House and the downstream face of concrete spillway downstream face of right embankment.

Photo No. 13
Standing below right embankment looking at downstream face of concrete spillway. Note chain link fence which limits pedestrian access to spillway crest.

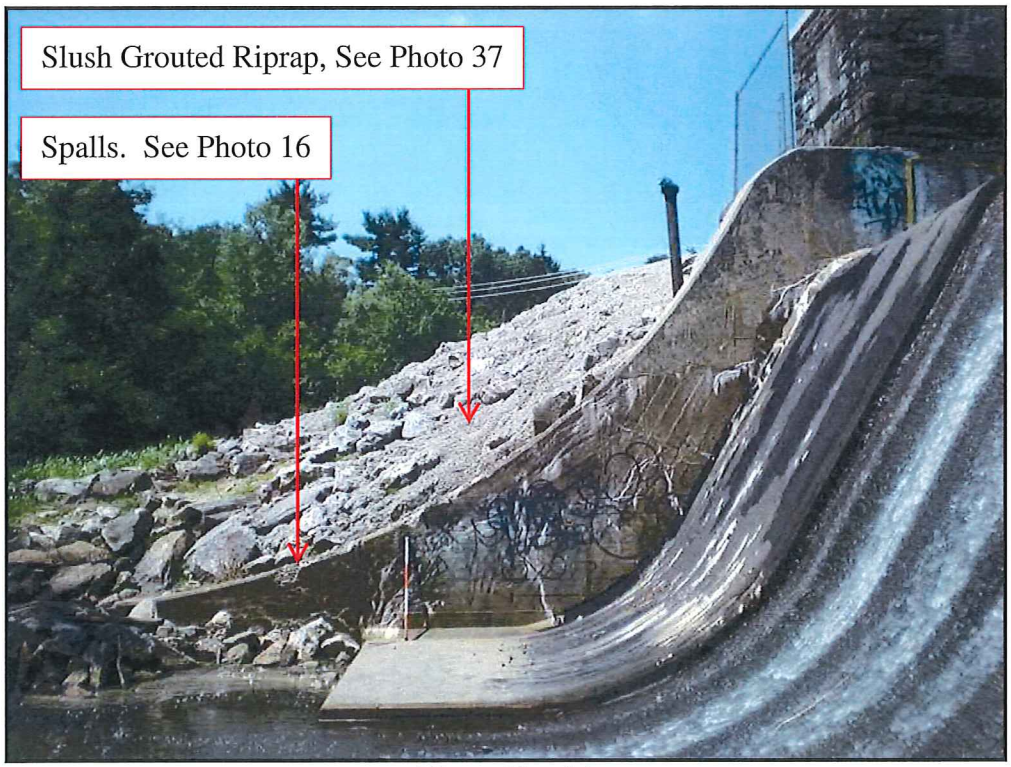

Photo No. 14
View of right spillway training wall.

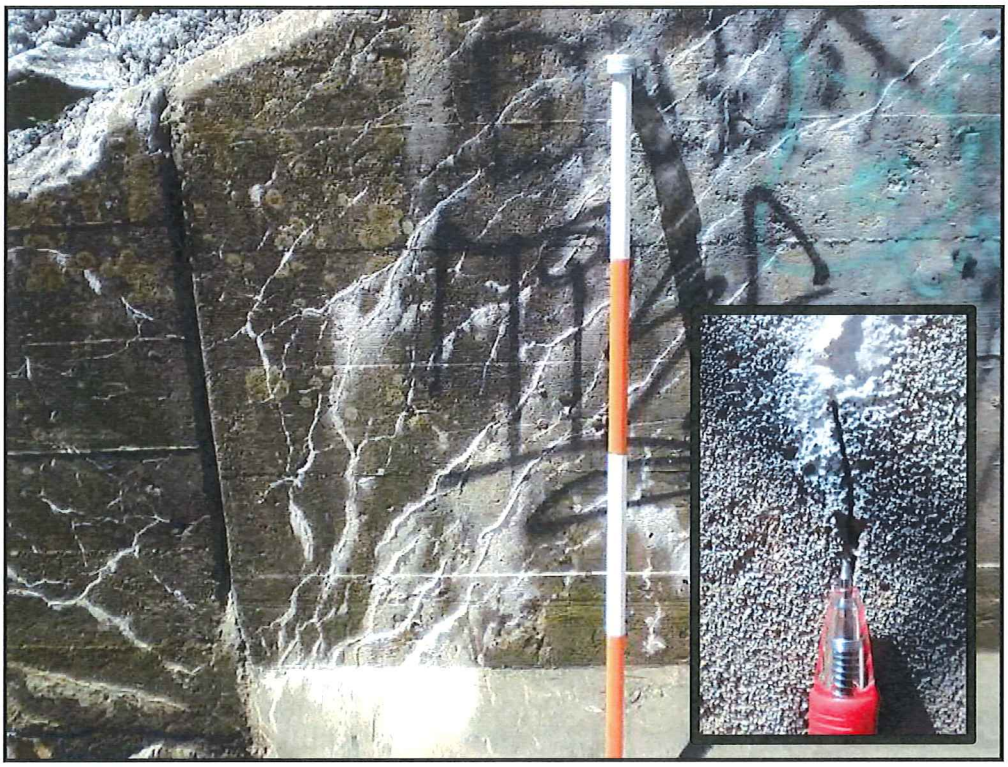

Photo No. 15
View of right spillway training wall. Note hairline cracking with efflorescence. Inset shows typical hairline crack with efflorescence.

Photo No. 16
View of downstream end of right spillway training wall. Note spalls on top of wall.

Photo No. 17
View of right half of downstream face of the concrete spillway. Darker black areas represent locations where the epoxy coating was replaced in the fall of 2015.
Inset shows condition of surface concrete within low flow notch (inset photo from June 2015).

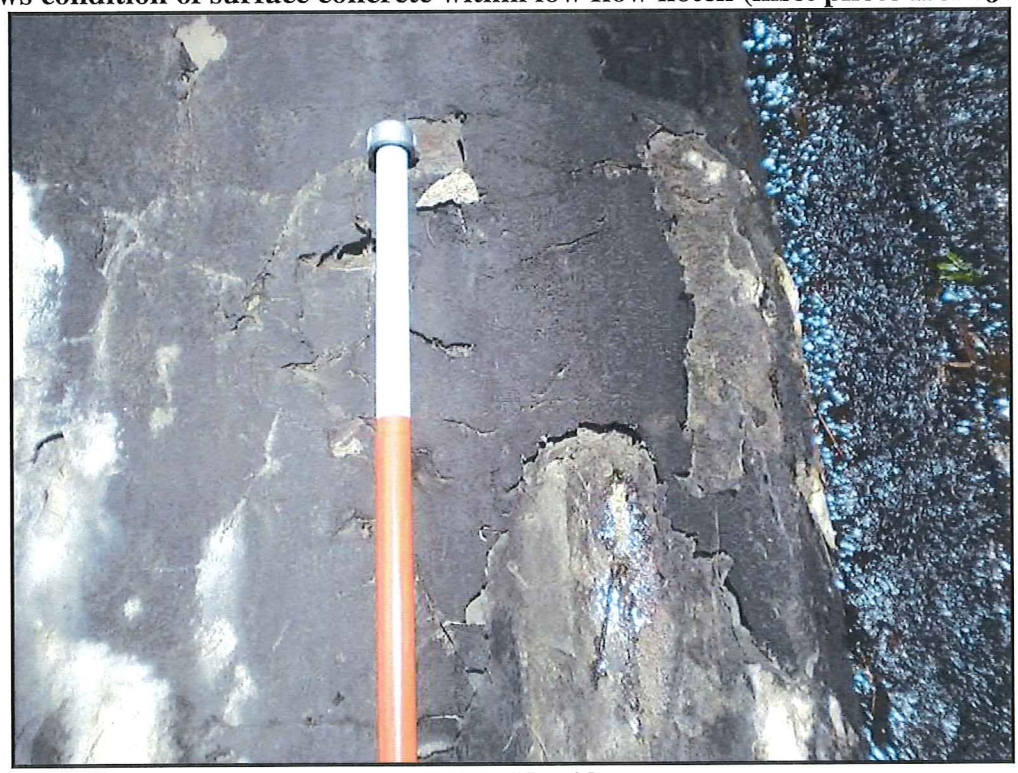

Photo No. 18
View of right half of downstream face of concrete spillway and areas where the epoxy coating has pealed.

Photo No. 19
View of left spillway training wall.

Photo No. 20
View of left spillway training wall. Note hairline cracking with efflorescence (typical throughout wall).

Photo No. 21
View of left half of downstream face of the concrete spillway. Darker black areas represent locations where the epoxy coating was replaced in the fall of 2015.

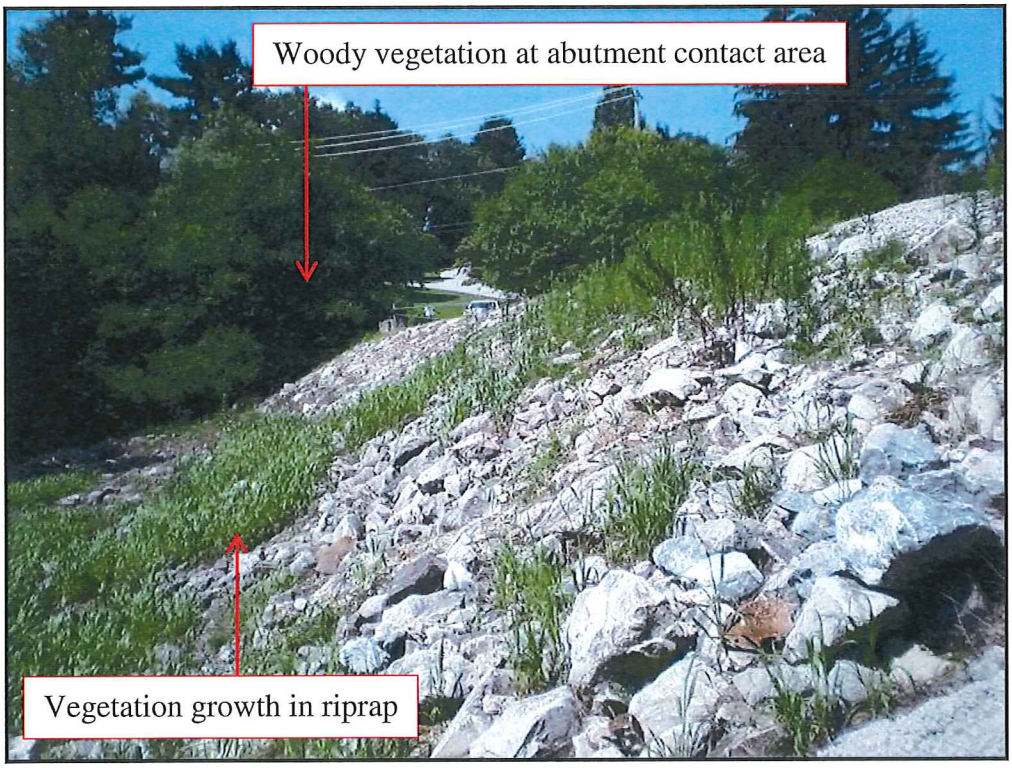

Photo 22
View of downstream slope of right embankment.

Photo 23
Standing water downstream of right embankment at edge of riprap.

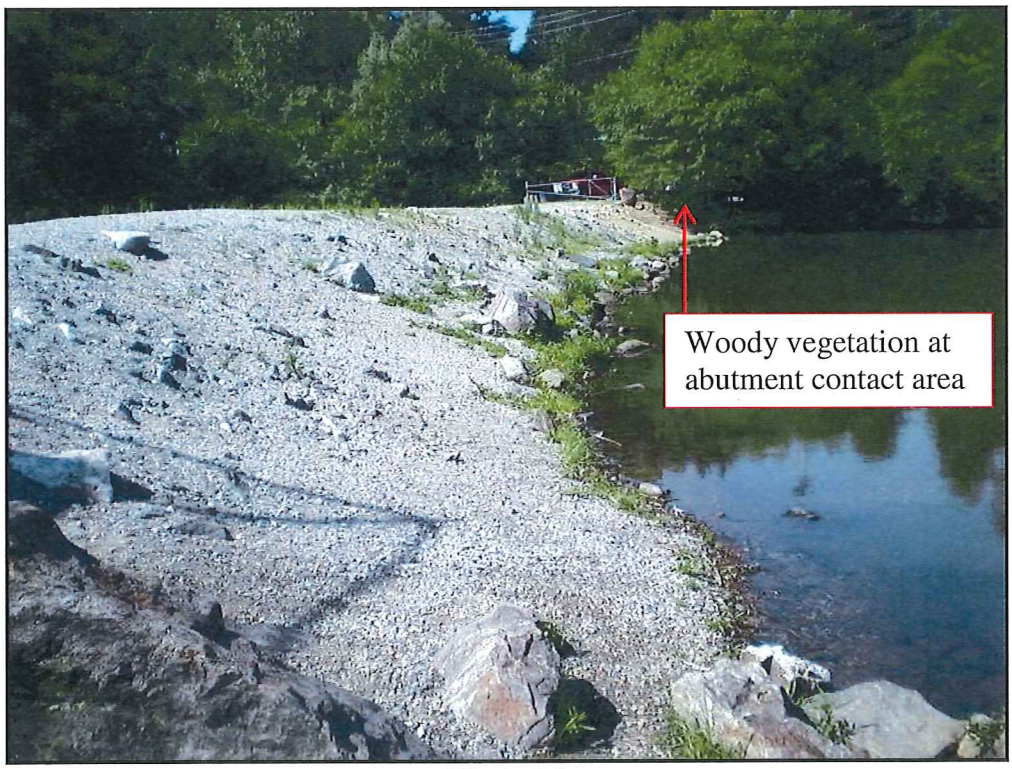

Photo 24
View of upstream face of right embankment.

Photo 25
View of Valve House. Inset shows warning sign which has been added since 2015 Annual Dam Inspection.

Photo No. 26
Chain link fence on downstream side of Valve House. Note missing top rail.

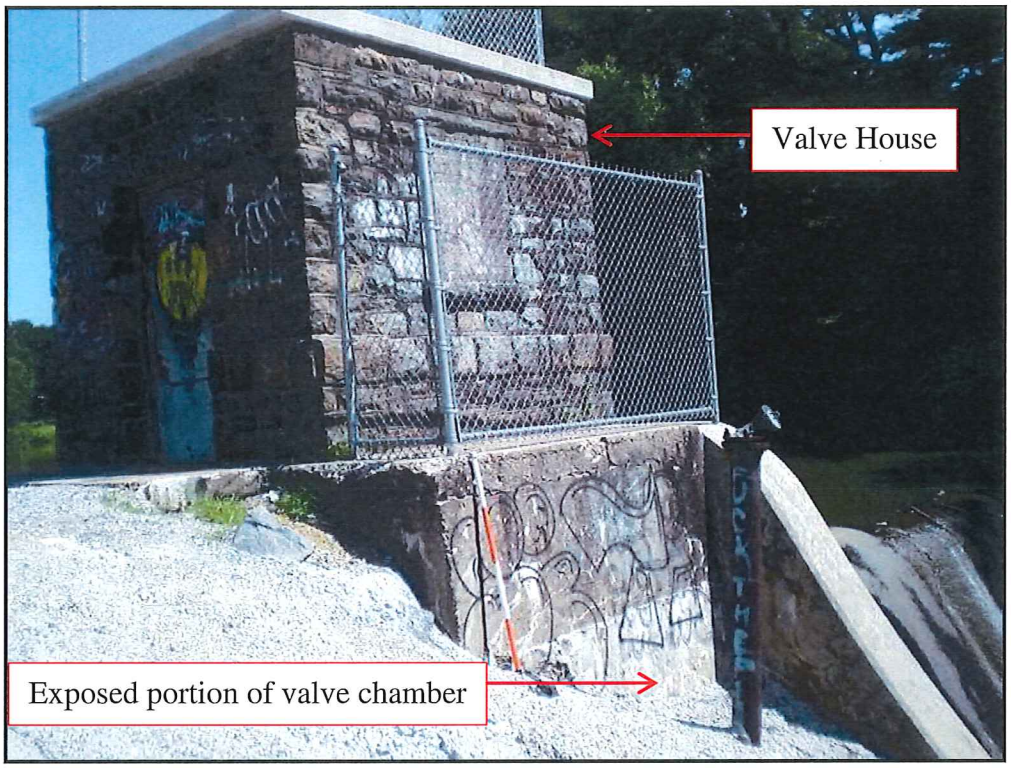

Photo 27
View of downstream side of Valve House.

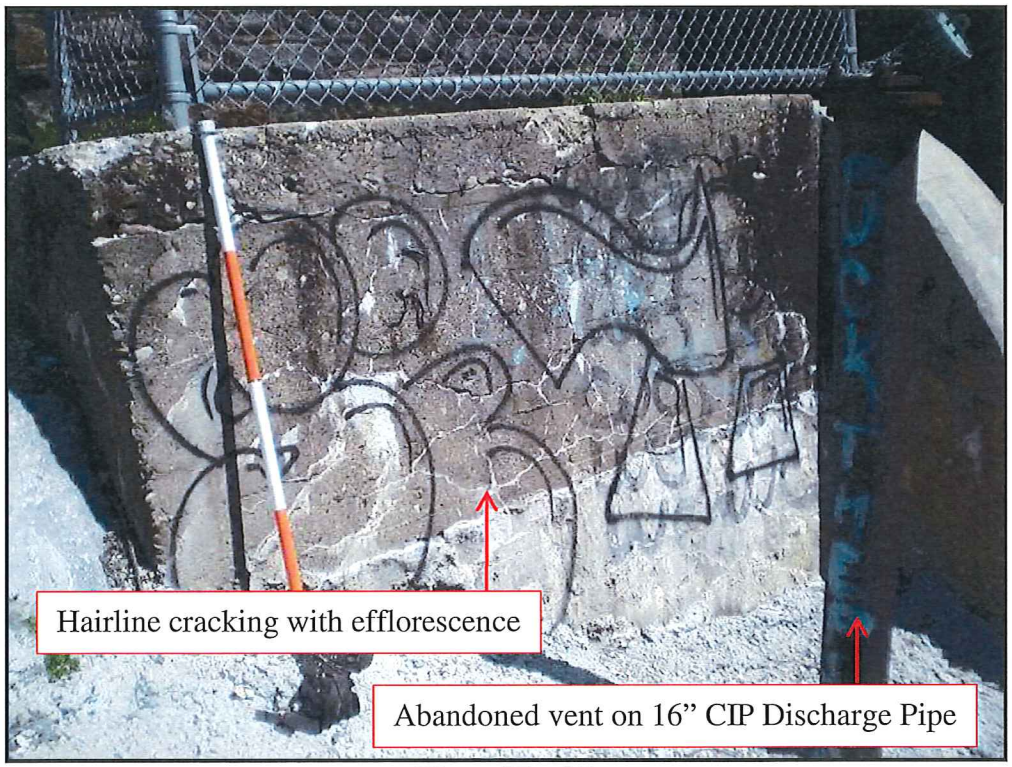

Photo No. 28
View of downstream face of exposed valve chamber. Note hairline cracking with efflorescence.

Photo 29
View of upstream face of Valve House. Note hairline cracking with efflorescence throughout exposed portion of concrete valve chamber.

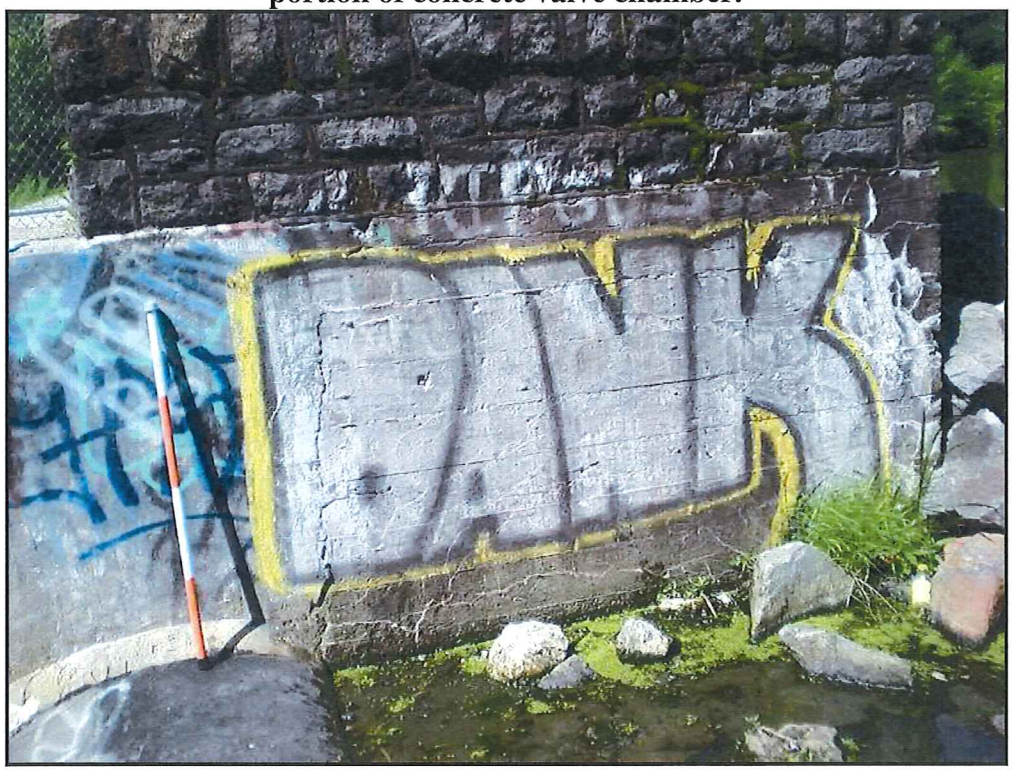

Photo No. 30
View of left face of Valve House and exposed portions of the valve chamber. Note hairline cracking with efflorescence throughout exposed portion of concrete valve chamber.

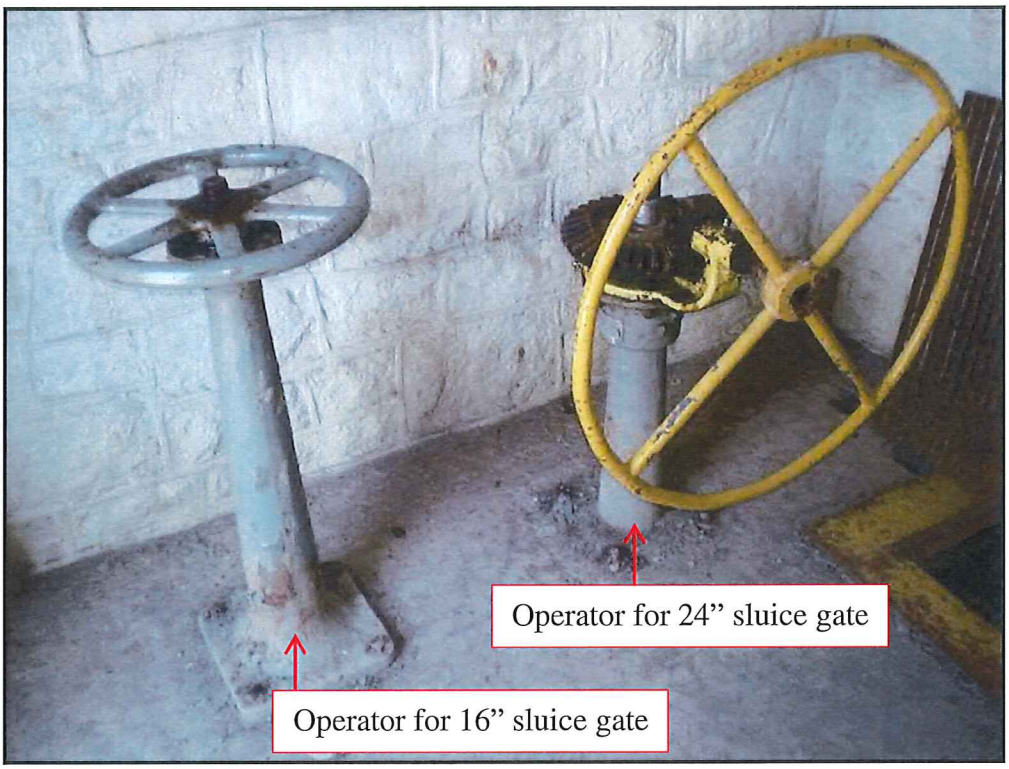

Photo 31
View of upstream interior of Valve House and operable sluice gate operators.

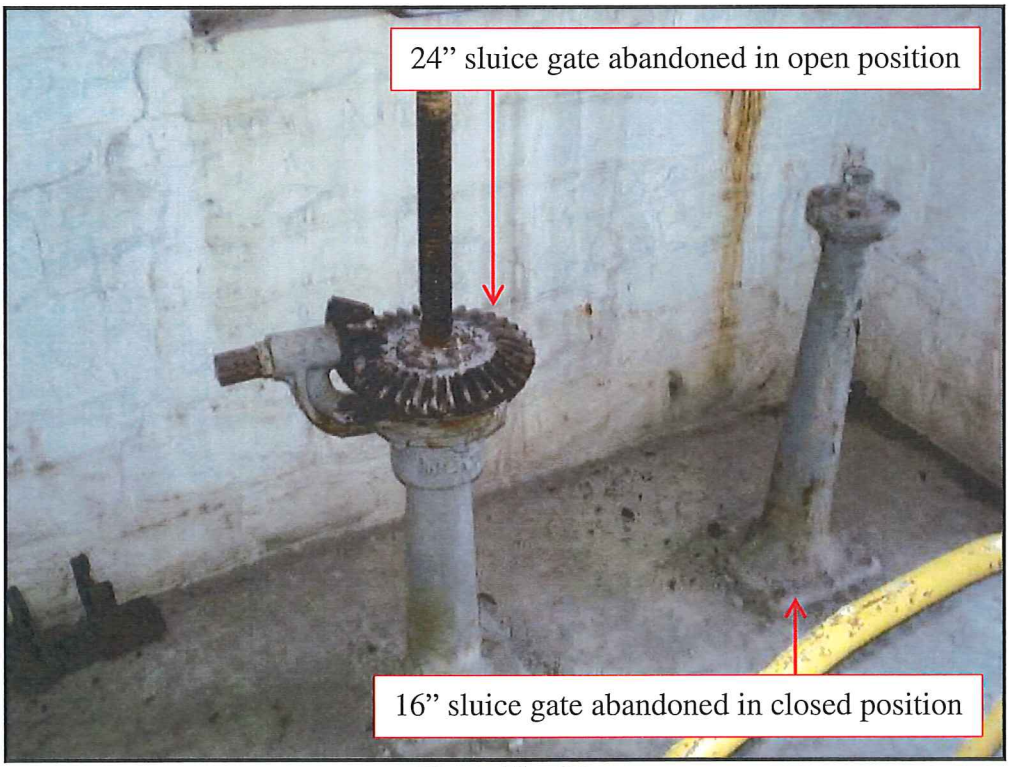

Photo No. 32
View of downstream interior of Valve House and in-operable sluice gate operators.

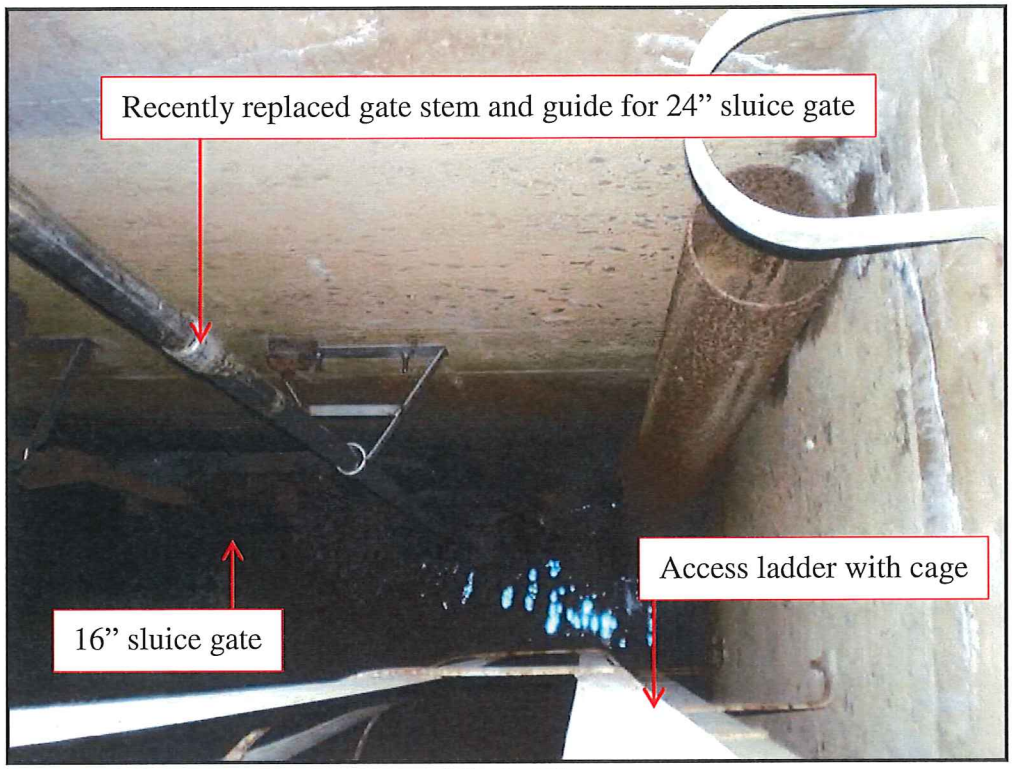

Photo 33
View of interior upstream wall of valve chamber.

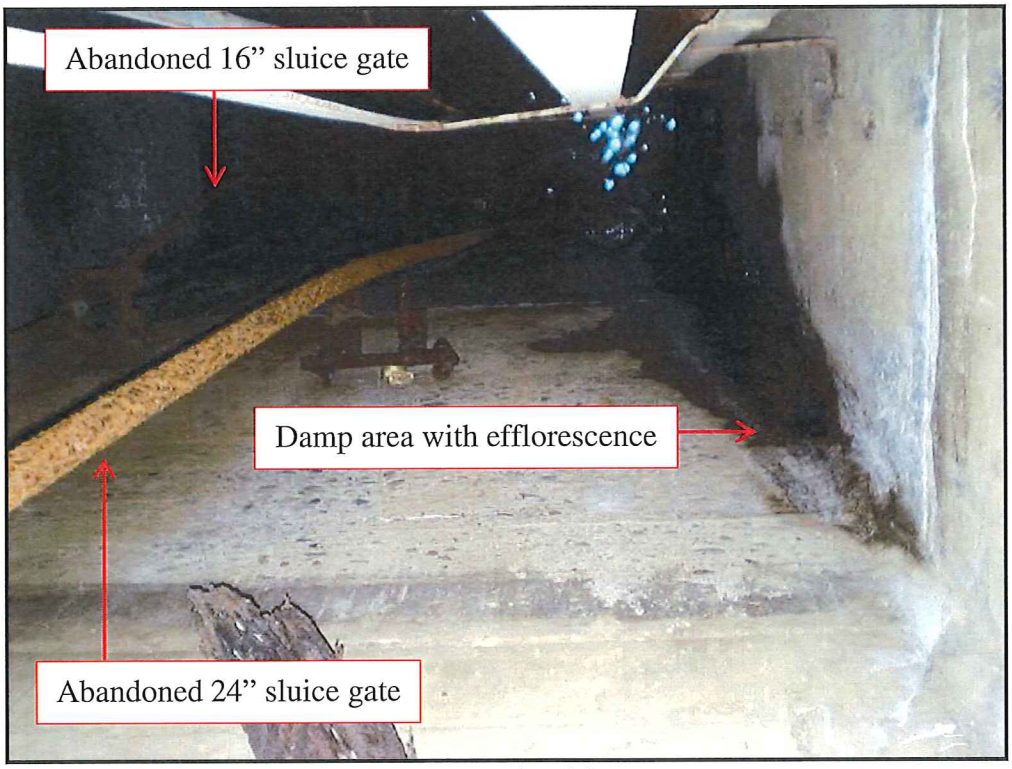

Photo No. 34
View of interior downstream wall of valve chamber.

Photo 35
Valve manhole on 24" CIP low level dewatering pipe. Note loss of mortar around frame and cover.

Photo No. 36
Discharge location of 24" CIP low level dewatering pipe.

Photo 37
Slush grouted riprap on downstream right embankment near Valve House.

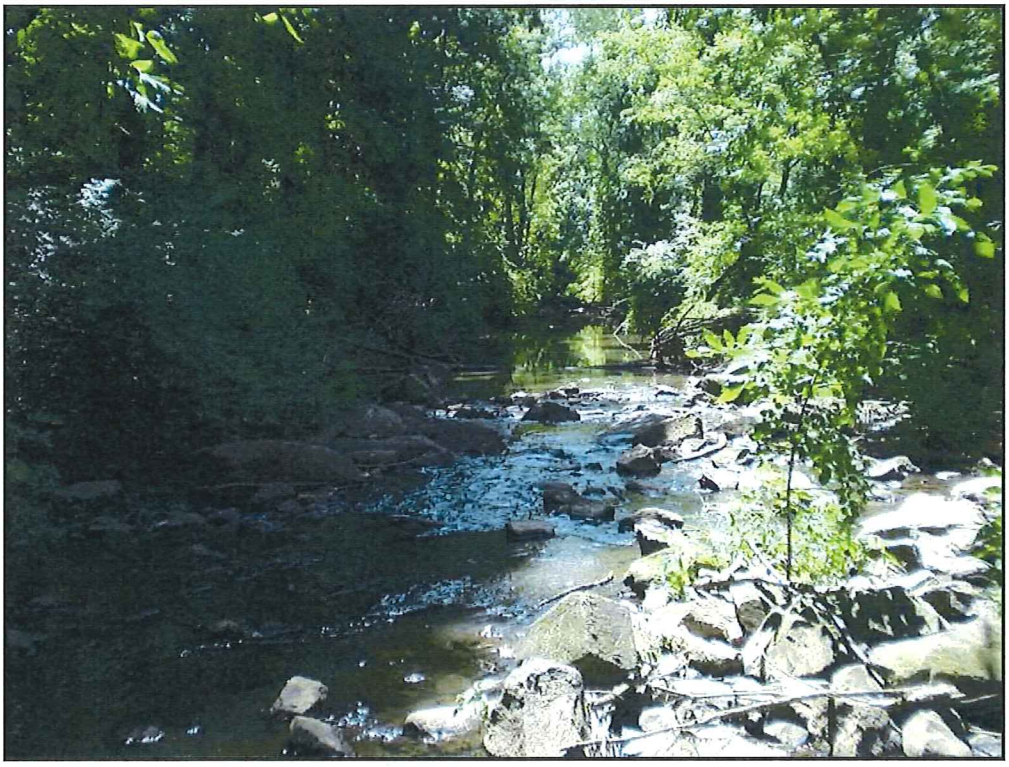

Photo No. 38
Standing below spillway looking downstream at receiving channel (East Branch Chester Creek).