



**Environmental
Protection Agency**

Ted Strickland, Governor
Lee Fisher, Lt. Governor
Chris Korleski, Director

October 6, 2010

Ms. Nancy McDonnell
Appleton Papers, Inc., West Carrollton Mill
1030 West Alex-Bell Road
Dayton, Ohio 45449

Re: Montgomery County, Appleton Papers, Inc., Compliance Evaluation Inspection

Dear Ms. McDonnell:

On September 8, 2010, I conducted a Compliance Evaluation Inspection at Appleton Papers, Inc. (NPDES Permit No. OH0009377; OEPA Permit No. 11A00004*MD). Representing this facility was Mr. Jay Cottingim, Mr. Layne Mitchell, and yourself. I have included with this letter a copy of the inspection report.

Three areas of the inspection report were rated as Marginal. One area rated as Marginal is the "Effluent/Receiving Waters". We were able to discuss this matter at length during the meeting held on September 17, 2010. During the meeting Appleton Paper, Inc. stated that they had investigated the removal of the coloration from their discharge and had performed bench scale treatment trials to remove the coloration. Appleton Paper, Inc. said that they were confident enough in the results of the bench scale trials to perform a full scale trial of the treatment. Subsequent to the meeting Appleton Paper, Inc. was informed that a Permit to Install would be required for the modification of the treatment process. The Ohio EPA is currently awaiting receipt of the Permit to Install application for the full scale trial.

The other two areas rated as Marginal are interrelated, "Laboratory" and "Self Monitoring Program". It should be noted that the Ohio EPA recently developed additional inspection criteria for the laboratory section of the inspection and said criteria were used during this inspection. I have included with this letter a copy of the General Lab Criteria. Details regarding the deficiencies identified during the inspection can be found in the inspection report and the General Lab Criteria form.

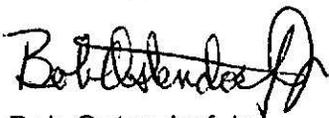
Please inform this office, in writing, within ten days of receipt of this notification as to the actions which will be taken to correct the deficiencies identified in the inspection report and the General Lab Criteria. Your response should include the dates, either actual or proposed, for completion of said actions. I have included with this letter a copy of a "Standard Operating Procedure" that Appleton Papers, Inc. can use as a template in revising or developing their site specific Standard Operating Procedures.

Ms. Nancy McDonnel
October 6, 2010
Page 2

During the inspection it was discovered that an overflow of wastewater containing pulp had overflowed onto the ground. After further investigation by Appleton Paper, Inc. it was determined that the pH sample weir backed up and overflowed. Please be advised that this is a violation of Part II, Item 11 of permit 11A00004*MD. Appleton paper, Inc. should take all necessary measures to prevent the reoccurrence of this incident.

If you have any questions or concerns regarding this matter please feel free to contact me at (937) 285-6107 or via email at: Robert.Ostendorf@epa.state.oh.us .

Sincerely,



Bob Ostendorf Jr.
Division of Surface Water
Permits Section

Enclosure

cc: Mr. Jay Cottingim, Appleton Papers, Inc.



State of Ohio Environmental Protection Agency
Southwest District Office

NPDES Compliance Inspection Report

Section A: National Data System Coding					
Permit #	NPDES#	Month/Day/Year	Inspection Type	Inspector	Facility Type
11A00004*MD	OH0009377	9/8/2010	C	S	2

Section B: Facility Data		
Name and Location of Facility Inspected	Entry Time	Permit Effective Date
Appleton Papers Inc. 4000 Hydraulic Road West Carrollton, OH 45449	9:05 a.m.	10/1/09
	Exit Time	Permit Expiration Date
	12:35 p.m.	3/31/14
Name(s) and Title(s) of On-Site Representatives		Phone Number(s)
Ms. Nancy McDonnell, Environmental Manager Mr. Jay Cottingim, Environmental Process Engineer Mr. Mr. Layne Mitchell, Senior Lab Technician		937-847-7310
Name, Address and Title of Responsible Official		Phone Number
Mr. Satish Damodaran, Mill Manager 1030 West Alex Bell Road West Carrollton, OH 45449		937-847-7022

Section C: Areas Evaluated During Inspection					
(S = Satisfactory, M = Marginal, U = Unsatisfactory, N = Not Evaluated)					
S	Permit	S	Flow Measurement	N	Pretreatment
S	Records/Reports	M	Laboratory	N	Compliance Schedule
S	Operations & Maintenance	M	Effluent/Receiving Waters	M	Self-Monitoring Program
N	Facility Site Review	S	Sludge Storage/Disposal	N	Other
N	Collection System				

Section D: Summary of Findings (Attach additional sheets if necessary)
See attached Summary of Findings / Comments

Inspector	Reviewer
 Bob Ostendorf Jr. Division of Surface Water Southwest District Office	 Martyn Burt Compliance & Enforcement Supervisor Division of Surface Water Southwest District Office
10-6-10 Date	10/6/10 Date

Sections E thru K: Complete on all inspections as appropriate
Y – Yes, N – No, N/A – Not Applicable, N/E – Not Evaluated

Section E: Permit Verification

Inspection observations verify the permit

- (a) Correct name and mailing address of permittee Y
- (b) Correct name and location of receiving waters..... Y
- (c) Do Categorical Standards apply?...If yes, list applicable standards.. Y

40 CFR Part 430 - Pulp and Paper Point Source Category, Subpart I -
Secondary Fiber Deink Production

- (d) Product(s) and production rates conform with permit application (Industries)..... Y
- (e) Flows and loadings conform with NPDES permit..... N
- (f) Treatment processes are as described in permit application... Y
- (g) All discharges are permitted..... Y
- (h) Number and location of discharge points are as described in permit..... Y
- (i) Storm water discharges properly permitted..... Y

Comments/Status:

The plant is designed for an average flow of 6.5 MGD and the average daily flow for the previous 12 months is 7.12 MGD. There have been no numerical loading violations reported during this time period.

Section F: Compliance

- (a) Any significant violations since the last inspection..... Y
- (b) Appropriate Non-compliance notification of violations..... Y
- (c) Permittee is taking actions to resolve violations..... Y
- (d) Permittee has a compliance schedule..... N
- (e) Compliance schedule contained in...N/A
- (f) Permittee is in compliance with schedule..... N/A
- (g) Has biomonitoring shown toxicity in discharge since last inspection N/E

Comments/Status:

The Ohio EPA recently received and investigated a complaint regarding the color present in the discharge. Part III, Item 2 of permit 11A00004*MD prohibits the presence of color in amounts that would alter the natural color of the receiving waters to such a degree as to create a nuisance.

Section G: Operation & Maintenance

Treatment Works:

Treatment facility properly operated and maintained

(a) Standby power available.....generator or dual feed N

i. What does the back-up power source operate.....

N/A

ii. How often is the generator tested under load.....

N/A

(b) Which components have an alarm system available for power or equipment failures.....

The following equipment is alarmed: Press, Influent pump station, Blowers, and aerators.

(c) All treatment units in service other than backup units..... N

(d) What method is used for scheduling routine & preventative maintenance (calendar, software, etc.).....

Computerized Maintenance Management System Software

(e) Any major equipment breakdown since last inspection..... Y

(f) Operation and maintenance manual provided and maintained..... Y

(g) Any plant bypasses since last inspection..... N

(h) Any plant upsets since last inspection..... Y

Comments/Status:

At the time of the inspection 3 aerators were out of service and had been schedule for service. The facility experienced a slugload earlier in the year when their boilers went down. The facility was required to feed the plant while the mill was not operating and they were also required to seed the plant so as to maintain their population.

Section H: Sludge Management

- (a) Method of Sludge Disposal... Land Application
 Haul to Another NPDES Permittee
 Haul to a Mixed Solid Waste Landfill

*if one of the selected methods is land application, complete applicable charts.

Class A - Exception Quality Sewage Sludge (monitoring station 584)

Pathogen Reduction Alternative	84370 Vector Attraction Reduction Options							
	Option 1 -38% Volatile Solids Reduction	Option 2 -Anaerobic Bench Scale Analysis	Option 3 - Aerobic Bench Scale Analysis	Option 4 - Specific Oxygen Uptake Rate	Option 5 - Aerobic Time and Temperature	Option 6 - Alkali Addition	Option 7 - >75% Percent Solids without Unstabilized Solids	Option 8 - >75% Percent Solids with Unstabilized Solids
Alternative 1 - Time and Temperature Regime (84369)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 2 - High pH and High Temperature (84369)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 3 - Other Processes (84369)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 4 - Unknown Processes (84369)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 5 - Composting (84397)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 5 - Heat Drying (84397)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 5 - Heat Treatment (84397)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 5 - Thermophilic Aerobic Digestion (84397)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 5 - Beta Ray Irradiation (84397)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 5 - Gamma ray Irradiation (84397)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 5 - Pasteurization (84397)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 6 - Approved Equivalent Process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Class B Sewage Sludge (monitoring station 581)

Pathogen Reduction Alternative	84370 Vector Attraction Reduction Options									
	Option 1 -38% Volatile Solids Reduction	Option 2 -Anaerobic Bench Scale Analysis	Option 3 - Aerobic Bench Scale Analysis	Option 4 - Specific Oxygen Uptake Rate	Option 5 - Aerobic Time and Temperature	Option 6 - Alkali Addition	Option 7 - >75% Percent Solids without Unstabilized	Option 8 - >75% Percent Solids with Unstabilized	Option 9 - Land Injection	Option 10 - Immediate Incorporation
Alternative 1 - Geometric Mean of Seven Fecal Samples (84369)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 2 - Aerobic Digestion (46396)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 2 - Air Drying (46396)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 2 - Anaerobic Digestion (46396)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 2 - Composting (46396)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 2 - Lime Treatment (46396)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative 3 - Approved Equivalent Process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- (a) Has amount of sludge generated changed significantly since the last inspection..... N
- (b) How much sludge storage is provided at the plant.....
- (c) Records kept in accordance with State and Federal law (5 years according to OAC 3745-40-06)..... Y
- (d) Any complaints received in last year regarding sludge..... N
- (e) 5/8" screen at headworks for facilities that land apply sludge..... N/A
- (f) Are sludge application sites inspected to verify compliance with NPDES permit..... N/A
- (g) Is a contractor used for sludge disposal..... Y
 If so, what is the name of the contractor.....

Comments/Status:

The sludge is being used by various customers in a solidification process prior to disposal.

Section I: Self-Monitoring Program

Flow Measurement:

- (a) Primary/Secondary flow measuring devices operated and maintained..... Y
Type of device (e.g. weir with ultrasonic level sensor):
- (b) Calibration frequency adequate Y
(Date of last calibration: 06/03/2010)
- (c) 24-hour recording instruments operated and maintained..... Y
- (d) Flow measurement equipment adequate to handle full range of flows..... Y
- (e) Actual flow discharged is measured..... N
- (f) Flow measuring equipment inspection frequency
Daily Weekly monthly other

Comments/Status:

The influent meter is used for reporting flow on the DMR. I was informed during the inspection that this was due to inaccurate readings at the final effluent discharge point caused by surface turbulence.

Section I: Self-Monitoring Program (con't)

Sampling:

- (a) Sampling location(s) are as specified by permit..... Y
- (b) Parameters and sampling frequency agree with permit..... Y
- (c) Permittee uses required sampling method..... Y
(see GLC page)
- (d) Monitoring records (i.e., flow, pH, DO) maintained for a minimum of three years including all original strip chart recordings (i.e, continuous monitoring instrumentation, calibration and maintenance records)..... Y

Comments/Status:

Section I: Self-Monitoring Program (con't)

Laboratory:

General

- (a) Does the Quality Assurance Manual contain written Standard Operating Procedures (SOP's) for all analysis performed onsite..... N
- (b) Do SOP's include the following if applicable..... N
 - Title
 - Scope and Application
 - Summary
 - Sample Handling and Preservation
 - Interferences
 - Apparatus and Materials
 - Reagents
 - Procedure
 - Calculations
 - Quality Control
 - Maintenance
 - Corrective Action
 - Reference (Parent Method)

Note: Standard Methods 1020A establishes that "Quality assurance (QA) is the definitive program for laboratory operation that specifies the measure required to produce defensible data of known precision and accuracy. Standard operating procedures are to be used in the laboratory in sufficient detail that a competent analyst unfamiliar with the method can conduct a reliable review and/or obtain acceptable results." SOPs should be developed for each analytical procedure.

- (c) EPA approved analytical testing procedures used (40 CFR 136.3).. N
- (d) If alternate analytical procedures are used, proper approval has been obtained..... N
- (e) Analyses being performed more frequently than required by permit. N
- (f) If (e) is yes, are results in permittee's self-monitoring report..... N/A
- (g) Satisfactory calibration and maintenance of instruments/equipment. N (see score from GLC page)
- (h) Commercial laboratory used..... Y
Parameters analyzed by commercial lab: SAS (Ana Lab), Flow, DO and pH in house, balance of parameters sent to Belmont Labs

Lab name: Ana Labs, Belmont Labs

Discharge Monitoring Report Quality Assurance (DMRQA)

- (a) Participation in latest USEPA quality assurance performance sampling..... Y
Date: 7/2010
- (b) Were any parameters "Unsatisfactory"..... N
- (c) Reasons for "Unsatisfactory" parameters.....

Comments/Status:

The facility has SOPs written for some of the analysis performed onsite but the SOPs need to be reviewed to ensure they comply with the requirements (See above). The facility is currently using a method that is not approved by the USEPA for the monitoring of DO at their final outfall.

Section J: Effluent/Receiving Water Observations

Outfall # 001

Outfall Description: The discharge appeared to have a slight coloration (see pictures included with this report).

Receiving Stream: Great Miami River

Receiving Stream Description: The river appeared to be normal in appearance (see pictures included with this report).

Comments/Status:

Section K: Multimedia Observations

- (a) Are there indications of sloppy housekeeping or poor maintenance in work and storage areas or laboratories..... N
- (b) Do you notice staining or discoloration of soils, pavement or floors.. N
- (c) Do you notice distressed (unhealthy, discolored, dead) vegetation.. N
- (d) Do you see unidentified dark smoke or dust clouds coming from sources other than smokestacks..... N
- (e) Do you notice any unusual odors or strong chemical smells..... N
- (f) Do you see any open or unmarked drums, unsecured liquids, or damaged containment facilities..... N

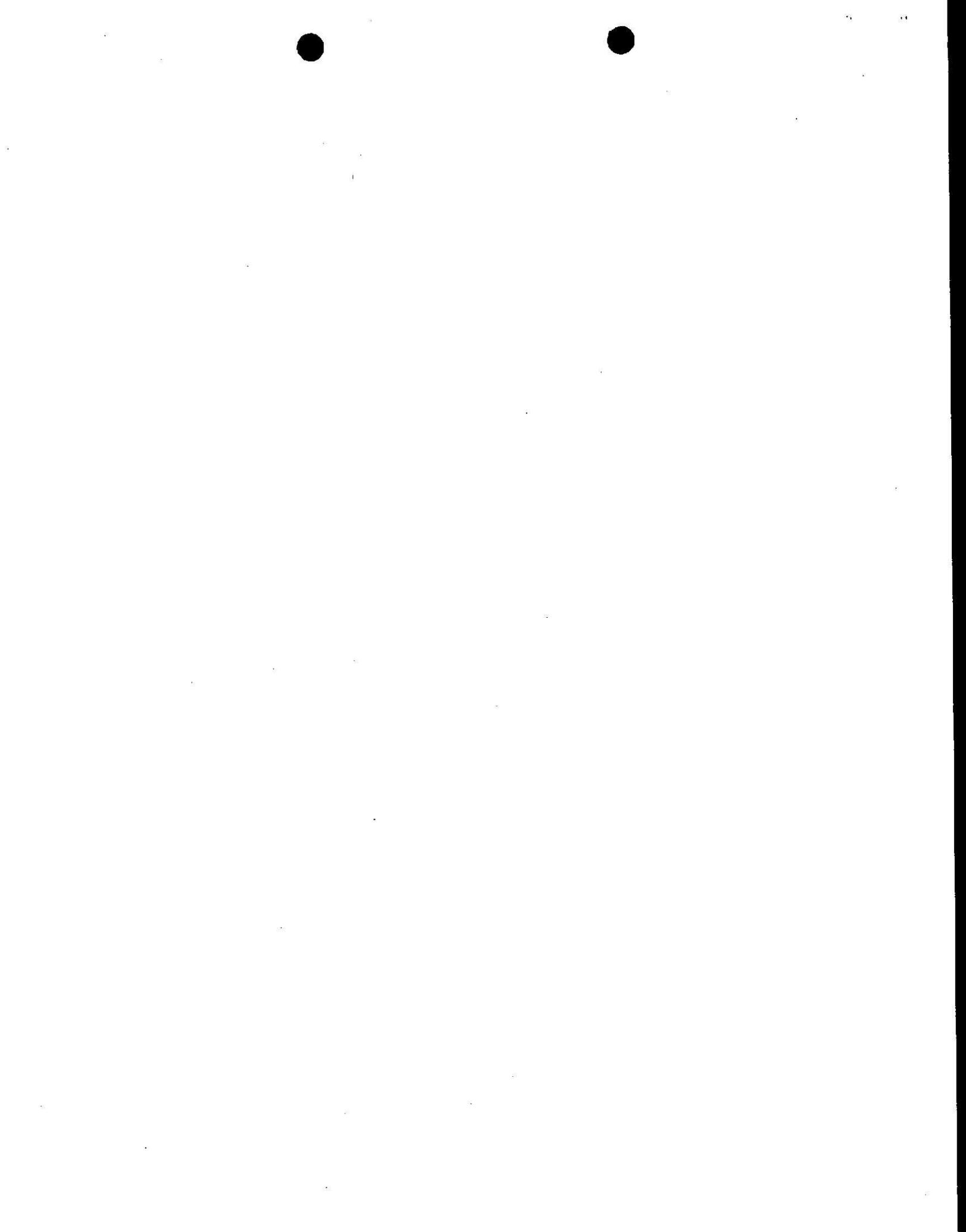
If any of the above are observed, ask the following questions:

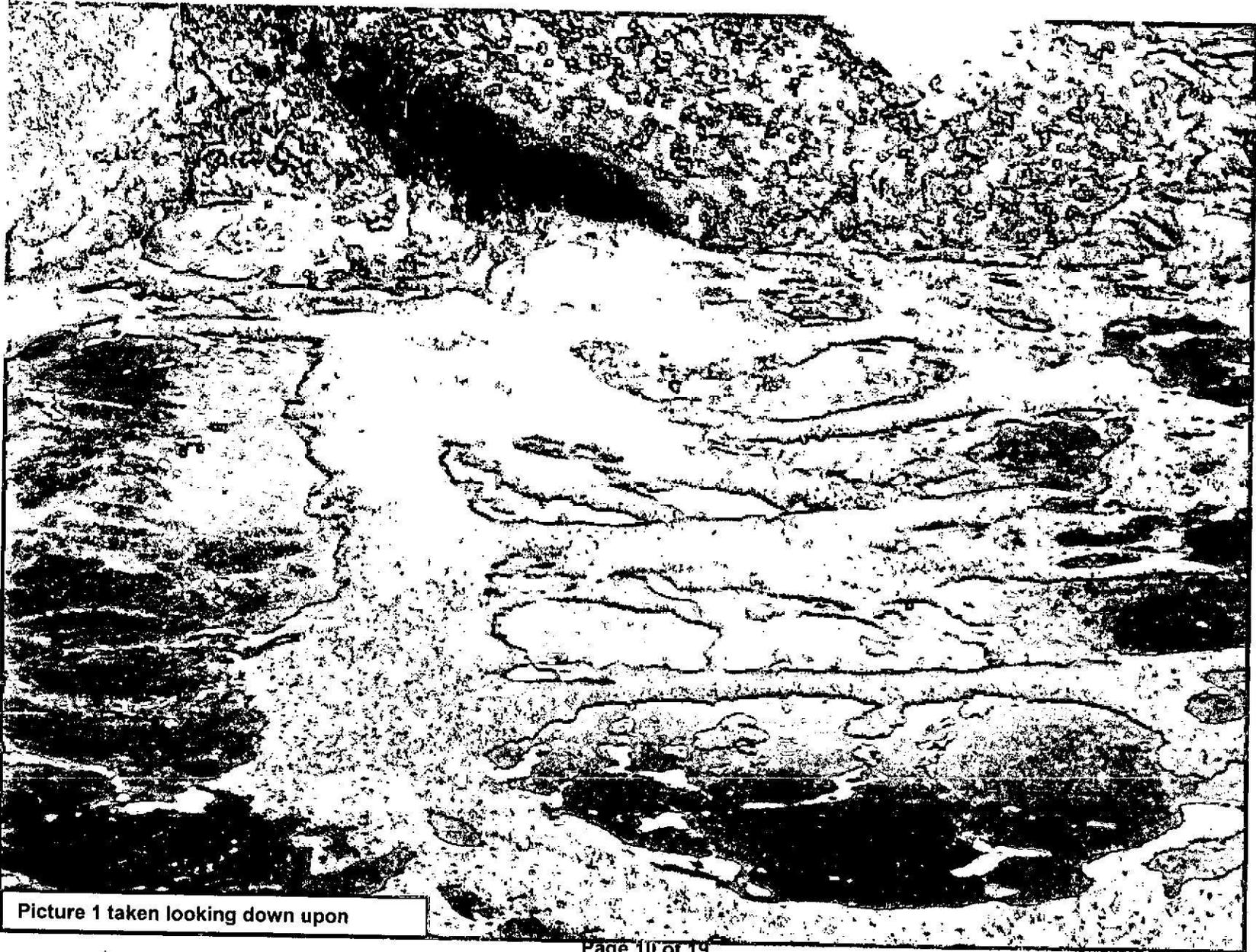
- (1) What is the cause of the condition?
- (2) Is the observed condition or source a waste product?
- (3) Where is the suspected contaminant normally disposed?
- (4) Is this disposal permitted?
- (5) How long has the condition existed and when did it begin?

Comments/Status:

Permit #: 1IA00004*MD
NPDES #: OH0009377

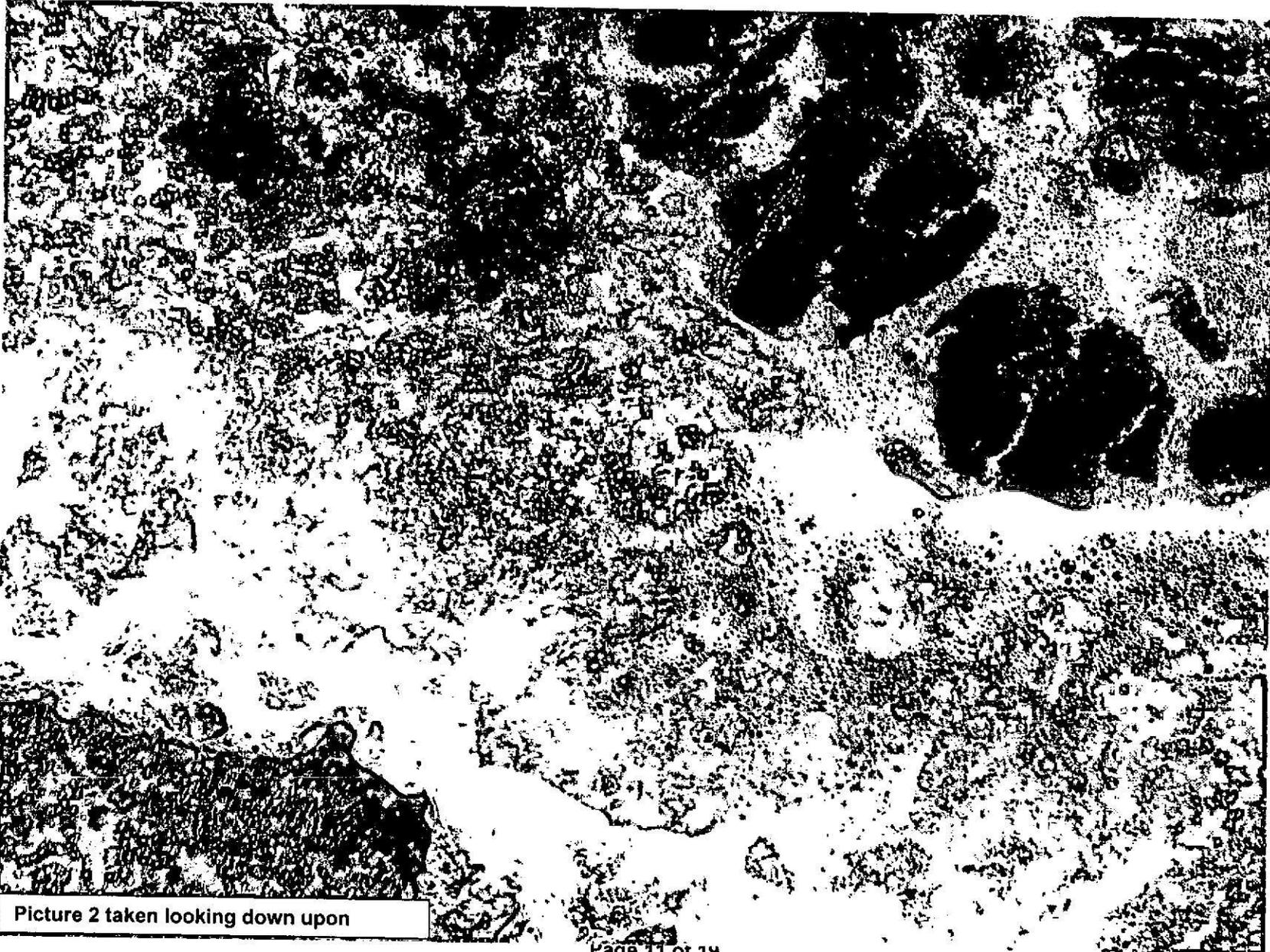
The screenshot shows a Bing Maps interface in Windows Internet Explorer. The browser's address bar contains the URL: <http://www.bing.com/maps/#3mNwPTMSLjk5MDAwMTY3OH4tODIuOTkwOTk3MzE0Jmx2bD00JnN0eT1yJnJ0cD1wb3MuMzkuNj>. The map is in 'Aerial' view, showing a dirt road labeled 'Hydraulic Rd' that runs from the bottom left towards the center. A black arrow points from a white box labeled 'Outfall Location' to a specific spot on the road. Along the road, there are ten numbered white boxes: '1-3', '4', '5', '6', '7', '8', '9', and '10'. The road leads to a large, muddy area. The map includes a compass, zoom controls, and a scale bar at the bottom right showing 50 feet and 20 meters. Copyright information at the bottom of the map area reads: '© 2010 Microsoft Corporation © 2010 NAVTEQ © AND Pictometry Bird's Eye © 2010 Pictometry International Corp'. The Windows taskbar at the bottom shows the Start button, several application icons, and the system tray with the time '10:15 AM'.



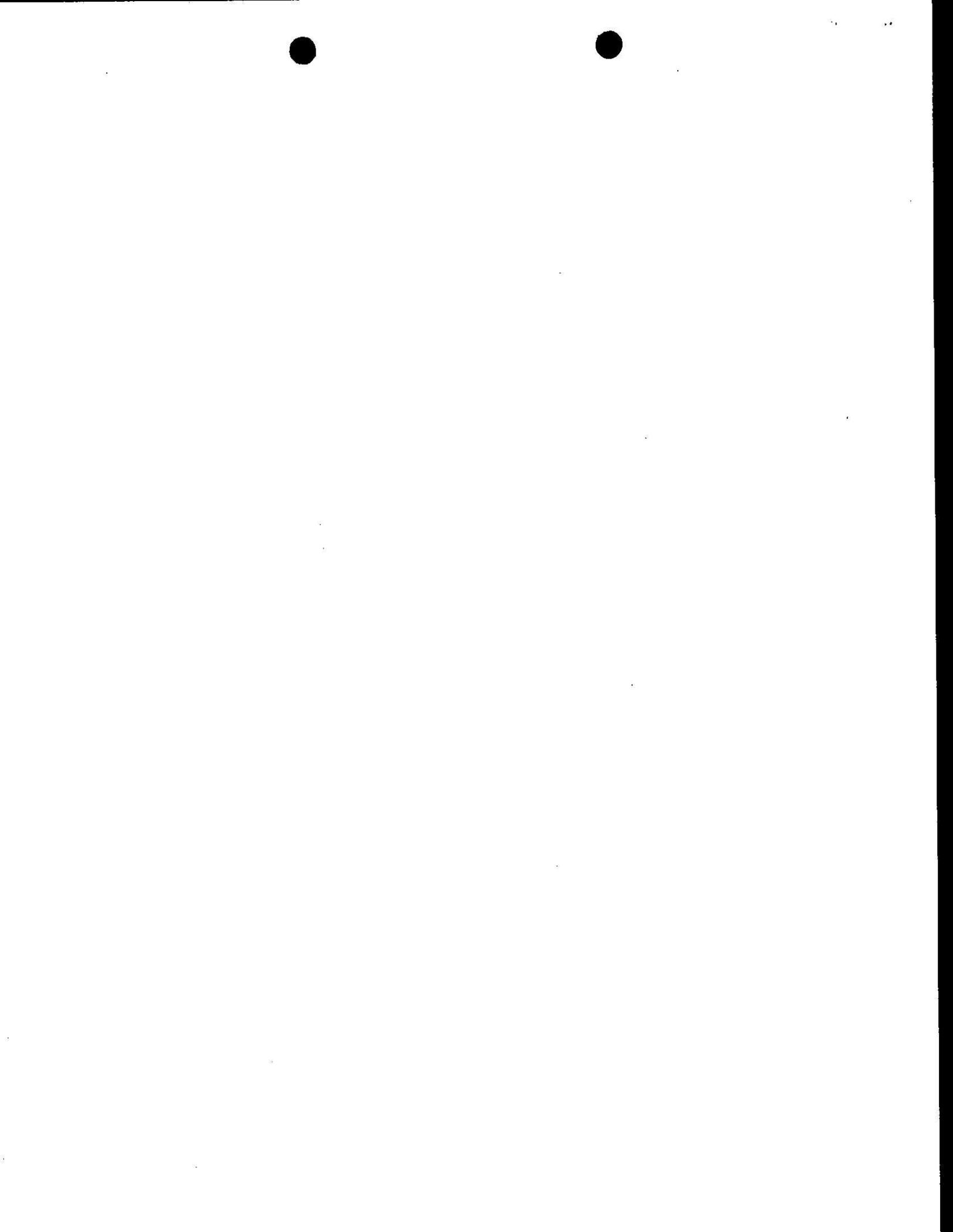


Picture 1 taken looking down upon

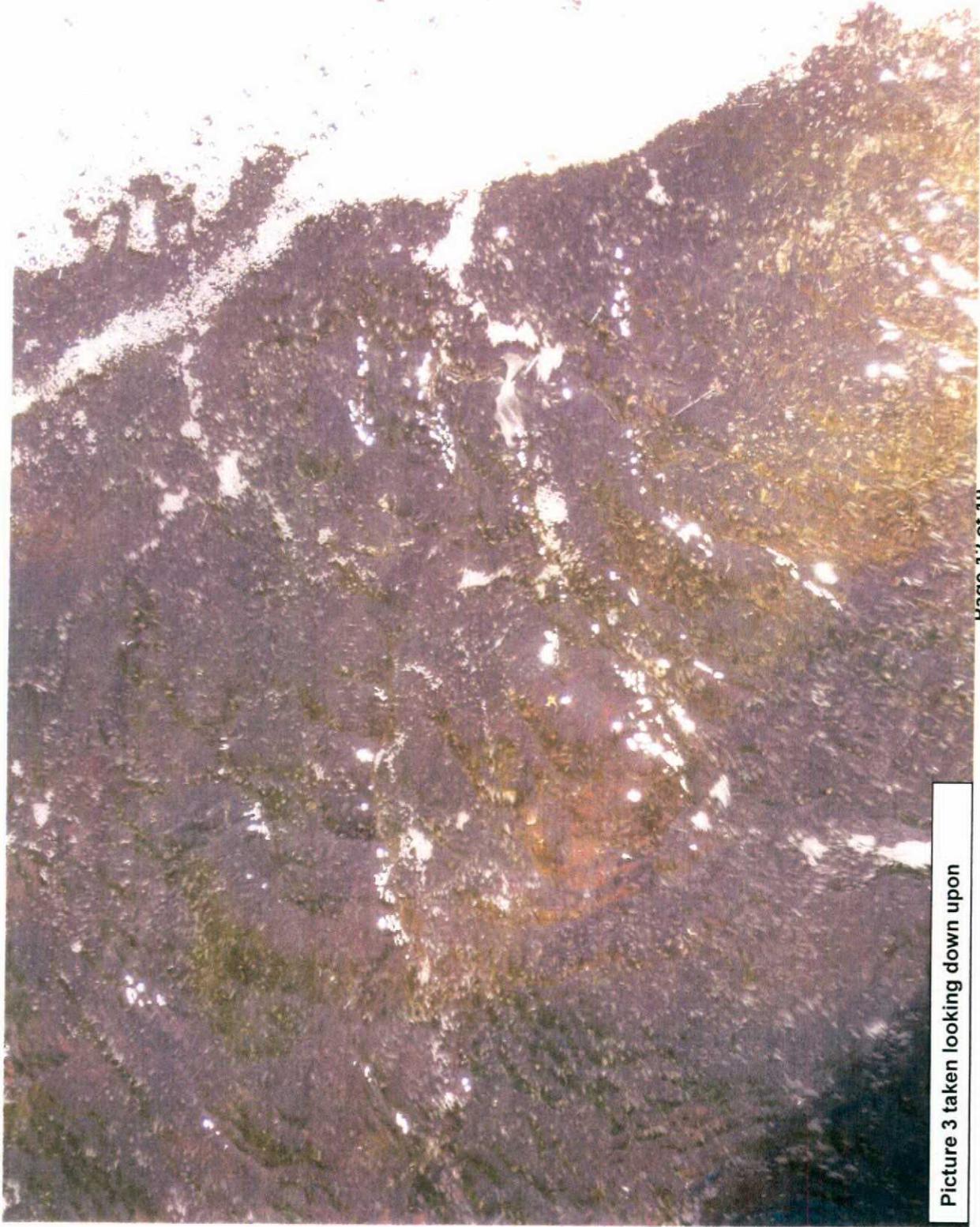




Picture 2 taken looking down upon



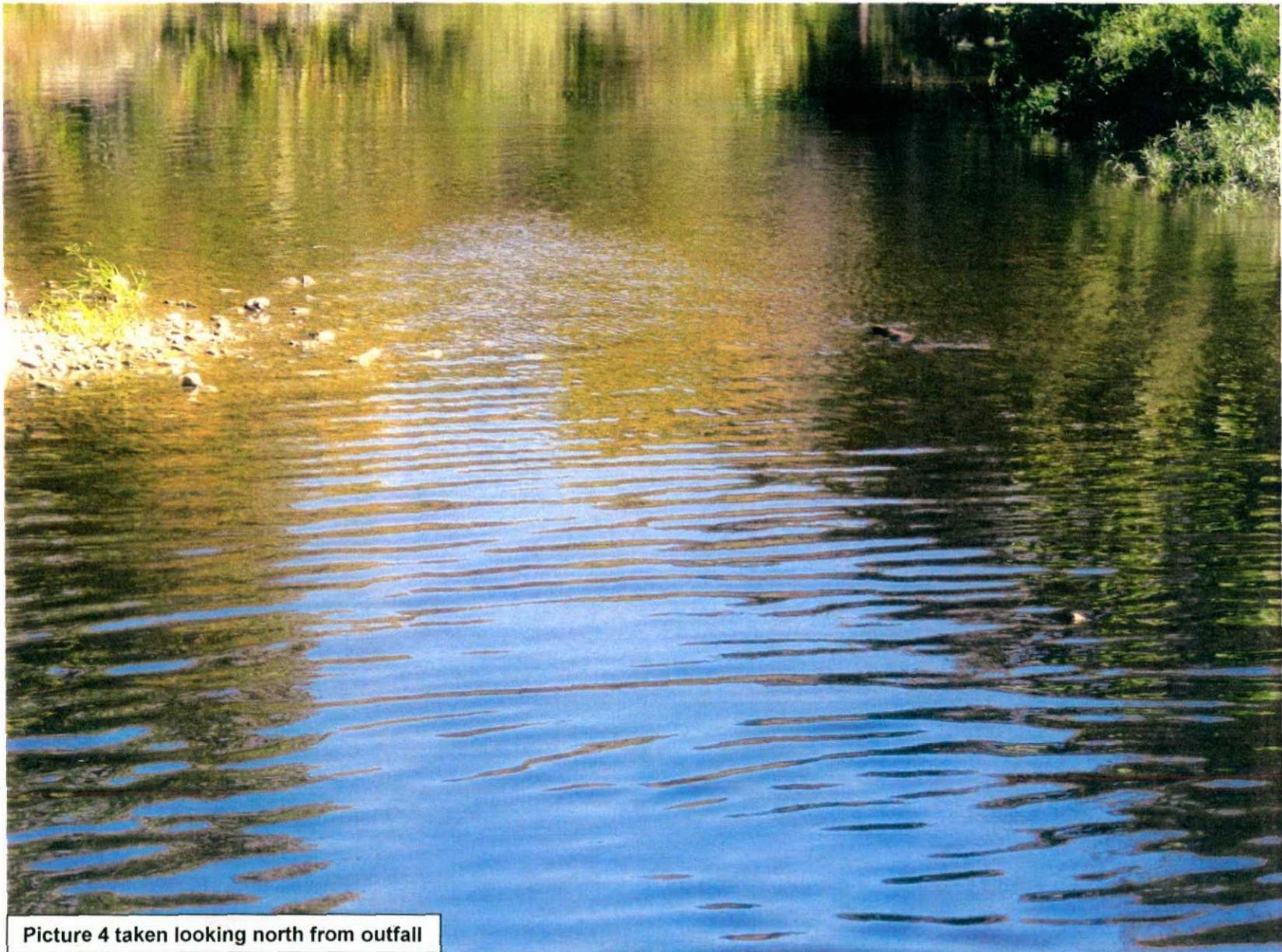
Permit # : 11A00004*MD
NPDES #: OH0009377



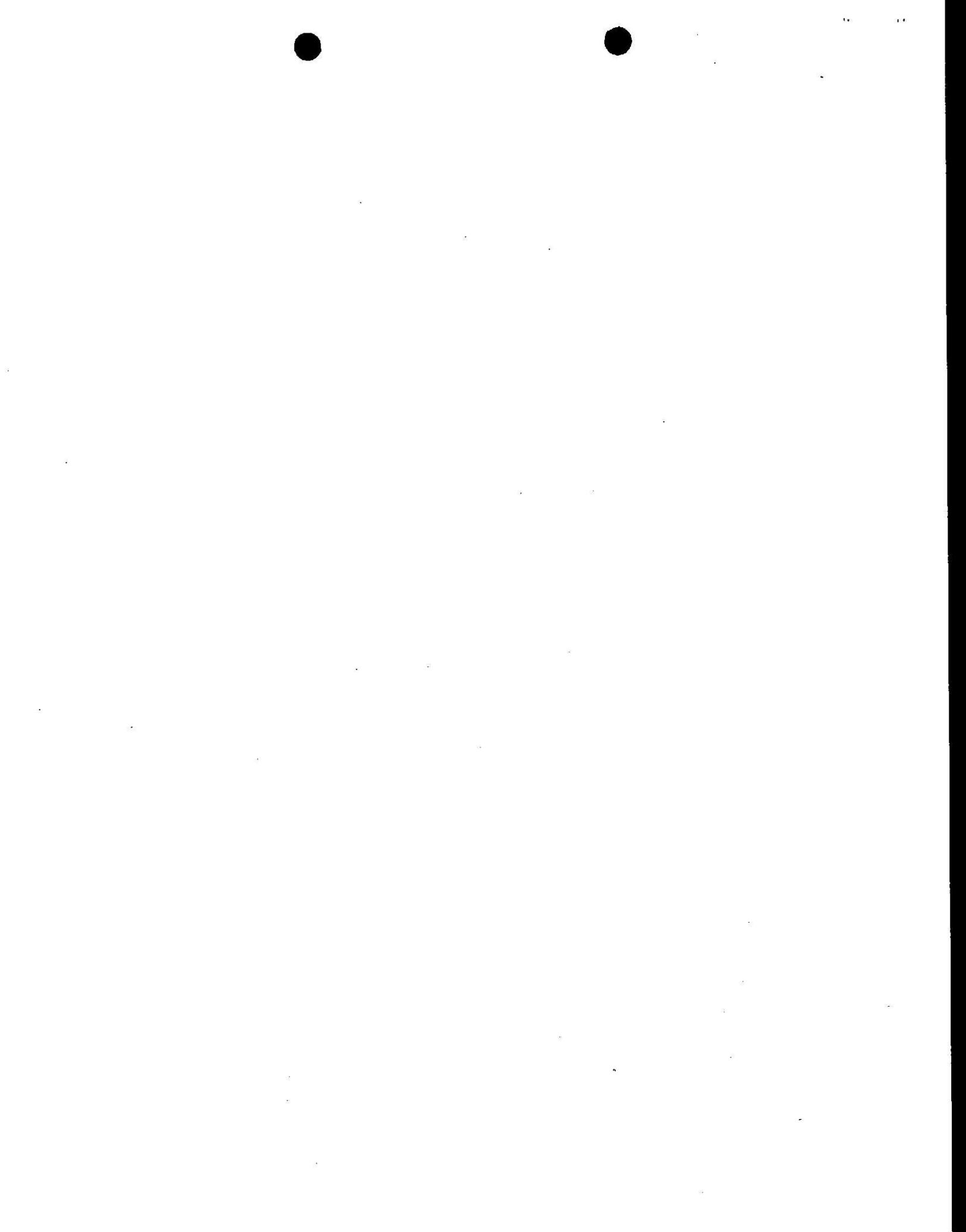
Picture 3 taken looking down upon



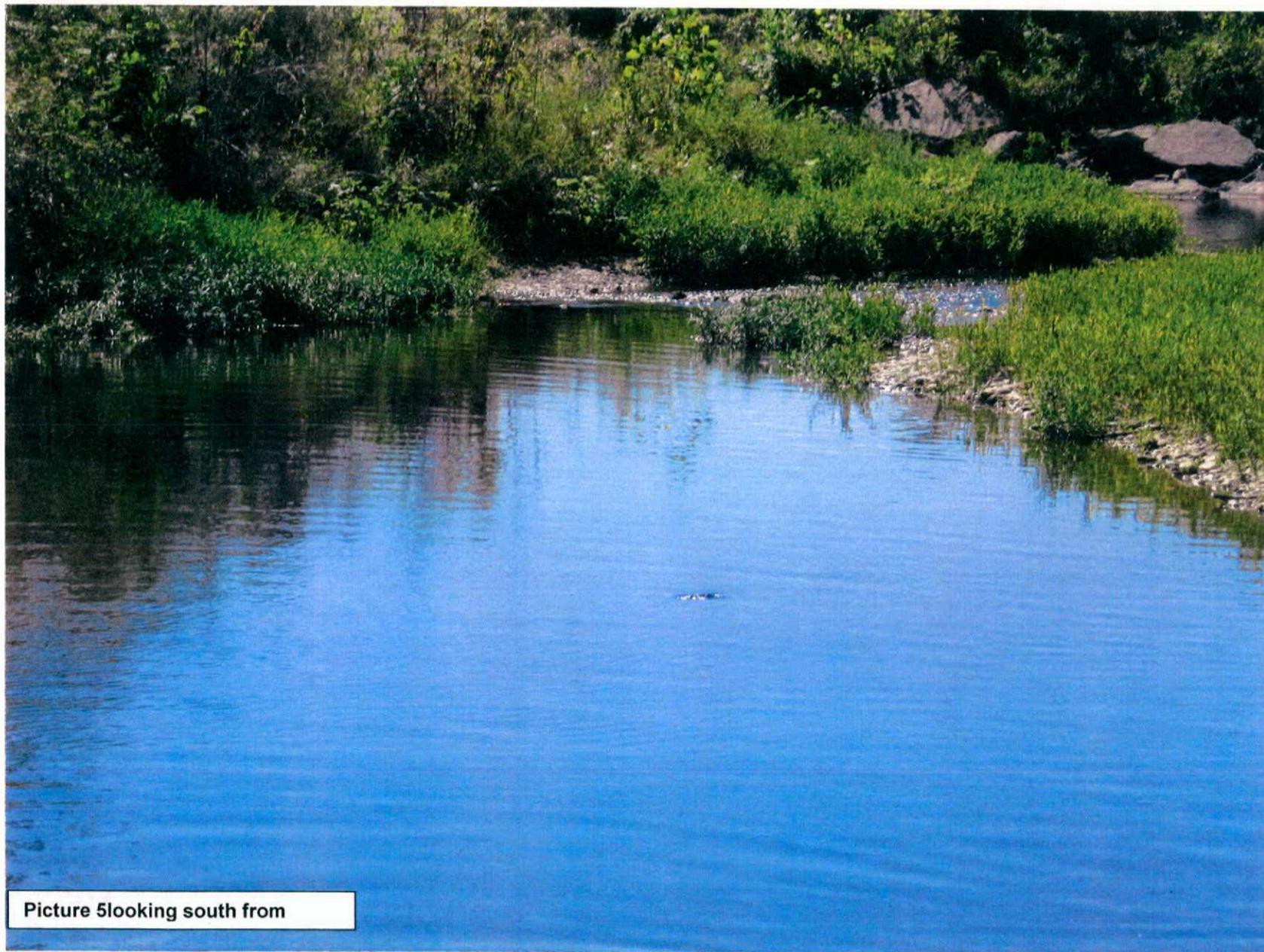
Permit # : 11A00004*MD
NPDES #: OH0009377



Picture 4 taken looking north from outfall



Permit # : 11A00004*MD
NPDES # : OH0009377



Picture 5 looking south from



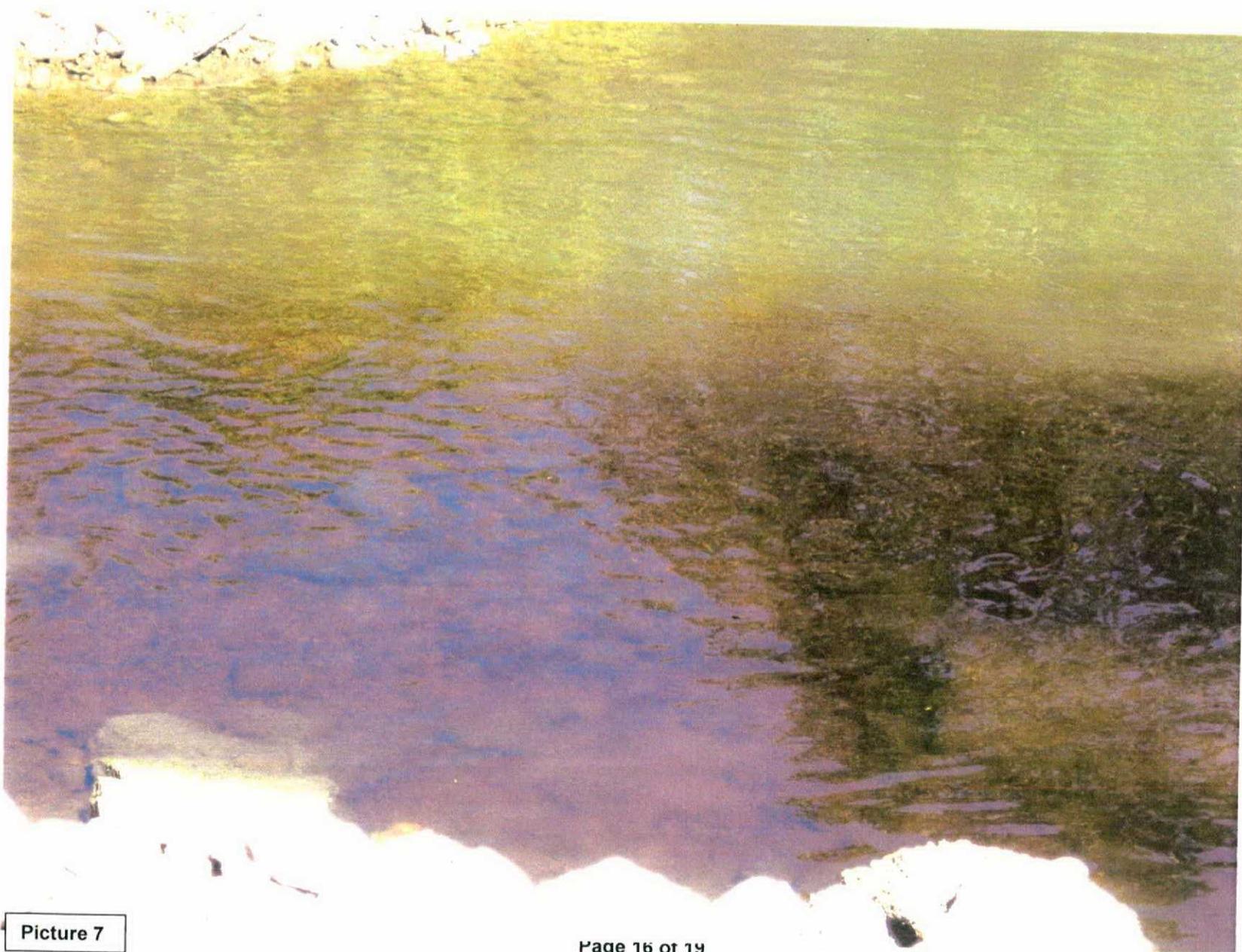
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NPDES #: OH0009377



Picture 6



Permit # : 1IA00004*MD
NPDES #: OH0009377



Picture 7

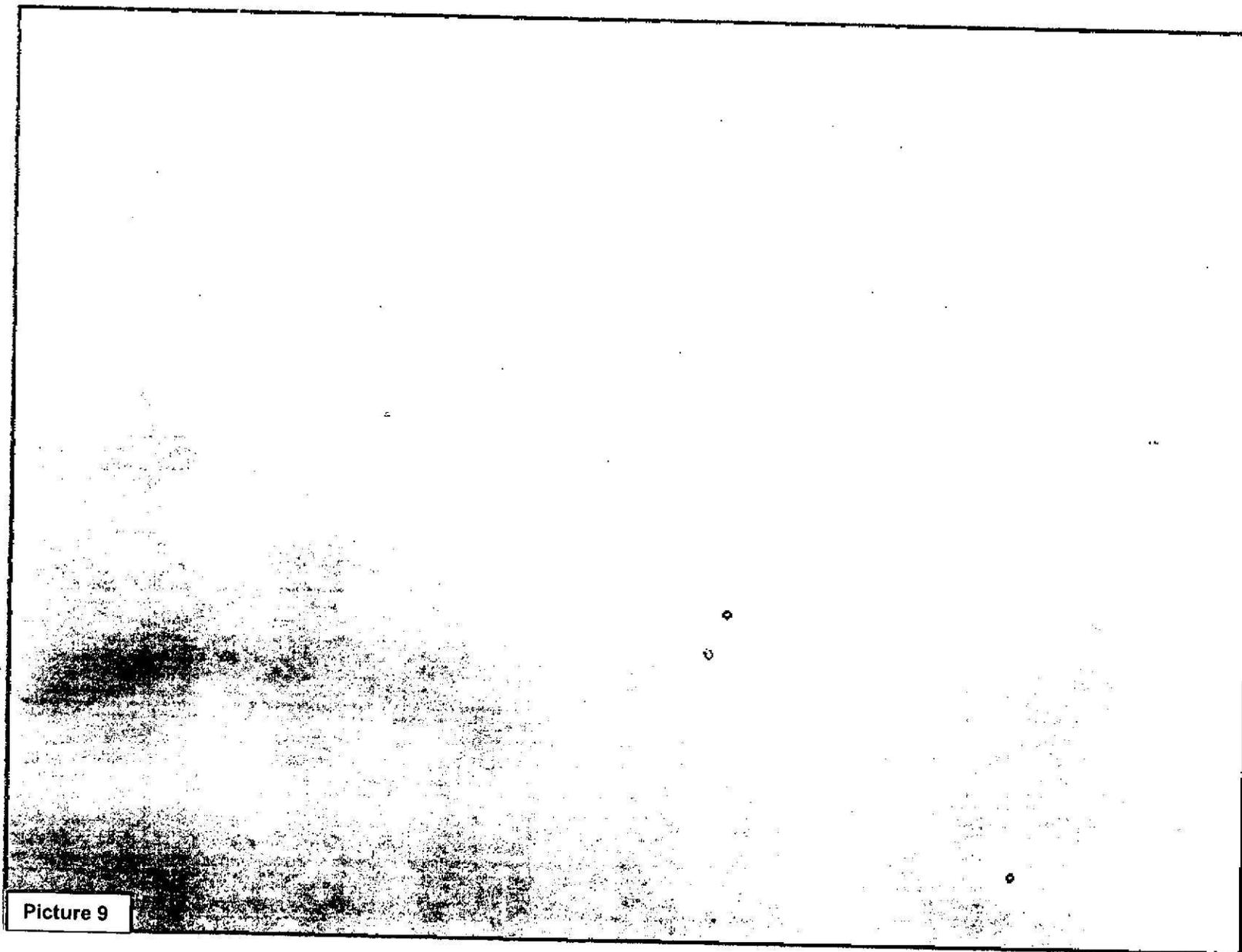


Permit # : 11A00004*MD
NPDES # : OH0009377

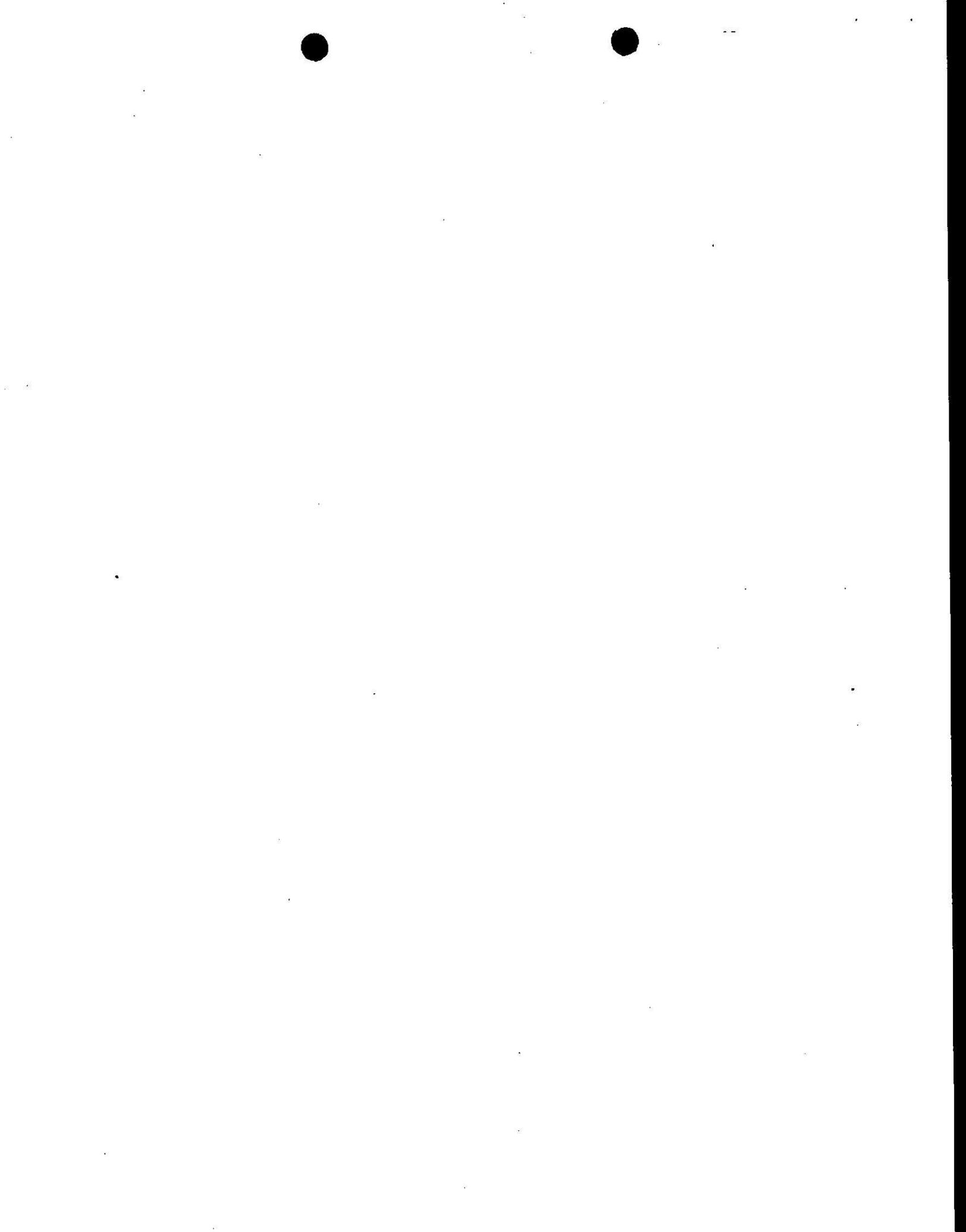


Picture 8





Picture 9





Picture 10



General Lab Criteria
 Appleton Papers Inc. (11A00004*MD) - Sept. iber 8, 2010

Criteria	Standard Methods Requirement	Acceptable?		Rating
Balance				NR
• Standard Weights	• Either NIST Class 1 or ASTM/ANSI Class 1 weights ^{1,2}	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Calibration Frequency / Documentation	• Calibration verification required at least once each day the balance is used. ³	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Cleanliness, air movement, vibration	• Cleanliness of balance is a must and air movement and vibration needs to be kept to a minimum ¹	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Other	• Service and recalibrate annually (manufacturer representative or comparable) ¹	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Must be able to measure to 0.1 grams ⁴	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Instrument manual available	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Log book maintained ²	<input type="checkbox"/> Yes	<input type="checkbox"/> No	

Comments: :

Criteria	Standard Methods Requirement	Acceptable?		Rating
Drying Oven (Suspended Solids)				NR
• Temperature Recordkeeping	• Temperature recorded with each use ⁴	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Log book maintained ²	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Calibration Frequency / Documentation	• Thermometer calibrated annually with NIST traceable thermometer ^{1,2} . Correction factor posted on thermometer / equipment ¹	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Other	• Thermometer temperature accurate to 0.5° Celsius ⁵	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Acceptable temperature range is 103° – 105° F ⁴	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Instrument manual available	<input type="checkbox"/> Yes	<input type="checkbox"/> No	

Comments: :

General Lab Criteria
Appleton Papers Inc. (11A00004*MD) - September 8, 2010

Criteria	Standard Methods Requirement		Rating
pH Meter	Acceptable?		A
• Calibration Frequency / Documentation	• Calibration verification required for testing over long period of time (e.g. 12 hrs.), or after a large number of samples (every 10 samples) ³	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
	• Logbook maintained ²	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
• Minimum of 2 point calibration	• Calibration per manufacturer specification and calibration buffers must bracket anticipated result ⁷	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
• Slope Documentation / Acceptability	• Slope acceptable range indicated on benchsheet ²	<input type="checkbox"/> Yes <input type="checkbox"/> No	
• Buffer Expiration Date	• Buffers must not be expired	<input type="checkbox"/> Yes <input type="checkbox"/> No	
• Other	• Instrument manual available	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Teflon covered magnetic stirrer or equivalent for mixing ⁸	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Comments :

Criteria	Standard Methods Requirement		Rating
Dissolved Oxygen Meter	Acceptable?		U
• Calibration Method	• Air or known DO calibration method ¹⁰	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Calibration per manufacturer specification ¹⁰	<input type="checkbox"/> Yes <input type="checkbox"/> No	
• Calibration Frequency / Documentation	• Logbook maintained ²	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Calibration verification required at least once each day the meter is used. ³	<input type="checkbox"/> Yes <input type="checkbox"/> No	
• Other	• Small to no bubble present under membrane (must be smaller than the lead in number 2 pencil) ¹¹	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Instrument manual available	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Comments: *The facility is currently using a Luminescence Dissolved Oxygen method for monitoring DO of the final effluent. The manufacturer has a letter from the USEPA stating that the method will be recommended for approval. At this time this method is not considered an approved method for demonstrating compliance with final discharge limits.*

General Lab Criteria
 Appleton Papers Inc. (11A00004*MD) - September 8, 2010

Criteria	Standard Methods Requirement		Rating
Incubator (CBOD/ E-Coli)	Acceptable?		
• Temperature Recordkeeping	• Temperature checked / recorded twice daily for each shelf in use ¹ (E-Coli)	<input type="checkbox"/> Yes <input type="checkbox"/> No	NR
	• Temperature checked / recorded daily ² (CBOD)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Acceptable temperature range (CBOD) is 20° C ±1.0 ° ¹²	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Acceptable temperature range (E-Coli) is 35° C ±0.5 ° ²²	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Logbook maintained ²	<input type="checkbox"/> Yes <input type="checkbox"/> No	
• Temperature Calibration / Documentation	• Thermometer calibrated annually with NIST traceable thermometer ^{1,2}	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Temperature correction information posted on incubator ¹	<input type="checkbox"/> Yes <input type="checkbox"/> No	
• E-Coli can use multiple tubes (five 20 ml or ten 10 ml), or mfg's multi-well tray	• E-coli Ultraviolet lamp (365 nm wave length, 6 W bulb) ²³	<input type="checkbox"/> Yes <input type="checkbox"/> No	
• Other	• Instrument manual available	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Temperature Log (thermometer accurate to 0.5 Celsius). ¹	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Comments: :

Criteria	Standard Methods Requirement		Rating
Refrigerator	Acceptable?		
• Temperature Recordkeeping	• Temperature Log (thermometer accurate to 0.5 Celsius). ⁵	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	M
• Temperature Calibration / Documentation	• Thermometer calibrated annually with NIST traceable thermometer ^{1,2}	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
	• Thermometer held in water bath. ¹	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
• Other	• Refrigerator temperature ≤6° Celsius. ¹³	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
	• Do not store volatile solvents, food, or beverages. ¹⁴	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Comments:

General Lab Criteria
 Appleton Papers Inc. (1IA00004*MD) - September 8, 2010

Criteria	Standard Methods Requirement		Rating
Chlorine Meter	Acceptable?		NR
• Calibration Frequency / Documentation	• pH / millivolt meter read to 0.1 mV ¹⁵	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Calibration verification required for testing over long period of time (e.g. 12 hrs.), or after a large number of samples (every 10 samples) ³	<input type="checkbox"/> Yes <input type="checkbox"/> No	
• Calibration Method	• Calibration using three iodate solutions 0.2, 1.0, 5.0 milliliters or calibration per manufacturer specification ¹⁶	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Standards used for calibration not expired	<input type="checkbox"/> Yes <input type="checkbox"/> No	
• Slope Documentation / Acceptability	• Calibration curve (acceptable slope)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
• Other	• Electrode free of deposits and foreign material	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Log book being maintained. ²	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Instrument manual available	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Comments: :			

Criteria	Standard Methods Requirement		Rating
Ammonia Meter	Acceptable?		NR
• Calibration Frequency / Documentation	• Calibration verification required for testing over long period of time (e.g. 12 hrs.), or after a large number of samples (every 10 samples) ³	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Log book being maintained ²	<input type="checkbox"/> Yes <input type="checkbox"/> No	
• Slope acceptability	• Verify calibration slope is acceptable (per mfg. spec.).	<input type="checkbox"/> Yes <input type="checkbox"/> No	
• Calibration Method	• Standards used for calibration (3 ammonia solutions of 10 mg/l, 1 mg/l, and 0.1 mg/l) or per mfg. spec. ¹⁷	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Standards used for calibration not expired	<input type="checkbox"/> Yes <input type="checkbox"/> No	
• Other	• Electrode free of deposits and foreign material	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Teflon covered magnetic stirrer or equivalent for mixing ¹⁸	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Instrument manual available	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Comments: :			

General Lab Criteria
 Appleton Papers Inc. (11A00004*MD) - September 8, 2010

Criteria	Standard Methods Requirement	Acceptable?		Rating
Sample Collection/Handling				M
• Sample Labeling	• Samples container labeled (description, date, time, preservative added, initialed). ¹⁹	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
• Chain of Custody	• Chain of custody (description, date, time, signature). ¹⁹	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
• Other	• Composite samples refrigerated during sample collection ¹⁴	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Equipment blanks utilized ¹⁴	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
	• SOP for cleaning of sampling equipment	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
	• Logbook being maintained ²	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	

Comments: *In reviewing the criteria it was discovered that the Chain of Custody form documented a lapse in time for someone being in possession of the sample. The facility should also be aware that each individual sample needs to be reported on a separate line of the Chain of Custody form. At the time of the inspection the facility did not have a written procedure for the cleaning of the sampling equipment. In reviewing the thermometer in the refrigerator for the automatic sampler it was discovered that the thermometer is not NIST traceable.*

Criteria	Standard Methods Requirement	Acceptable?		Rating
Desiccator				NR
• General criteria	• Properly working seals.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Desiccant fresh (blue color)	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Documentation	• Log book being maintained ²	<input type="checkbox"/> Yes	<input type="checkbox"/> No	

Comments:

Criteria	Standard Methods Requirement	Acceptable?		Rating
Bench sheets				A
• General criteria	• Date(s) ²	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Analyst initials ²	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Blue or black ink pen ²	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Calibration information ²	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Equations, calculations, units for all measurements, notations, and results present ²	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Corrections, single line through, initialed and dated ²	<input type="checkbox"/> Yes	<input type="checkbox"/> No	

Comments: *The results of the analysis performed at the facility are entered into the computer. The computer software used at the facility tracks who makes and/or modifies an entry. The facility should be aware that all written documentation of analytical results constitutes a record and is subject to record keeping requirements found in permit 11A00004*MD.*

General Lab Criteria
 Appleton Papers Inc. (11A00004*MD) - September 8, 2010

Criteria	Standard Methods Requirement	Acceptable?		Rating
Hot Water Bath (Fecal Coliform/E. Coli)				
• Temperature Recordkeeping	• Temperature Log (thermometer accurate to 0.2° C) ²¹	<input type="checkbox"/> Yes	<input type="checkbox"/> No	NR
	• Incubator temperature 44.5° C ± 0.2° ^{21/24}			
• Temperature Calibration / Documentation	• Thermometer calibrated annually with NIST traceable thermometer ^{1, 2}	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Log book being maintained ²	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Water Level	• Thermometer total immersion or partial (line on thermometer to ID immersion depth) ^{1, 5}	<input type="checkbox"/> Yes	<input type="checkbox"/> No	

Comments:

Criteria	Standard Methods Requirement	Acceptable?		Rating
Autoclaves/Steam Sterilizers				
• All apparatus utilized is adequately sterilized before use	• Sterilizing temperature 121° C ²⁵	<input type="checkbox"/> Yes	<input type="checkbox"/> No	NR
	• 10 to 30 minutes time based on material being sterilized ²⁶	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Documentation	• Verify the autoclave temperature weekly by using a maximum registering thermometer (MRT) to confirm that 121°C has been reached as measured in the exhaust. ¹	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Date, contents, sterilization time and temperature, total time in autoclave, and analyst's initials should be recorded each time the autoclave is used ¹	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Temperature Calibration / Documentation	• Thermometer calibrated annually with NIST traceable thermometer ^{1, 2}	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	• Log book being maintained ²	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Performance Checks	• Test monthly for efficacy using a biological such as commercially available <i>Geobacillus stearothermophilus</i> in spore strips, suspensions, or capsules ¹	<input type="checkbox"/> Yes	<input type="checkbox"/> No	

Comments:

General Lab Criteria
 Appleton Papers Inc. (11A00004*MD) - September 8, 2010

Criteria	Standard Methods Requirement	Acceptable?	Rating
Final Effluent Temperature Monitoring			
• General Criteria	• Thermometer calibrated annually with NIST traceable thermometer ^{1,2}	<input type="checkbox"/> Yes <input type="checkbox"/> No	NR
	• Thermometer accurate to 0.1° Celsius ⁵	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	• Log book being maintained ²	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Comments:			
Number of Criteria Rated:			
			Acceptable 2
			Marginal 2
			Unacceptable 1
			Total Number of Areas Rated 5
<p>Acceptable Ratings – No action required (recommend SOP's written or updated, perform DMRQA's for all onsite analysis, recommend voluntary lab analyst certification, written response not required).</p>			
<p>Marginal Ratings – Improvements required, written response required (recommend SOP's be written or updated, recommend they perform DMRQA's for all onsite analysis, recommend voluntary lab analyst certification, require deficiencies to be addressed in written response).</p>			
<p>Unsatisfactory Rating - Improvements required, written response required, NOV issued (recommend SOP's be written or updated, recommend they perform DMRQA's for all onsite analysis, recommend voluntary lab analyst certification, require deficiencies to be addressed in written response to NOV).</p>			
Consider recommending PAI Audit from DES when:		>60% of ratings are Marginal >45% of ratings are a combination of Marginal or Unacceptable >30% of ratings are Unacceptable	

Notation of Referenced Method

- | | |
|----------------------------|------------------------------|
| 1 Method 9020-B, Item 3 | 14 Method 1060A, Item 1 |
| 2 Method 1020-A, Item 1 | 15 Method 4500-CI I, Item 2 |
| 3 Method 1020-B, Item 10 | 16 Method 4500-CI I, Item 4 |
| 4 Method 2540-B, Item 2 | 17 Method 4500-NH3 D, Item 4 |
| 5 Method 2550-B, Item 1 | 18 Method 4500-NH3 D, Item 2 |
| 6 Method 1020-A, Item 1 | 19 Method 1060-B, Item 2 |
| 7 Method 4500-H B, Item 4 | 20 Method 1060-B, Item 1 |
| 8 Method 4500-H B, Item 2 | 21 Method 9222D, Item 1 |
| 9 Method 1020-B, Item 2 | 22 Method 9223 B, Item 2 |
| 10 Method 4500-O B, Item 3 | 23 Method 9223 B, Item 3 |
| 11 Method 4500-O G, Item 3 | 24 Method 1603, Item 2 |
| 12 Method 5210-B, Item 5 | 25 Method 9030-B, Item 3 |
| 13 CFR 136.3, Table II | 26 Method 9020 B, Table IV |

Equipment Logbook Content - all maintenance performed on a piece of equipment should be documented in the logbook. This should include parts replacement and routine maintenance activities. Entries should include date, maintenance performed and initials of person making entry.

Preservation and Holding Times						
Parameter	Container	Min. Sample Size (mL)	Sample Type	Preservation	Maximum Storage Time	
					Recommended	Regulatory
BOD / CBOD	P, G	1000	G, C	Refrigerate $\leq 6^{\circ}\text{C}$	6h	48h
TSS	P, G	200	G, C	Refrigerate $\leq 6^{\circ}\text{C}$	7 d	7 d
pH	P, G	50	G	Analyze immediately	0.25h	0.25 h
NH3-N	P, G	500	G, C	Analyze as soon as possible or add H_2SO_4 to pH <2, Refrigerate $\leq 6^{\circ}\text{C}$	7 d	28 d
TRC	P, G	500	G	Analyze immediately	0.25h	0.25 h
DO (electrode)	G, BOD Bottle	300	G	Analyze immediately	0.25h	0.25 h
Temperature	P, G	--	G	Analyze immediately	0.25h	0.25 h
Metals, general	P, G	1000	G, C	For dissolved filter immediately and add HNO_3 to pH <2	6 months	6 months
Purgeables by purge and trap	G (PTFE lined lid)	40 (X2)	G	HCl to pH<2, Refrigerate $\leq 6^{\circ}\text{C}$	7 d	14 d
Base/Neutrals and acids	G (solvent rinsed or baked)	1000	C, G	Refrigerate $\leq 6^{\circ}\text{C}$	7 d	7 days until extraction 40 days after extraction
Pesticides	G (PTFE lined lid)	1000	C	Refrigerate $\leq 6^{\circ}\text{C}$	7 d	7 days until extraction 40 days after extraction
Fecal Coliform / E-Coli	G, P (Sterilized)	100	G	Refrigerate $\leq 10^{\circ}\text{C}$ If chlorine present, add sodium thiosulfate tablet	6 hrs transport Start analysis within 2 hrs of receipt in lab.	
Oil and Grease	G	1000	G	HCl or H_2SO_4 to pH <2, Refrigerate $\leq 6^{\circ}\text{C}$	28 d	28 d

Approved Standard Methods

CBOD / BOD 5 Day	Std Methods 5210-B
Ammonia, Selective Electrode Method	Std Methods 4500-NH3 D
Total Residual Chlorine, DPD Colorimetric Method	Std Methods 4500-Cl G
Total Suspended Solids, Dried at 103-105 °C	Std Methods 2540-D
Dissolved Oxygen, Membrane Electrode Method	Std Method 4500-O G
pH, Electrometric Method	Std Methods 4500-H+ B
Fecal Coliform, Membrane Filter Procedure	Std Methods 9222D
Escherichia Coli, Enzyme Substrate Test	Std Method 9223B
Escherichia Coli Membrane Filtration Procedure	EPA Method 1603
Oil and Grease	USEPA 1664A or Std Methods 5520B
Metals, general	USEPA 200, Std Methods 3111B or C, or 3120B
Volatiles (Purgeables by purge and trap)	USEPA 6210, Std Methods 624
Semi-Volatiles (Base/Neutrals and acids)	USEPA 6410, Std Methods 625
Pesticides	USEPA 6410 and 6630, Std Methods 608

1. SCOPE AND APPLICATION:

This method is used for the measurement of pH in natural surface water, treated and untreated sewage, and industrial wastewater. It may also be used for potable and ground water. However, severe limitations are encountered in extremely acid or alkaline samples.

2. SUMMARY OF METHOD:

The samples are measured at room temperature while stirring using a pH meter and electrode that has been calibrated using two known pH buffers that encompass the expected pH of the samples. The pH, defined as $-\log[H^+]$, is measured potentiometrically. The meter is calibrated to read in standard pH units.

3. SAMPLE HANDLING AND PRESERVATION:

- 3.1 Samples are cooled to 4°C immediately after collection in the field. No preservatives are added.
- 3.2 A minimum sample volume of one quart collected in a polyethylene or glass container is required.
- 3.3 Samples should be submitted to the laboratory immediately and the pH measured as soon as possible. Sample pH should be obtained within 24 hours of the time of collection.

4. INTERFERENCES:

- 4.1 Results are subject to error when extreme pH values (below 1 or greater than 10) are encountered. The pH meter manufacturer instructions should be consulted when such values are expected.
- 4.2 Grease or oil in the sample can coat the electrode and cause a sluggish response. If the electrode is contaminated in this manner, clean by gently washing with a detergent solution, rinsing with tap water, 10% hydrochloric acid and finally reagent water. Be sure the electrode filling hole is closed during this cleaning operation.

5. APPARATUS:

- 5.1 Electronic pH meter with a pH readout having a temperature compensation and a slope adjustment: Orion 520A pH meter
- 5.2 Combination glass and reference electrode: Ross 80-03/81-72 Sure-Flow electrode
- 5.3 Magnetic stir plate and Teflon-coated magnetic stir bars
- 5.4 100 mL beakers

6. REAGENTS:

- 6.1 Reagent water: Prepare by passing distilled water through a deionization system. Use distilled deionized water for the preparation of all reagents and to rinse the probe. Currently, water of this quality is prepared by using a Barnstead Nanopure system (minimum resistance of 18.0 M Ω).
- 6.2 Commercially prepared pH 2.00, 4.00, 7.00 and 10.00 buffers are available to calibrate the pH meter. Unopened buffers are acceptable for use until their expiration date (one year from receipt if not labeled with an expiration date) but should be discarded once they have been open for three months.
- 6.3 Buffers for pH values that fall outside the 4 to 10 range may be prepared in the laboratory according to instructions in *Standard Methods for the Examination of Water and Wastewater*, 18th Ed.(1992), p.4-67 or CRC Handbook of Chemistry and Physics, 63rd Ed. These buffers are also commercially available.
- 6.4 Reference electrode filling solution: Orion # 81-00-07; electrode storage solution: Orion #SE40-1 or 1.0 g KCl per 200 mL of pH buffer 7
- 6.5 Quality Control Sample: This solution is a pH 7.00 buffer that is from a different manufacturer or lot than that of the calibration buffers. It is purchased ready to use.

7. PROCEDURE:

- 7.1 Electrode Use:
 - 7.1.1 If a new pH electrode is being put into operation, refer to the manufacturer instructions to prepare it for use. New electrodes must be soaked prior to use. If it requires that a filling solution be added, the solution must cover the coil and be at least one inch above the sample level that the electrode is immersed in. Once an electrode has been put into service the glass membrane must not be exposed to the air for extended periods of time or be allowed to dry out.
 - 7.1.2 If the electrode has a solution fill cap, remove the cap when using the electrode and replace it when probe is not in use.
- 7.2 Meter Calibration:
 - 7.2.1 Calibration must be done daily or anytime the pH meter is used. Turn on the pH meter and allow it to warm up for 30 minutes. Refer to the manufacturer instructions for information on using the instrument. Check probe filling solution level. If there are air bubbles in the probe tip or chamber, shake down the probe like a thermometer. If crystals have formed inside or around filling solution hole, rinse with distilled water and replace solution with Orion #810007, 3M KCl. Do not use solutions containing silver.
 - 7.2.2 Calibrate the 520A meter using autocalibration with two buffers. This procedure is outlined in the instrument manual. (Manual calibration with two buffers may also be selected if desired).

- 7.2.3 For samples expected to have a pH above 7, calibrate with buffers pH 7.00 and 10.00. For samples expected to have a pH between 4 and 7, calibrate with buffers pH 4.00 and 7.00. For samples expected to have a pH below 4, calibrate with buffers pH 2.00 and 4.00.
- 7.2.4 Press "calibrate."
- 7.2.5 Press "2" to indicate the number of buffers used to calibrate. Press "yes."
- 7.2.6 Place a stir bar and the probe in the first buffer and start the stirrer. Enter the buffer value if the one indicated by the meter is not correct. Press "yes."
- 7.2.7 Rinse the probe with reagent water and blot dry. Be sure not to wipe the probe as this will leave a static charge that will create error in the results. Repeat step 7.2.6 for the second buffer.
- 7.2.8 The meter will then display the electrode slope. The slope must be between 80 and 120%. If it is not, recalibrate. Record this value on the bench sheet.
- 7.2.9 The meter will automatically go into "MEASURE" mode.

7.3 Sample Determinations

- 7.3.1 For best results, samples and buffers should be within a 2°C range.
- 7.3.2 Rinse the pH electrode with reagent water and blot dry with a tissue. Pour approximately 50 mL of sample into a 100 mL beaker and add a magnetic stir bar. Immerse probe in sample and gently stir.
- 7.3.3 Wait for the reading to stabilize (indicated by the meter changing from "measuring" to "ready") and record the reading to the nearest 0.01 pH unit.
- 7.3.4 Between samples, rinse the pH electrode with reagent water and blot dry with a tissue.

8. DATA TREATMENT:

The pH values of the samples are read directly from the meter display. Results are to be reported to the nearest 0.01 pH unit. Sample results must fall between the calibration buffer values. For samples that fall outside the original calibration, recalibrate with appropriate buffer values and reanalyze.

9. QUALITY CONTROL:

- 9.1 The Instrument Performance Check (IPC) (calibration buffer pH 7.00) must be analyzed after every 10 samples and at the end of a sample run. If the buffer does not maintain within 0.05 pH unit, discontinue analysis and recalibrate. Reanalyze the samples after the last acceptable IPC and before a failing IPC until precision criteria is met.
- 9.2 At least one Quality Control Sample (QCS) (pH 7.00 buffer from a manufacturer different than that used for calibration) is analyzed following the calibration. Periodic reanalysis of the QCS is recommended. Results obtained must be within 0.05 pH unit.

- 9.3 Audit samples supplied by a NIST accredited PT vendor will be analyzed biannually. Results will be reported to the quality assurance officer who will submit them to the PT vendor for evaluation.
- 9.4 Duplicates are analyzed on 10% of samples in any analytical batch. The allowable difference of duplicate samples for is 0.14 pH unit. Samples with results outside the limits must be repeated as well as additional samples in the analytical batch.
- 9.5 Repeat any field blank with pH results outside the range of 6-9. If the repeat analysis does not confirm earlier results, repeat other samples in the analytical batch.
- 9.6 Repeat field duplicates with relative difference greater than 0.14 pH unit.
- 9.7 A QC summary should be completed immediately after sample analysis. All data must be submitted to the QA office for approval.
- 9.8 Results for any samples analyzed past the 24-hour holding time will be qualified using the appropriate qualifier.

10. REFERENCES:

Standard Methods for the Examination of Water and Wastewater, 18th, 19th, and 20th editions, 4500-H⁺ B.

11. REVISIONS:

- 11.1 Added section 10 for References.
- 11.2 Altered title from "US EPA Method 150.1" to read "STD METHODS 18th, 19th, & 20th ed. 4500-H⁺ B."