Alcoa Badin Business Park
Environmental Stakeholders Workshop
Salisbury, NC | March 23, 2022

The workshop was organized by Robyn Gross (Alcoa) and Edgar Miller (Yadkin Riverkeeper) and facilitated by Dr. John B. Stephens (UNC-Chapel Hill School of Government). A copy of the workshop agenda, workshop attendees, and expectations/ground rules for participants are attached.

PURPOSE
To build understanding and trust among stakeholders affected by Badin Business Park's National Pollutant Discharge Elimination System (NPDES) permitted discharges and monitoring of water quality in Badin Lake and Little Mountain Creek with the overall goal of protecting water resources.

OBJECTIVES
- To educate and engage stakeholders on Badin Business Park's NPDES permit
- To increase transparency and understanding of the roles of Alcoa and DEQ for environmental management, protection, and compliance
- To explain the scientific basis behind effluent monitoring, answer questions, and enhance public confidence of the testing regimen for effluents affecting Little Mountain Creek and Badin Lake
- To explore steps that involve some or all stakeholders working cooperatively on:
  > Communication and understanding of sampling, testing, and reporting on cyanide and fluoride
  > Procedures for near-term sampling and testing for cyanide and fluoride
  > Participating in NCDEQ's triennial review of water quality standards for cyanide
  > Possible topics for similar workshops

WELCOME AND INTRODUCTIONS
Robyn and Edgar welcomed the participants and observers. Introductions were made with each person stating one thing they wanted to get from the workshop. Those goals included:
- To be heard and respected
- To focus on wildlife protection and pollution impacts of cyanide and fluoride
- To learn about downstream effects and how clean-up works
- To gather information and listen *(a few voices on this point)*
- To ask questions to seek solutions
- To increase trust
- To understand impacts on Morrow Mountain State Park
- To enhance water quality protection
- To explore how discharges could affect hydropower operations
- Concerns about effects on development/re-development in or near Badin
- To offer resources on water quality sampling and analysis
- To understand water quality monitoring

<u>PART 1: INFORMATION AND EDUCATION</u>
Copies of the presentations are attached.

Presentation: Jason Mibroda (Alcoa)
- Summary of NPDES permit and monitoring obligations
- Compliance history
- Recent actions
- Stakeholder engagements

Presentation: Christopher Ventaloro (NC DEQ, Division of Water Resources) and John Hennessy (NC DEQ, Division of Water Resources)

- Overview of the NC Surface Water Standards & the 2020-2022 Triennial Review
- Overview of the NC NPDES Permitting Process & Applicability to Badin Business Park

Presentation: Dr. Howard Weinberg, Cassidy Rice and Aashna Shukla (UNC-CH Gillings School of Public Health)

- Cyanide Species, Toxicity, and Methods
- Fluoride Overview

DEQ Information Sheet

"NPDES Permit Questions from Badin Community & DWR Responses" *Attached.*

Part 1 concluded with general questions and concerns expressed about how laypeople can understand the important points of the technical aspects of the presentations.

Other topics included:

- Proximity of mixing zones to lake areas designated for boating and swimming
- Seeking clarity on state government and Alcoa duties for regulatory interpretation and compliance
- Whether tests are conducted on mercury in the water samples
- The risks and measurements of free versus available and total cyanide
- Why NCDEQ considers cyanide results less than 10 ug/l as non-detect although laboratories can detect down to 2 ug/l

BREAK: POSTERS

The break included time for participants to view and discuss posters created by students at the UNC-Chapel Hill Gillings School of Public Health:

- Overview of NPDES Permit NC0004308 & ALCOA Compliance Status Regarding Cyanide and Fluoride by Claire Connelly (BSPH expected graduation May 2022)
- Mapping Badin Lake for Future Analysis by Samantha Feinstein (MSPH student)

<u>PART 2: STAKEHOLDER DISCUSSION</u>

Stakeholders explored common interests and possible cooperative steps around three areas:

- Monitoring and protection (e.g., options for addressing ambient water quality standards)
- Communication about data, analysis, NCDEQ regulation
- New NPDES permit: possible content/standards

Stakeholder Presentation: Macy Hinson (Concerned Citizens of West Badin)

- Shared opinions on history of pollution affecting West Badin and the disproportionate impact from a "trash dump" on the citizens of West Badin associated with Alcoa's former operations
- Expressed concern over groundwater impacts and sensitivity of laboratory analysis
- Voiced opposition to renewing the NPDES permit and asked for:
  - > More frequent testing
  - > West Badin to be added to the Superfund list
  - > Full remediation of unlined disposal sites
  - > Protection of human health

Stakeholder Presentation: Jen Caldwell (Protect Badin Lake)

- Concerned about pollution of Badin Lake and opposed to Badin Lake receiving flows from the former industrial site. Specific concern include:
  > Proximity of mixing zones to "shore-hugging areas"
  > Potential for persistent bio-accumulative toxins (PBTs) in the discharge
  > Reliability of groundwater information due to passage of time
  > Adequacy of fines levied for permit non-compliances.
- Interested in greater transparency and trust

STAKEHOLDER DISCUSSION TOPICS

- **Resource Conservation and Recovery Act (RCRA) vs. Superfund**

  > Representatives (Bill Hunneke & Rob McDaniel) from Division of Waste Management discussed their rules and permitting process
    — *Hazardous waste permits require remediation*
    — *DWM focuses on investigating solid waste pollution and effects on the environment*
    — *Several items are "in progress," DWM working to fill "data gaps"*
    — *Alcoa's site in Badin was never covered by Superfund*
    — *USEPA decides on standards for corrective measures*
    — *There is public review*
    — *DEQ website has extensive information about Badin Business Park site*
  > Discussed specific elements of RCRA and how it affects the clean-up of Badin Business Park
  > Discussed differences between Superfund and RCRA
    — *Per DWM, RCRA is most relevant for Badin and their understanding is that under Superfund the site would be ranked very low from a risk perspective which would mean it would take a long time to be addressed*
    — *Per Alcoa, when compared to Alcoa sites managed by Superfund in other states, the RCRA process at Badin was much more comprehensive.*
    — *Per Alcoa, while the Alcoa Superfund sites removed wastes in the receiving water bodies, they too have onsite disposal areas. In addition, similar capping and remediation was done at Badin Lake.*

- **Communication, Data and Transparency Goals**
  > Help non-experts understand data (sources, sampling methods, analysis)
  > Protect Badin Lake seeks independent, third-party testing, increased confidence in results
  > Concerned Citizens of West Badin feel left out, seek more input and inclusion particularly in decisions about recruiting new industry to the site and other economic development initiatives

- **Specific Environmental Issues**
  > Surface vs. drinking water standards
    — *Montgomery County representatives expressed need for adequate testing since some of the discharges via Little Mountain Creek flow to Lake Tillery which is the only source of their drinking water supply.*
  > Aquatic life and bioaccumulation / potential harm to fish and people who consume fish
    — *NC Wildlife Resources Commission: Can we monitor/protect endangered animals per state and national threatened/endangered species rules?*
    — *Need for appropriate signage in outfall areas*
    — *Need for downstream research on contaminants from Badin Lake (Tuckertown, Tillery)*

- *Morrow Mountain State Park: Alcoa committed to sharing previous relevant information/studies.*
- *Little Mountain Creek: Concern about potential effects of contaminants on aquatic life*
- *Lack of information on accumulation of PCB increase in fishing areas.*

FUTURE COOPERATION + CONSIDERATIONS

- **Clearer communication about environmental hazards, mitigation and remediation.**
  Laura Leonard, public information, Division of Waste Management (DMV): Goal is for DWM to be "translators" of scientific information and regulatory standards to better convey the meaning to the general public. She will work with CCWB to access current information and address how to present information in ways that are accessible to people with questions about effects on human health and related concerns.

- **Consider other substances to monitor**
  Robyn Gross reported that Alcoa is open to considering other substances to monitor on the site (e.g., PBTs). Concerns about mercury, for example, were raised by Protect Badin Lake. Yadkin Riverkeeper recommended dialogue around monitoring frequency and calculation of monthly averages and daily maximums. Yadkin Riverkeeper also wants to explore issue related to the use of PQL and MDL to determine compliance with NPDES effluent limits.

- **More discussion about the RCRA process and how it impacts remediation efforts**
  Ex: DEQ Division of Waste Management and its program on SWMUs – Solid Waste Management Units and ecological risk assessments being conducted. This could also include information about what Alcoa has done at other sites (e.g. New York and Texas) in relationship to what has been done at the Badin site.

Alcoa Badin Business Park Environmental Stakeholders Workshop

The Gateway Building
Second Floor Conference Room
204 East Innes Street, Salisbury, NC 28144
March 23, 2022, 1:00 – 5:30 PM

PURPOSE

Build understanding and trust among stakeholders affected by Alcoa Badin Business Park's National Pollutant Discharge Elimination System (NPDES) permitted discharges and monitoring of water quality in Badin Lake and Little Mountain Creek with the overall goal of protecting water resources.

OBJECTIVES

1. Educate and engage stakeholders on ALCOA's NPDES permit
2. Increase transparency and understanding of the roles of ALCOA and NCDEQ for environmental management, protection, and compliance
3. Explain the scientific basis behind the effluent monitoring scheme, answer questions, and enhance public confidence of the testing regimen for effluents affecting Little Mountain Creek and Badin Lake
4. Explore steps that involve some or all stakeholders working cooperatively on:
    a. Communication and understanding of sampling, testing, and reporting on cyanide and fluoride
    b. Procedures for near-term sampling and testing for cyanide and fluoride
    c. Participating in NCDEQ's triennial review of water quality standards for cyanide
    d. Possible topics for similar workshops

Time	Topic/Activity
1:00-1:30	Welcome - Robyn Gross, ALCOA and Edgar Miller, Yadkin Riverkeeper Getting Started – Facilitator: John Stephens o Purpose and Objectives of workshop o Review agenda o Participant Introductions o Key concerns, topics for the workshop o Review Group expectations / Ground rules and participant and observer roles o Summary of the Workshop

Time	Topic/Activity
1:30-3:00 60 minutes (approx.) for presentations and short Q & A Reserve 30 minutes for *Question and Answer and Discussion*	**PART 1 – Background Presentations and Question and Answer** a) ALCOA (20 minutes) o Summary of NPDES permit and monitoring obligations under same o NPDES Compliance history o Recent actions (e.g., soil removal) o Engagement with stakeholders *Q & A for clarification* b) NC DWR (20 minutes) o Method for establishing NPDES limits and monitoring frequency o Lake assessment data for Badin and Tillery lakes o Use of Mixing Zone o Enforcement policy o NPDES permit process *Q & A for clarification* c) UNC-CH Public Health (20 minutes) o Methods for measuring different forms of cyanide (free, available, total) and the risks associated with each form o Methods for measuring fluoride *Q & A for clarification* **Question and Answer and Discussion** (30 minutes) a) Stakeholders: important points b) Stakeholders: questions and concerns c) Presenters: responses

Time	Topic/Activity
3:00 – 3:30	Break + Student Posters available
3:30 –5:15 Reserve 10-15 minutes for Next Steps	**PART 2 - Stakeholder Exploration: Possible cooperative/joint actions** Part 2 will be dedicated to providing more opportunities for stakeholders to speak out about their concerns related to the workshop topics. In addition, the facilitator may pull topics into Part 2 based on what he hears from attendees as concerns, opportunities for cooperation, etc. in Part 1. Possible topics for discussion include: a) Concerned Citizens of West Badin b) Protect Badin Lake c) Monitoring and protection (e.g., options for addressing ambient water quality standards) d) Communication about data, analysis, NCDEQ regulation e) New NPDES permit: possible content / standards f) Topics for future workshops **Next Steps** a) Check for alignment/consensus i. Specific short- to medium-term actions ii. More general or longer-term objectives and coordinated activities b) Distribution of workshop summary
5:15 – 5:30	**Feedback on the workshop** a) Purpose met? b) Satisfaction with participation/discussion? c) Clarity on next steps d) Unanswered or ongoing questions and expectations
5:30	**Adjourn**

Organization	Attendees
Protect Badin Lake	Jen Caldwell, Colleen McDaniel, Kathy Brown
Concerned Citizens of West Badin	Macy Hinson, Richard Leak, Sarah Allen, Valerie Tyson, Earnest Cole Libby McClure (UNC School of Public Health)
Better Badin	Frances Whalen, Jenny Henderson, Curt Dorsey
Town of Badin	Jay Almond, Mayor Anne Harwood
NC DEQ – Division of Water Quality	John Hennessy, Christopher Ventaloro, Anna Gurney
NC DEQ - Division of Waste Management	Rob McDaniel, William Hunneke, Laura Leonard
NC DEQ - Environmental Justice and Equity Board	Renee Kramer
Stanly County Government	Candice Lowder w/ Stanly County Economic Development Commmission
Montgomery County Government	John Shaw, Frankie Maness
CUBE Hydro/Eagle Creek Renewable Energy	Karen Baldwin
Yadkin-Pee Dee River Basin Association	Sara Yeh
NC Division of State Parks and Recreation	Jeff Davidson, Brian Strong
NC Wildlife Resources Commission	Olivia Munzer
US Forest Service - Uwharrie National Forest	Theresa Savery
Alcoa	Robyn Gross, Jason Mibroda, Tommy Gibson, Joyce Fitzpatrick
Yadkin Riverkeeper	Edgar Miller, Katie Wilder, Grace Fuchs, Joe Morris, Dr. Nancy Laeur
UNC - School of Government	John Stephens (Facilitator)
UNC - Gillings School of Public Health	Howard Weinberg, Samantha Feinstein, Claire Connelly, Toby Tula, Cassidy Rice, Aashna Shukla, Susie Proctor

Group Ground Rules

Alcoa Badin Business Park Environmental Workshop

March 23, 2022

1. Equitable participation: share the air – hear from each stakeholder
2. Speak up: questions, concerns, incomplete ideas are welcomed
3. Time management: honor agenda timeframes with some flexibility
4. COVID-19 safety step: masks optional
5. Focus on water quality issues and future actions
6. Participants: engage in Q and A and discussion. Observers: listen and can offer thoughts privately to a participant for discussion during Part 2 of the agenda
7. For open discussion and speaking freely, attendees will not video or audio record the workshop. Individual notetaking is fine. Media organizations and attorneys representing stakeholders are not included in this workshop. (FYI – some people are observing via video)
8. Workshop summary: main points from Part 2 Exploration + Presentation materials from Part 1. The summary will not have specific attribution of comments, questions, ideas, etc.
9. Facilitation: monitor agenda timeframes; manage equitable participation; help stay on topic; help identify areas of cooperation/agreement; help identify next steps

Stakeholder Engagement

Badin Business Park

March 23, 2022

Topics to be Covered

- Summary of National Pollutant Discharge Elimination System (NPDES) permit and monitoring obligations
- NPDES compliance history
- Recent actions (e.g., soil removal project)
- Engagement with stakeholders

NPDES Permit – Badin Business Park

Regulatory Basis

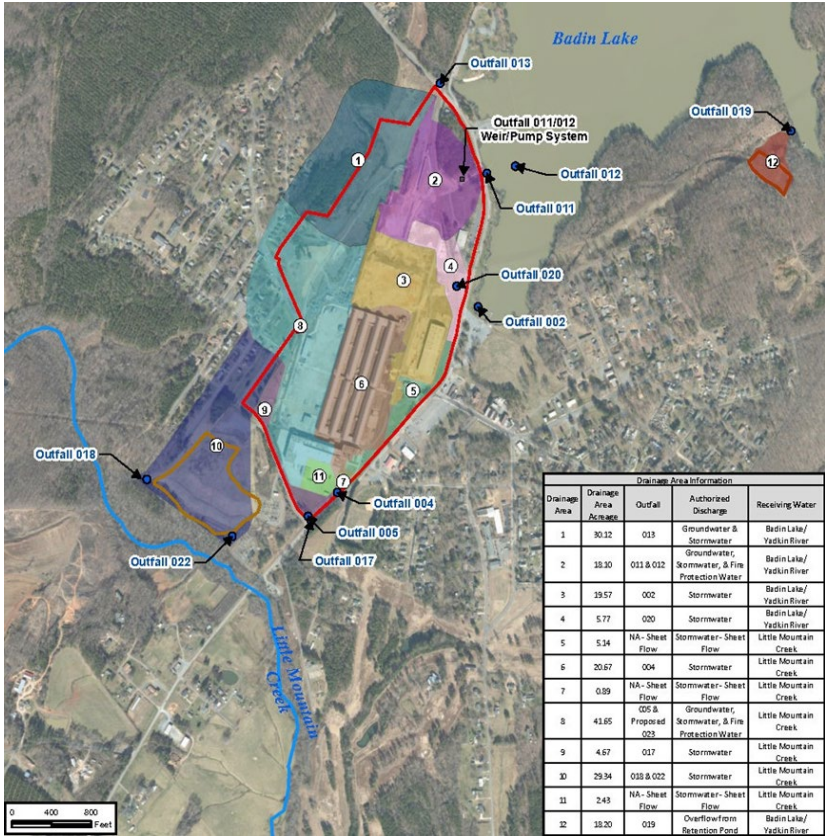
- Point Source discharges to surface waters are regulated through National Pollutant Discharge Elimination System (NPDES) program as part of the 1972 Clean Water Act
- Regulated by the US Environmental Protection Agency and overseen by NCDEQ Division of Water Resources.

Badin Business Park's Permit

- Current Permit issued July 2, 2019; Expires Oct. 31, 2022.
- 11 discharges (i.e., outfalls) are permitted to discharge to two surface water bodies (i.e., Tributary to Little Mountain Creek & Badin Lake).

Types of Permitted Discharges

- Stormwater only – flow observed in response to a precipitation event. (Outfalls 002, 004, 017, 018, 020, & 022)
- Combined industrial and stormwater – Stormwater and other sources in this case groundwater & fire protection water. (Outfalls 005, 011, 012 & 013)
- Stormwater retention pond overflow – Stormwater that exceeds the capacity of a retention pond designed to reduce turbid discharges. (Outfall 019)



Drainage Area Information

Drainage Area	Drainage Area Acreage	Outfall	Authorized Discharge	Receiving Water
1	30.12	013	Groundwater & Stormwater	Badin Lake/ Yadkin River
2	18.10	011 & 012	Groundwater, Stormwater, & Fire Protection Water	Badin Lake/ Yadkin River
3	19.57	002	Stormwater	Badin Lake/ Yadkin River
4	5.77	020	Stormwater	Badin Lake/ Yadkin River
5	5.14	NA - Sheet Flow	Stormwater - Sheet Flow	Little Mountain Creek
6	20.67	004	Stormwater	Little Mountain Creek
7	0.89	NA - Sheet Flow	Stormwater - Sheet Flow	Little Mountain Creek
8	41.65	005 & Proposed 023	Groundwater, Stormwater, & Fire Protection Water	Little Mountain Creek
9	4.67	017	Stormwater	Little Mountain Creek
10	29.94	018 & 022	Stormwater	Little Mountain Creek
11	2.43	NA - Sheet Flow	Stormwater - Sheet Flow	Little Mountain Creek
12	18.20	019	Overflow from Retention Pond	Badin Lake/ Yadkin River

Permitted Discharge – Stormwater Outfalls

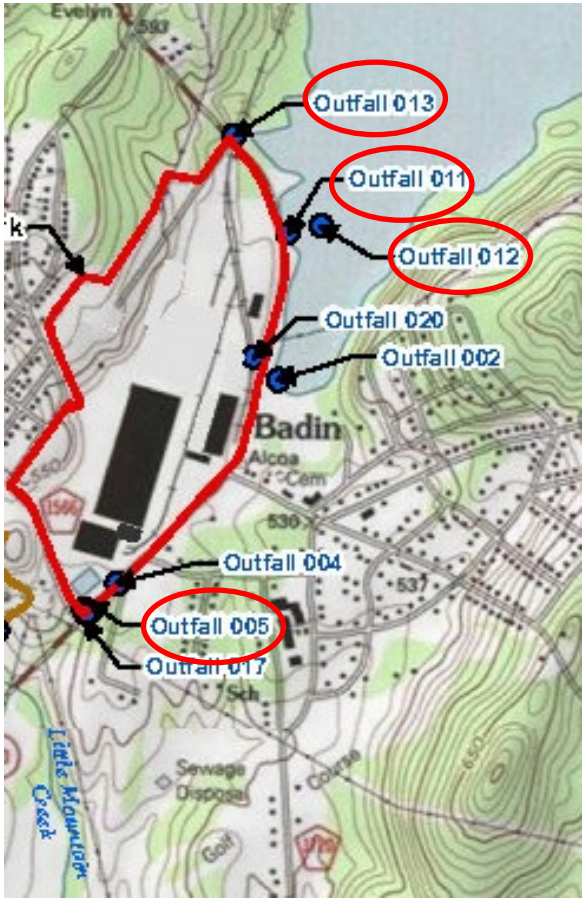
Outfalls 002, 004, 017, 018, 020 & 022		
Permit Parameters	**Measurement Frequency**	**Sample Type**
Total Suspended Solids (TSS)	2/year	Grab
Chemical Oxygen Demand (COD)	2/year	Grab
Aluminum, Total Recoverable	2/year	Grab
Total Cyanide	2/year	Grab
Total Fluoride	2/year	Grab
Total Rainfall	2/year	Rain Gauge
Color	2/year	visual
Odor	2/year	visual
Clarity	2/year	visual
Floating Solids	2/year	visual
Suspended Solids	2/year	visual
Foam	2/year	visual
Oil Sheen	2/year	visual
Erosion/Deposition at outfall	2/year	visual
Obvious indicators of SW pollution	2/year	visual
Non-Stormwater Certification	1/year	visual

Permitted Discharge – Combined Outfalls

Groundwater, Surface water & Fire Protection Water

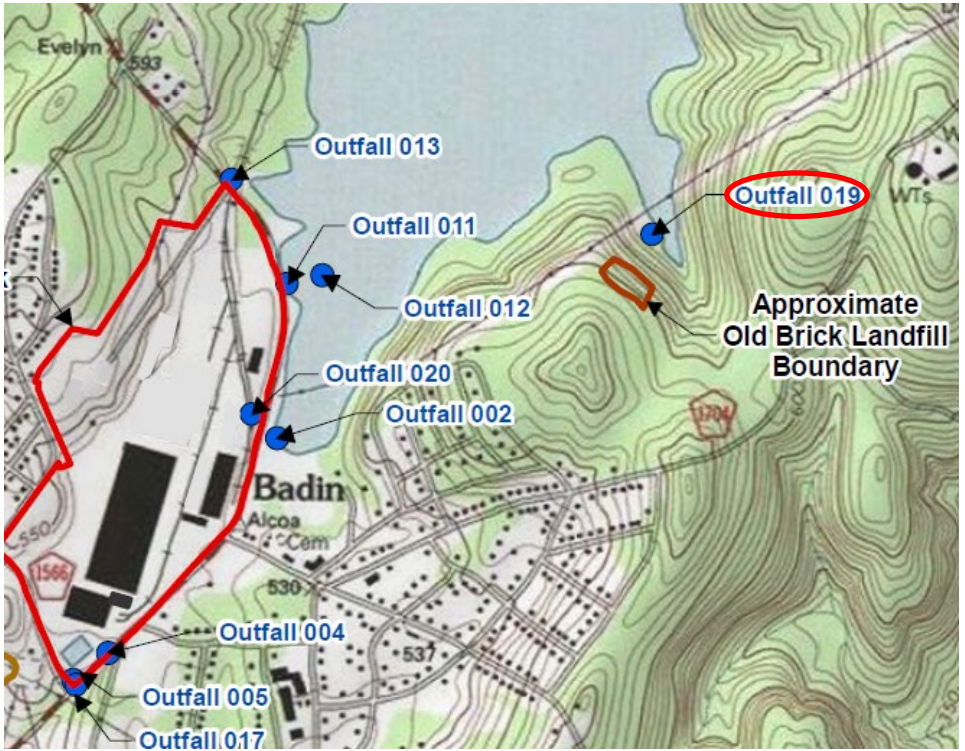
Outfalls	005		011	
Permit Parameter	Measurement Frequency	Sample Type	Measurement Frequency	Sample Type
Flow	Monthly	Instantaneous	Monthly	Instantaneous
pH	Monthly	Grab	Quarterly	Grab
Total Fluoride	Monthly	Composite (time)	Monthly	Grab
Total Cyanide	Monthly	Grab	Monthly	Grab
Total Residual Chlorine	Monthly	Grab	Not applicable	Not applicable
Total Suspended Solids	Quarterly	Composite (time)	Quarterly	Grab
Total Aluminum	Quarterly	Composite (time)	Quarterly	Grab
Trichloroethylene (TCE)	Not applicable	Not applicable	Monthly	Grab
Acute / Chronic Toxicity	Quarterly	Composite (time)	Quarterly	Grab

Outfalls	012		013	
Permit Parameter	Measurement Frequency	Sample Type	Measurement Frequency	Sample Type
Flow	Monthly	Instantaneous	Monthly	Instantaneous
pH	Monthly	Grab	Monthly	Grab
Total Fluoride	Quarterly	Composite (time)	Quarterly	Composite (time)
Total Cyanide	Monthly	Grab	Monthly	Grab
Total Residual Chlorine	Not applicable	Not applicable	Not applicable	Not applicable
Total Suspended Solids	Quarterly	Composite (time)	Quarterly	Composite (time)
Total Aluminum	Quarterly	Composite (time)	Quarterly	Composite (time)
Trichloroethylene (TCE)	Monthly	Grab	Not applicable	Not applicable
Acute / Chronic Toxicity	Quarterly	Composite (time)	Quarterly	Composite (time)



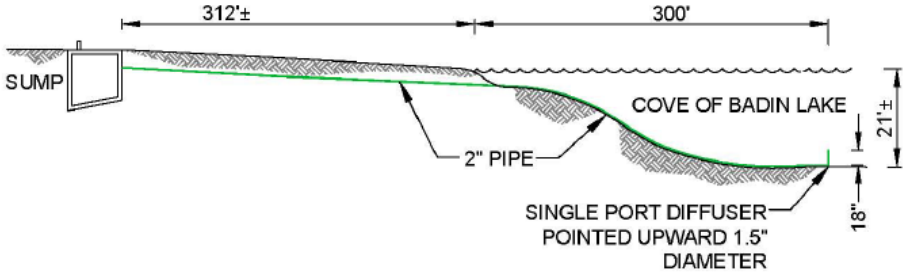
Permitted Discharge – Stormwater Retention Pond Overflow

Outfall 019		
Permit Parameter	**Measurement Frequency**	**Sample Type**
Flow	Semi-annual	Instantaneous
Total Rainfall (inches)	Semi-annual	Rain Gauge
Total Suspended Solids	Semi-annual	Grab
Total Aluminum	Semi-annual	Grab
Total Fluoride	Semi-annual	Grab
Total Cyanide	Semi-annual	Grab
pH	Semi-annual	Grab
Acute Toxicity	Annually by June 30	Grab



Outfall 012 Diffuser and Mixing Zone

- Outfall 012 drainage basin is collected in a sump and pumped through a 2-inch pipe to a single port diffuser approximately 300 ft from shore at the bottom of a cove of Badin Lake.
- Mixing zone is a limited area or volume of water where initial dilution of a discharge takes place and within which the water quality standards allow certain water quality criteria to be exceeded. While the criteria may be exceeded within the mixing zone, the use and size of the mixing zone must be limited such that the waterbody will not be impaired and such that all designated uses are maintained (EPA NPDES Permit Writers' Manual, 2010).
- Mixing zone for Outfall 012 is sampled monthly at three (3) locations 20 feet from the diffuser at the surface and 3.5 m (11.5 ft) below the surface – per special condition C.(7.)



Mixing Zone (for Outfall 012)			
Permit Parameter	**Measurement Frequency**	**Sample Type**	**Sample Location**
pH	Monthly	Grab	Lake Surface
Total Cyanide	Monthly	Grab	Lake Surface
Total Fluoride	Monthly	Grab	Lake Surface
Trichloroethylene (TCE)	Monthly	Grab	Lake Surface

Compliance History – Stormwater Only Outfalls

Cyanide (Total) – Data in ug/L

	Outfall 002		Outfall 004		Outfall 017		Outfall 018		Outfall 019		Outfall 020		Outfall 022	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Limit	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
August 2019														
September 2019														
October 2019	0.0	0.0	0.0	0.0	0.0	0.0	5.0	5.0			0.0	0.0	0.0	0.0
November 2019														
December 2019														
January 2020														
February 2020	78.0	78.0	0.0	0.0					0.0	0.0				
March 2020														
April 2020					0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0
May 2020														
June 2020														
July 2020														
August 2020														
September 2020														
October 2020	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0
November 2020														
December 2020														
January 2021														
February 2021									0.0	0.0				
March 2021	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0
April 2021														
May 2021													0.0	0.0
June 2021													0.0	0.0
July 2021													0.0	0.0
August 2021														
September 2021														
October 2021					0.0	0.0	0.0	0.0			0.0	0.0		
November 2021	0.0	0.0	0.0	0.0										
December 2021														

Two shown detections analyzed by EPA Method 335.4

Compliance History – Stormwater Only Outfalls

Fluoride – Data in mg/L

	Outfall 002		Outfall 004		Outfall 017		Outfall 018		Outfall 019		Outfall 020		Outfall 022	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Limit	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
August 2019														
September 2019														
October 2019	0.26	0.26	3.4	3.4	0.18	0.18	0.0	0.0			0.42	0.42	0.0	0.0
November 2019														
December 2019														
January 2020														
February 2020	2.5	2.5	3.2	3.2					0.77	0.77				
March 2020														
April 2020					0.25	0.25	0.0	0.0			0.64	0.64	0.13	0.13
May 2020														
June 2020														
July 2020														
August 2020														
September 2020	0.0	0.0	1.1	1.1	0.50	0.50	0.0	0.0			0.84	0.84	0.65	0.65
October 2020														
November 2020														
December 2020														
January 2021														
February 2021									1.8	1.8				
March 2021	0.82	0.82	1.0	1.0	0.18	0.18	0.0	0.0			0.43	0.43	0.22	0.22
April 2021														
May 2021													0.12	0.12
June 2021													0.24	0.24
July 2021													0.0	0.0
August 2021														
September 2021														
October 2021					0.20	0.20	0.0	0.0			0.21	0.21		
November 2021	0.16	0.16	2.5	2.5										
December 2021														

Compliance History – Industrial Outfalls

Cyanide (Total) – Data in ug/L

	Outfall 005		Outfall 011		Outfall 012		Outfall 013	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Limit	**5.0**	**46.6**	**NA**	**46.6**	**242.0**	**285.0**	**5.0**	**46.6**
August 2019	6.8	6.8	ND	ND	ND	ND	9.0	18.0
September 2019	ND	ND			ND	ND	ND	ND
October 2019	5.0	10.0	6.2	6.2	ND	ND	ND	ND
November 2019	ND	ND			21.0	21.0	ND	ND
December 2019	5.5	26.0			8.6	8.6	3.7	11.0
January 2020	6.1	13.0	ND	ND	88.0	88.0	4.3	13.0
February 2020	2.9	5.8	5.4	5.4	210.0	210.0	ND	ND
March 2020	32.0	32.0			29.0	29.0	16.0	16.0
April 2020	ND	ND	11.0	11.0	ND	ND	ND	ND
May 2020	ND	ND	ND	ND	ND	ND	ND	ND
June 2020	ND	ND	35.0	35.0	18.0	18.0	ND	ND
July 2020*	9.1	9.5	ND	ND	ND	ND	3.2	32.0
August 2020	ND	ND			ND	ND	ND	ND
September 2020	ND	ND	2.2	2.2	51.0	51.0	ND	ND
October 2020	ND	ND	17.0	17.0	11.0	11.0	ND	ND
November 2020	ND	ND	ND	ND	ND	ND	ND	ND
December 2020	ND	ND			ND	ND	ND	ND
January 2021	ND	ND			78.0	78.0	ND	ND
February 2021	3.7	7.3			81.0	81.0	4.8	9.5
March 2021	ND	ND			32.5	46.0	ND	ND
April 2021	8.2	9.6			9.4	9.4	ND	ND
May 2021	ND	ND			ND	ND	ND	ND
June 2021	ND	ND			ND	ND	ND	ND
July 2021	ND	ND			ND	ND	ND	ND
August 2021	4.1	10.0	ND	ND	6.2	6.2	ND	ND
September 2021	ND	ND	ND	ND	ND	ND	ND	ND
October 2021	ND	ND	ND	ND	9.4	9.4	ND	ND
November 2021	ND	ND			ND	ND	ND	ND
December 2021	3.6	14.0			ND	ND	4.1	37.0

Highlighted in red = exceedance; green = compliance

Compliance History – Industrial Outfalls

Fluoride – Data in mg/L

	Outfall 005		Outfall 011		Outfall 012		Outfall 013	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Limit	**1.8**	**24.0**	**NA**	**24.0**	**NA**	**NA**	**NA**	**NA**
August 2019	2.0	2.0	0.74	0.74	1.3	1.3	0.35	0.35
September 2019	2.4	2.4						
October 2019	1.7	1.7	0.59	0.59	1.0	1.0	0.43	0.43
November 2019	2.0	2.4						
December 2019	0.92	0.92						
January 2020	1.4	1.4	0.44	0.44	1.1	1.1	0.47	0.47
February 2020	1.8	2.3	0.48	0.48				
March 2020	2.0	2.3						
April 2020	1.8	1.8	0.41	0.41	0.91	0.91	0.34	0.34
May 2020	1.6	2.1	0.43	0.43				
June 2020	2.2	2.4	1.4	1.4				
July 2020	2.1	2.6	0.67	0.67	0.83	0.83	0.38	0.38
August 2020	2.3	2.4						
September 2020	1.8	1.8	0.61	0.61				
October 2020	1.2	1.2	0.66	0.66	0.84	0.84	0.45	0.45
November 2020	1.6	1.9	0.58	0.58				
December 2020	1.8	1.8						
January 2021	1.7	1.7			0.87	0.87	0.30	0.30
February 2021	1.5	1.5						
March 2021	1.6	1.6			1.1	1.1	0.20	0.20
April 2021	1.9	2.1			0.72	0.72	0.19	0.19
May 2021	2.4	2.4						
June 2021	2.2	2.5						
July 2021	2.1	2.4			1.0	1.0	0.33	0.33
August 2021	2.2	2.4	0.69	0.69				
September 2021	1.9	2.4	0.36	0.36				
October 2021	1.4	1.4	0.29	0.29	0.97	0.97		
November 2021	2.4	2.4					0.12	0.12
December 2021	2.2	2.6						

Highlighted in red = exceedance; green = compliance

Compliance History – Badin Lake Mixing Zone

Fluoride and Cyanide

	MZ1A		MZ1B		MZ2A		MZ2B		MZ3A		MZ3B	
	Cyanide (µg/L)	Fluoride (mg/L)	Cyanide (µg/L)	Fluoride (mg/L)	Cyanide (µg/L)	Fluoride (mg/L)	Cyanide (µg/L)	Fluoride (mg/L)	Cyanide (µg/L)	Fluoride (mg/L)	Cyanide (µg/L)	Fluoride (mg/L)
August 2019	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
September 2019	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
October 2019	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
November 2019	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
December 2019	9.0	ND	8.1	ND	ND	ND	ND	ND	ND	ND	8.9	ND
January 2020	ND	ND	ND	ND	5.8	ND	5.6	ND	7.5	ND	ND	ND
February 2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.1	ND
March 2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
April 2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
May 2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
June 2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
July 2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
August 2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
September 2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
October 2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
November 2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
December 2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
January 2021	ND	0.13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
February 2021	ND	ND	ND	ND	7.5	ND	ND	ND	ND	ND	ND	ND
March 2021	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
April 2021	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
May 2021	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
June 2021	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
July 2021	ND	0.11	ND	ND	ND	0.11	ND	0.11	ND	ND	ND	ND
August 2021	ND	0.12	ND	ND	ND	0.10	ND	0.10	ND	0.10	ND	ND
September 2021	ND	0.13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
October 2021	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
November 2021	ND	ND	ND	0.15	ND	0.11	ND	ND	ND	ND	ND	0.11
December 2021	ND	0.13	ND	ND	ND	ND	ND	ND	9.1	ND	10.0	ND

Trichloroethylene (TCE) has not been detected at Outfall 012 or within the mixing zone.

Recent Activity (2017 – present)

- Infiltration/Inflow (I&I) Assessment
  - Camera Inspections, groundwater monitoring well installations, test pit and trench installations, & plant-wide comprehensive storm event sampling
- Jet cleaning of storm water piping
- Installation of new shallow storm water system
- Abandonment/isolation of existing system through slurry wall placement and installation of pipe seals and grouting
- Water quality and flow rate study
- Geophysics and environmental media investigations
- Soil removal

Former Bath Mill Soil Removal – Oct 2021

Former Bath Mill

- Demolished building previously used to recover bath material, a fluoride-bearing mixture from the aluminum reduction pots, was crushed and repurposed

Timeline

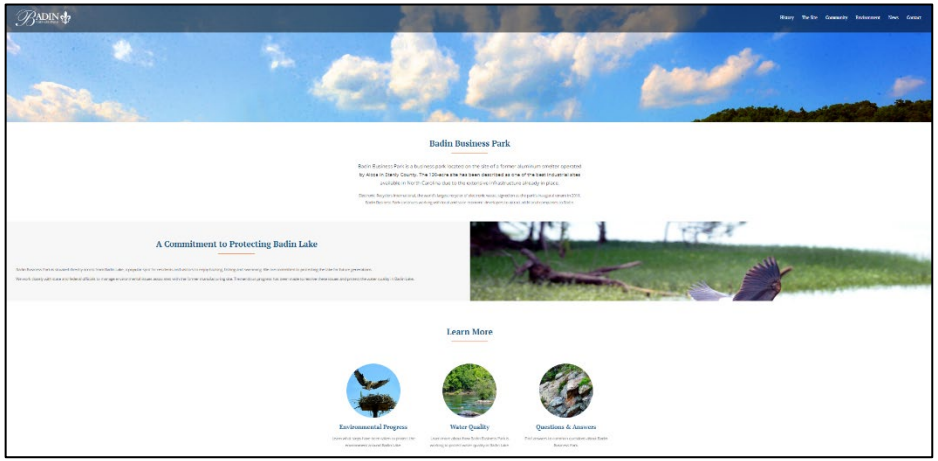
- March 2020 – Electromagnetic (EM) geophysical evaluation performed for source identification
  - Showed multiple areas of higher conductance
  - Most representative of concrete foundations
- June 2020 – Soil & shallow water samples collected from multiple areas of higher conductance.
  - Confirmed the presence of fluoride bearing soils with a potential to contribute to the Outfall 005 storm sewer
  - leachable fluoride was quantified in the samples at concentrations ranging from 0.17 mg/l to 25 mg/l
- October 2021 – 1,893 tons of solid materials excavated and disposed offsite

Stakeholder Engagement

Alcoa Badin Business Park is committed to increase communications, transparency and stakeholder engagement

Recent Activity

- Launched dedicated website to keep local community informed
  - https://badinbusinesspark.com/
- Continue to engage with community stakeholders
  - Badin Lake homeowner associations
  - Yadkin Riverkeeper
  - Locally elected officials
  - Badin community members



- Continued to coordinate remediation efforts with DEQ officials
- Engagement with University of North Carolina (UNC) students
- Piloting this stakeholder meeting

Overview of NC Surface Water Standards & the 2020-2022 Triennial Review

March 23, 2022 - Alcoa Badin Business Park Environmental Stakeholders Workshop

Christopher Ventaloro
Water Quality Standards Coordinator
Division of Water Resources, Classifications and Standards/Rules Review Branch

Water Quality Standards

Groundwater Standards

Drinking Water Standards

Surface Water Standards

Triennial Review Process

Development & Review

- Staff review available guidance & literature and develop Triennial Review package
- Staff present TR to WQC for comment/modification
- Staff present TR for public notice/comment
- TR goes to EMC for review/comment/modification

State Approval

- EMC approves TR to become standards in rule
- EMC approved TR goes to RRC for language/intent/legality review
- RRC modifies/approves TR
- NC Attorney General signs off on TR
- Triennial Review codified in NC state law as Water Quality Standards

Federal Approval

- EPA reviews TR for compliance with Clean Water Act (40 CFR)
- USFW reviews TR for compliance with Endangered Species Act
- EPA informs NC of compliance assessment results
- Triennial Review approved/disapproved or modified based on federal requirements

Current Triennial Review (2020-2022)

WQC
Nov. 2020

→ EMC March 2021

→ Last day to file for NC Register
April 26, 2021

→ Notice of Text/ Comment period begins
May 17, 2021

↓

Public Hearing
July 20, 2021

→ End of public comment period
August 3, 2021

→ EMC adoption process
March 10, 2022

→ RRC approval process
April 21, 2022

↓

Earliest effective date
May 1, 2022

→ Submit for AGO signoff
June 2022

→ Submit to EPA for CWA review
July 2022

Cyanide

EMC approved amendment of cyanide standard in 02B .0211

- Existing standard is for total cyanide (5 ug/L)
- Proposal was to include free cyanide
- Due to public comments received → Amended to remove free cyanide & include available cyanide
- Adopted standard is for available or total cyanide (5 ug/L)
- Protection of aquatic life

NORTH CAROLINA
Department of Environmental Quality

Current Triennial Review (2020-2022)

WQC
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→ EMC March 2021

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NORTH CAROLINA
Department of Environmental Quality

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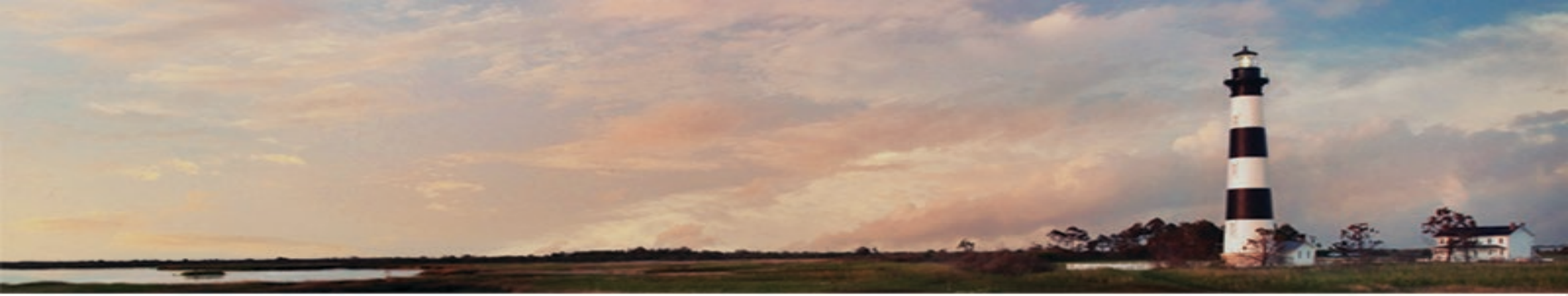


Nothing Compares
NORTH CAROLINA

March 23, 2022

Department of Environmental Quality

Federal Water Pollution Control Act (Clean Water Act) Overview

- Section 303 – Classifications & Standards

- Section 402 – National Pollutant Discharge Elimination System (NPDES)
  - Wastewater
  - Stormwater
  - Pretreatment

Water Quality Standards (Section 303 of CWA)

- Established by states (with EPA approval)
- Water quality must conform to designated uses
- Antidegradation Policy
- Typical Uses
  - Public water supplies
  - Protect human health
  - Propagation of fish and wildlife
  - Recreational
  - Agricultural

National Pollutant Discharge Elimination System (NPDES)

- Congressional Goals were:
  - Permit every discharge to waters
  - Eliminate all discharges by 1985
  - Protect water quality standards (technology based and water quality- based limits, acute & chronic limitations)
  - Discharge to waters is not a right

NPDES Laws & Regulations (Federal & State)

- Federal CWA- Section 402
- Federal Regulations Part 40 CFR

- State NCGS 143-215.1 (Permitting)
- State 143-215.6A (Compliance)
- State 15A NCAC 2B .0100 & .0200 (WQ Standards)
- State 15A NCAC 2H.0100 (Permitting)
- State 15A NCAC 2B .0400 & .0500 (Permitting Monitoring)

Types of Permits (Wastewater)

- Individual Permits ~ (1200 Permits)
  - Majors - 217
  - Minors ~ 1000

- General Permits (8 Permits)

- ATC Permit (Authorizes Construction of the Facility)

Effluent Limits & Monitoring (Example)

EFFLUENT CHARACTERISTICS	PARAMETER CODE	EFFLUENT LIMITATIONS		MONITORING REQUIREMENTS		
		Monthly Average	Daily Maximum	Measurement Frequency	Sample Type	Sample Location
Flow	50050	0.100 MGD		Weekly	Continuous	Influent or Effluent
BOD, 5-day, (20°C) [2]	CO310	30.0 mg/L	45.0 mg/L	Weekly	Composite	Influent & Effluent
Total Suspended Solids [2]	CO530	30.0 mg/L	45.0 mg/L	Weekly	Composite	Influent & Effluent
NH_3 as N	CO610			Monthly	Composite	Effluent
Fecal Coliform (geometric mean)	31616	200/100 mL	400/100 mL	Weekly	Grab	Effluent
Total Residual Chlorine [3]	50060		28 µg/L	2/Week	Grab	Effluent
Total Nitrogen (NO2 + NO3 + TKN)	CO600			Quarterly	Composite	Effluent
Total Phosphorus	CO665			Quarterly	Composite	Effluent
Temperature	00010			Weekly	Grab	Effluent
pH	00400	≥ 6.0 and ≤ 9.0 standard units		Weekly	Grab	Effluent
Total Mercury COMER	COMER	Monitor & Report		1/Permit Cycle[4]	Grab	Effluent

NPDES Permit Limits

Technology Based Limits – (TBELS)

- Category of Discharges
- "Level Playing Field" & Consistency Across States
- Based on achievable technology for a given industry type
- Minimum protection allowed – WQBELS can be more stringent

NPDES Permit Limits

- Technology Based Limits (TBELS)

- Determine proper category and subcategory

- Calculate TBELs and determine application of mass verses concentration limits

- For each parameter compare TBELs to WQBELs and put the most stringent limit in the permit.

NPDES Permit Limits

- Water Quality Based Limits (WQBELS)
  - Determine what WQBEL's apply
  - Determine or calculate permit limits
  - For toxics, perform a reasonable potential analysis on effluent data
  - If reasonable potential to violate standards exists - limit parameter in permit

NPDES Permit Limits

Water Quality Based Limits (WQBELS)

NC Surface Water Quality Standards 15A NCAC 2B .0100 - .0300

- Aquatic Life Surface WQS's
  - Freshwater & Saltwater (Acute and Chronic)

- Human Health Standards
  - Fish Consumption (apply to all streams)
  - Water Consumption & Fish Consumption (apply to WS streams)

- Aesthetic Standards (i.e. Total phenolic compounds, color)

NPDES Permit Limits

If there is no State WQS, DWR Considers…

US EPA – Nationally Recommended Water Quality Criteria [2]

- Freshwater & Saltwater (Chronic)
- Human Health Criteria

For Unique Pollutants – use EPA databases

- Risk Assessment Information System (RISK)
- EPA's Intergrated Risk Information System (IRIS)
- ECOTOXicology Database System (ECOTOX)

Calculate WQBELs

Dilution – NC rules allows for stream dilution in developing a permit limit

IWC – A calculation of the Instream Wastewater Concentration (IWC) is used to determine an allowable discharge concentration (permit limit).

IWC is the portion of the stream that is made up of effluent being discharged

$$IWC = \frac{\text{Permitted Flow (design)}}{\text{Permitted Flow + Stream Flow}}$$

Calculate WQBELs

Example: Calculate Chronic Cyanide Limit

Permitted Flow = 2 MGD

Critical low flow (7Q10) = 10 CFS or 6.46 MGD

Chronic cyanide standard = 5.0 µg/L

$$\text{IWC} = \frac{\text{PF (design)}}{\text{PF + 7Q10 Stream Flow}} = \frac{\text{2 MGD}}{\text{2 MGD + 6.46 MGD}} = 0.24$$

Permit Limit = Standard ÷ IWC = 5.0 µg/L ÷ 0.24 = 20.83 µg/L

Mixing Zones

- Per EPA, A mixing zone is a limited area or volume of water where initial dilution of a discharge takes place and where certain numeric water quality criteria may be exceeded.
  - CWA not require all criteria be met at the exact point where pollutants are discharged
  - Mixing with receiving waters allowed
  - Idea – exposure of aquatic organisms for short duration (clearly defined and limited) acceptable

Mixing Zones

- Mixing zones shall be designated such that discharges will not (15A NCAC .02B .0204):

(1) result in acute toxicity to aquatic life, defined in Rule .0202(1) of this Section, or prevent free passage of aquatic organisms around the mixing zone;

(2) result in offensive conditions;

(3) produce undesirable aquatic life or result in a dominance of nuisance species outside of the assigned mixing zone; or

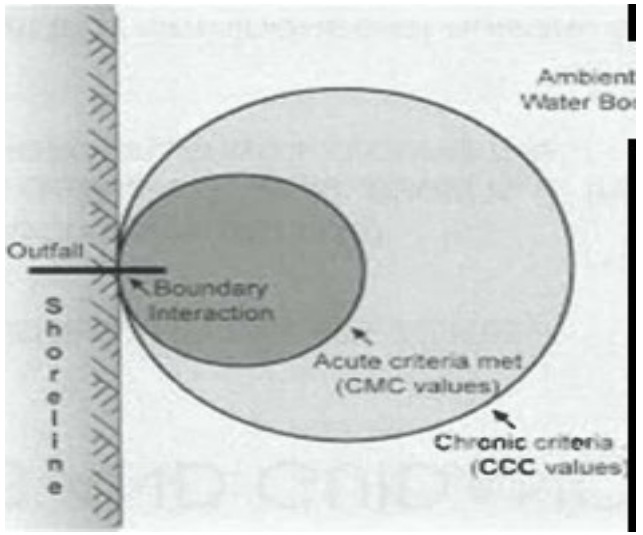
(4) endanger the public health or welfare.

Mixing Zones

- For application of two-number aquatic life criteria, there may be up to two types of mixing zones, an acute mixing zone and a chronic mixing zone.

- Acute mixing zone: neither the acute nor the chronic criterion is met.

- Chronic mixing zone: the acute, but not the chronic criterion is met.



Mixing Zones

- Design Considerations
  - Rivers
  - Estuaries/Tidal
  - Lakes

  - Only Included Lake (Badin Lake Concern):
    - Ambient velocity is 0
    - Seasonal variation in water level
    - Seasonal Stratification
    - Recommended design: Direct the outfall vertically upward or at an angle

2017 NPDES Badin Permit Limits (NC0004308)

Badin Permit Limit Development Information

- WQ Standards
  - Cyanide – 5 ug/L (Chronic), 46.6 ug/L (Acute)
  - Fluoride – 1.8 mg/L (Chronic), 24 mg/L (Acute)

- Outfall 005 – Little Mountain Creek 7Q10 (0 cfs)
- Outfall 012 (Diffuser Information) --
  - Acute Mixing Zone
    - At .7 feet, Dilution Ration of 14:1 (IWC of 7%)
    - At 2.6 feet, Dilution Ration of 26:1 (IWC of 3.8%)
    - Diffuser extends 300 feet at a depth of 20 feet with one port (1.5 in diameter)

2017 NPDES Badin Permit Limits (NC0004308)

- Outfall 005 (Little Mtn. Creek) Limits Calculation (No Dilution, so permit limit is the WQ standard)
  - Cyanide
    - Daily Maximum = 46.6 ug/L (acute standard)
    - Monthly Average = 5 ug/L (chronic standard)
  - Fluoride
    - Daily Maximum = 24 mg/L (acute standard)
    - Monthly Average = 1.8 mg/L (chronic standard)

- Outfall 0012 (In Lake Discharge) Limits Calculation
  - Cyanide
    - Daily Maximum = 46.6 ug/L * 14 (Dilution Ratio) = 652 ug/L
    - Monthly Average = 5 ug/L * 26 (Dilution Ratio) = 130 ug/L
  - Fluoride
    - Daily Maximum = 24 mg/L * 14 (Dilution Ratio) = 336 mg/L
    - Monthly Average = 1.8 * 26 (Dilution Ratio) = 46.8 mg/L
    - Reasonable Potential Analysis = No Reasonable Potential to Exceed = Monitoring Only

Contact Information

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Questions?

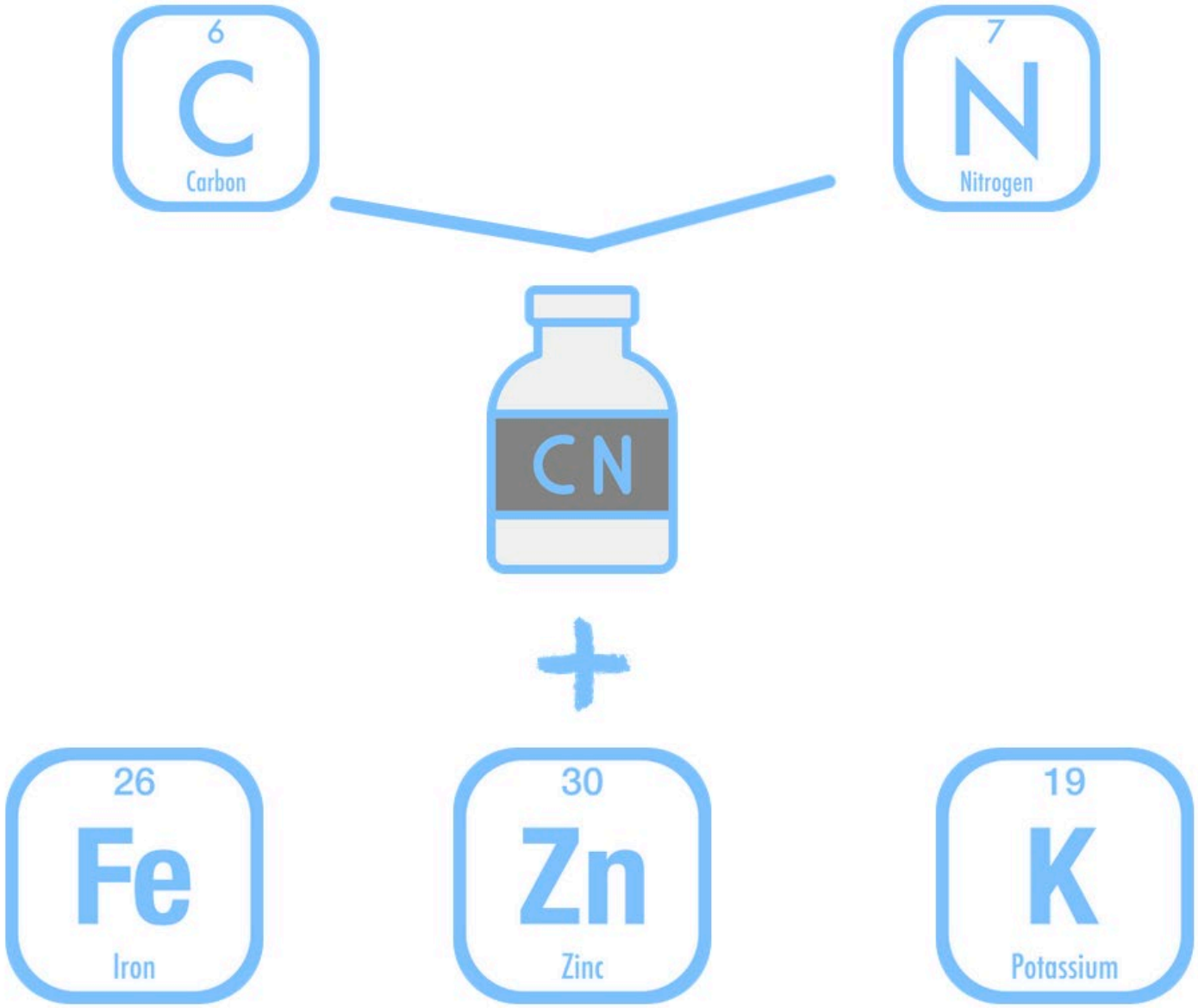
Department of Environmental Quality

Cyanide Species, Toxicity, and Methods

Acronyms

- ASTM – American Society for Testing and Materials
- OIA – OI Analytical
- US EPA – United States Environmental Protection Agency
- MCL – Maximum Contaminant Level
- µg/L -- micrograms/Liter
- mg/kg – milligram/kilogram
- CNIRS – Cyanide Numerical Interference Rating System

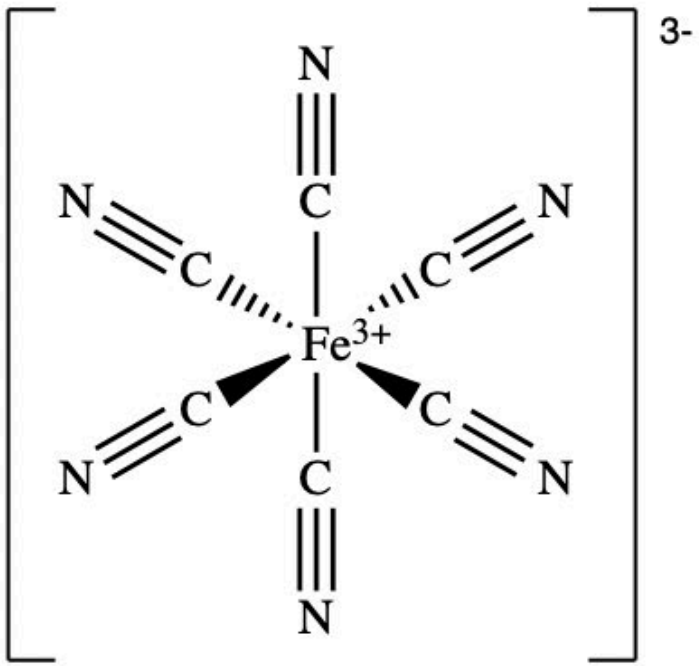
What is Cyanide?



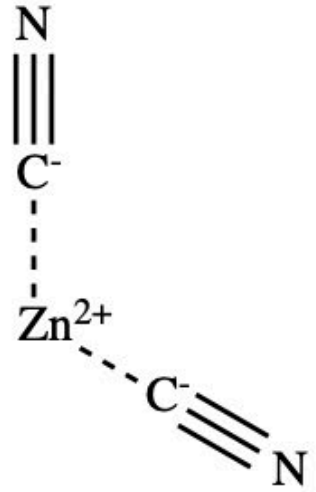
Hazard Scale

Least Hazardous — Most Hazardous

Strongly Complexed Cyanide Species



Weak Acid Dissociable Cyanide

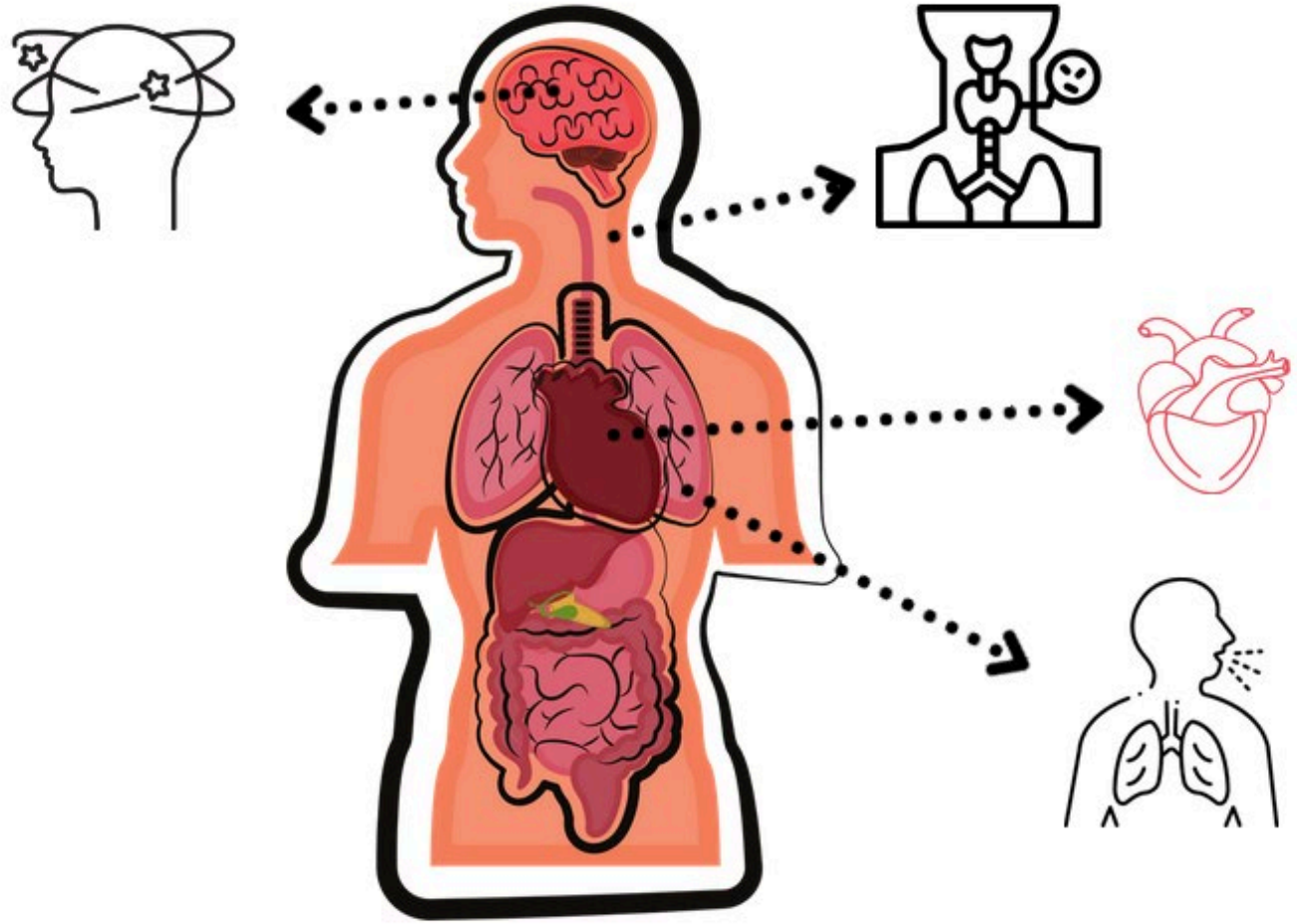


Free Cyanide

$[CN]^-$

How does cyanide enter the body?

What does cyanide exposure do to the body?



The **Reference Dose** for Free Cyanide (CN^-) is 0.02 mg/kg body weight/day

Based on this, a 170 lb person would have to consume…

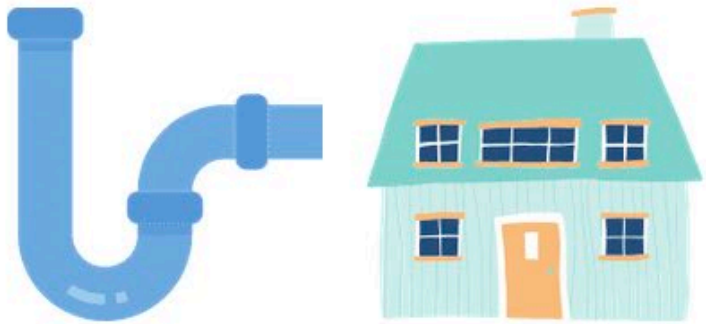
48 raw almonds

1/4 of one raw peach pit

… to experience negative health impacts from cyanide

US EPA Surface Water Criteria: **22.7 µg/L** (Acute, Free Cyanide)
5.2 µg/L (Chronic, Free Cyanide)
NC DEQ Surface Water Criteria: **5 µg/L** (Total Cyanide)

US EPA Drinking Water MCL: **200 µg/L** (Free Cyanide)



Cyanide Analysis Methods

Methods for the Analysis of Total Cyanide

EPA 335.4 – Semi-Automated Colorimetry

- 13 interferences
- Range: 5 to 500 µg/L

ASTM D7511 – Segmented Flow Injection Analysis, In-Line Ultraviolet Digestion and Amperometric Detection

- 6 interferences
- Range: 2 to 500 µg/L

Methods for the Analysis of Available Cyanide

OIA 1677 – Ligand Exchange and Flow Injection Analysis (FIA)

- 5 interferences
- Range: 2 to 5,000 µg/L

ASTM D6888 – Ligand Displacement and Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection

- 5 interferences
- Range: 2 to 400 µg/L

Methods for the Analysis of Free Cyanide

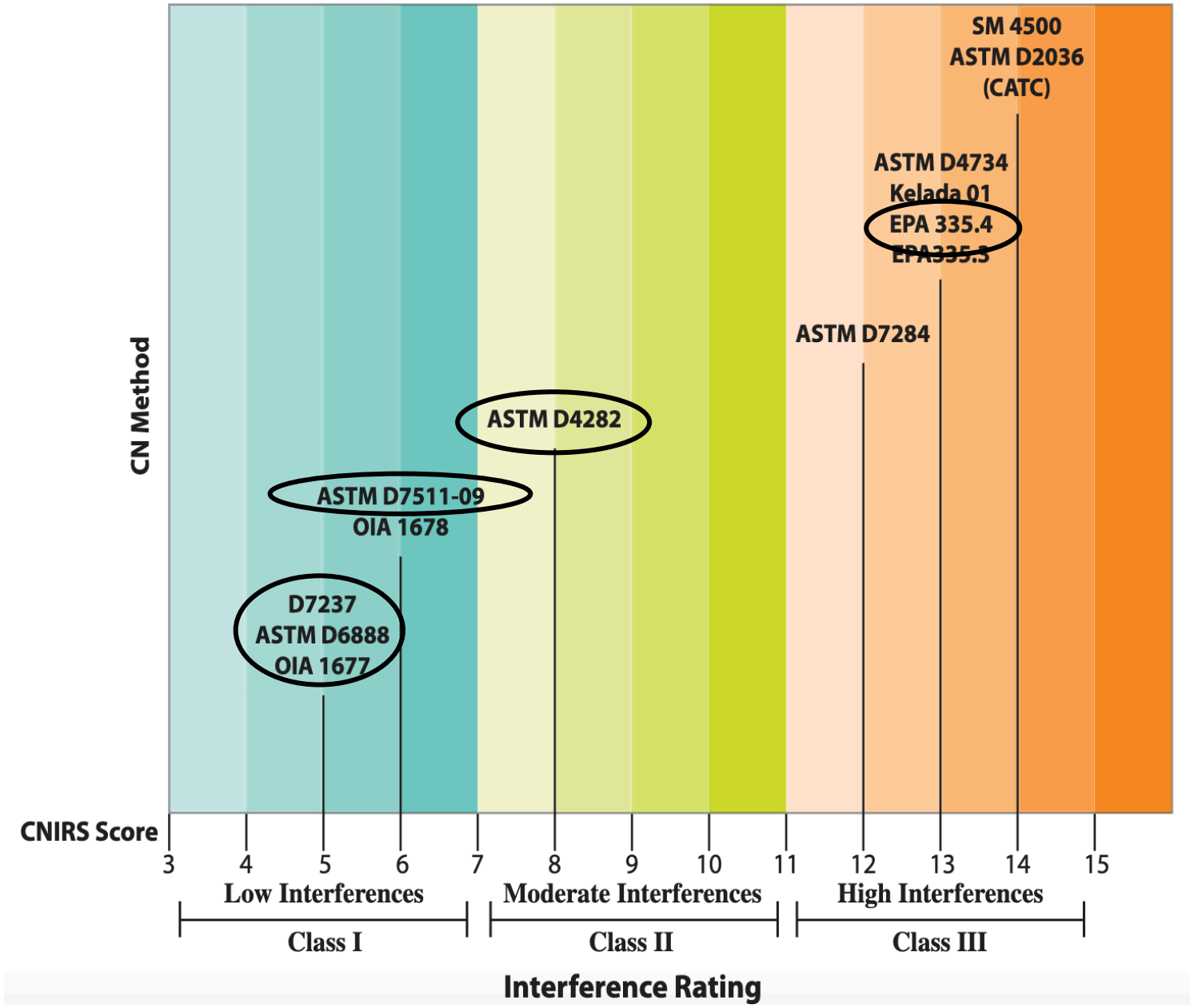
ASTM D4282 – Free Cyanide in Water and Wastewater by Microdiffusion

- 8 interferences
- Range: 10 to 150 µg/L

ASTM D7237 – Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection

- 5 interferences
- Range: 5 to 500 µg/L

Interference Ratings



Laboratories with Testing Capabilities

Total Cyanide

- NC DEQ has approved 81 laboratories both in and out of state to analyze total cyanide samples
  - Approved methods: ASTM D7511, EPA 335.4, SM 4500, SW-846 9014, SW-846 9012B

Available Cyanide

- NC DEQ has approved 1 out of state laboratory to test for available cyanide
  - This laboratory is Eurofins TestAmerica Pittsburgh
- A laboratory that has the capabilities but has not sought DEQ approval:
  - RTI Laboratories – ASTM D6888
    - Located in Livonia, MI

Free Cyanide

- NC DEQ has not approved any laboratories to test for free cyanide
- Laboratories that have the capabilities but have not sought DEQ approval:
  - Anatek Labs – ASTM D7237
    - Moscow, ID and Spokane, WA
  - GEL Labs – ASTM D4282
    - Charleston, SC

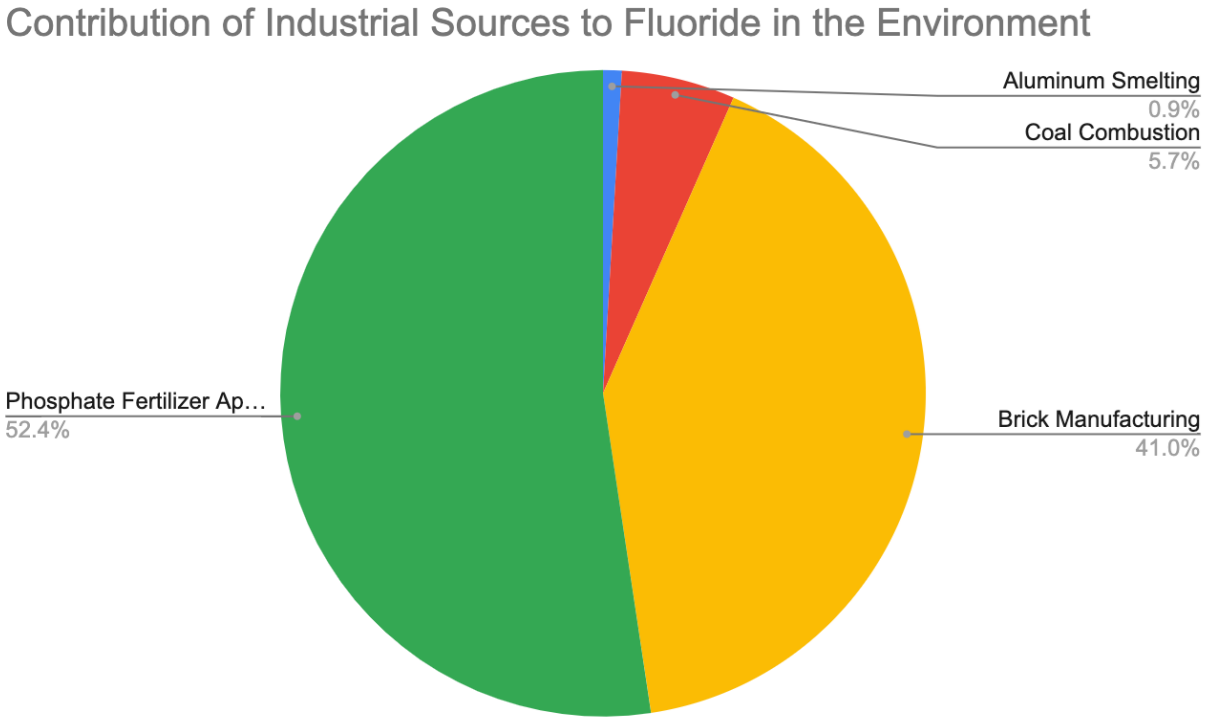
References

- Slide 3. Cyanide Compounds (2016). Washington D.C.; United States Environmental Protection Agency.
- Slide 4. OI Analytical. *Cyanide Analysis Guide*. College Station, TX.
- Slide 5. *Formal Toxicity Summary for Cyanide*. The Risk Assessment Information System. (1997, October 7). Retrieved February 13, 2022, from https://rais.ornl.gov/tox/profiles/cyanide_f_V1.html
- Slides 6 & 7. Hendry-Hofer, T., Ng, P. C., Witeof, A. E., Mahon, S. B., Brenner, M., Boss, G. R., & Bebarta, V. S. (2019). A review on ingested cyanide: Risks, clinical presentation, diagnostics, and treatment challenges. *Journal of Medical Toxicology, 15*(2), 128-133. doi:http://dx.doi.org/10.1007/s13181-018-0688-y
- Slide 8. Ground Water and Drinking Water, National Primary Drinking Water Regulations: Inorganic Chemicals (2009). Washington, D.C.; United States Environmental Protection Agency, Office of Ground Water and Drinking Water.
- Slide 8. Division of Water Resources, Classifications and Water Quality Standards Applicable to Surface Waters and Wetlands of North Carolina25–25 (2019). Raleigh, NC.
- Slide 10. D7511-12 Standard Test Method for Total Cyanide by Segmented Flow Injection Analysis, In-Line Ultraviolet Digestion and Amperometric Detection, ASTM International.
- Slide 10. O'Dell, J. W. (1996). Determination of total cyanide by semi-automated colorimetry. *Methods for the Determination of Metals in Environmental Samples*, 418–433. https://doi.org/10.1016/b978-0-8155-1398-8.50023-9
- Slide 11. Method OIA-1677-09 Available Cyanide by Flow Injection, Ligand Exchange, and Amperometry, EPA-821-R-99-013; U.S. Environmental Protection Agency, August 1999.
- Slide 11. D6888-04 Standard Test Method for Available Cyanide with Ligand Displacement and Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection, ASTM International.
- Slide 12. D7237-15 Standard Test Method for Aquatic Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection, ASTM International.
- Slide 12. D4282-15 Standard Test Method for Determination of Free Cyanide in Water and Wastewater by Microdiffusion, ASTM International.
- Slide 13. D7365 Standard Practice for Sampling, Preservation and Mitigating Interferences in Water Samples for Analysis of Cyanide, ASTM International.

Fluoride Overview

UNC
GILLINGS SCHOOL OF
GLOBAL PUBLIC HEALTH

Industrial Sources of Fluoride



Other Sources of Daily Fluoride

- Food
- Drinking water
  - NC regulated drinking water target level: 0.7 mg/L
- Dental Products
- Medications
- Dietary Supplements

F^-

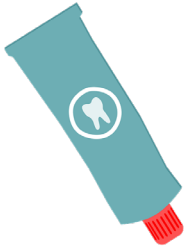
Fluoride Toxicity for Daily Intake

Daily Adequate Intakes for Fluoride

* AI: intake that ensures adequate nutritional value

Age	Male	Female
9-13 years	2 mg	2 mg
14-18 years	3 mg	3 mg
19+ years	4 mg	3 mg

Estimated amount ingested from toothpaste: 0.1 mg for adults



Long-term exposure to fluoride levels higher than 4.0 mg/L in drinking water can cause skeletal fluorosis. **Long-term exposure** to fluoride levels higher than 2.0 mg/L can cause dental fluorosis.

To experience **acute** fluoride poisoning, an adult male would have to drink approx 1520 glasses of water in one sitting, and an adult female would have to drink 1220 glasses of water.

Fluoride Regulation

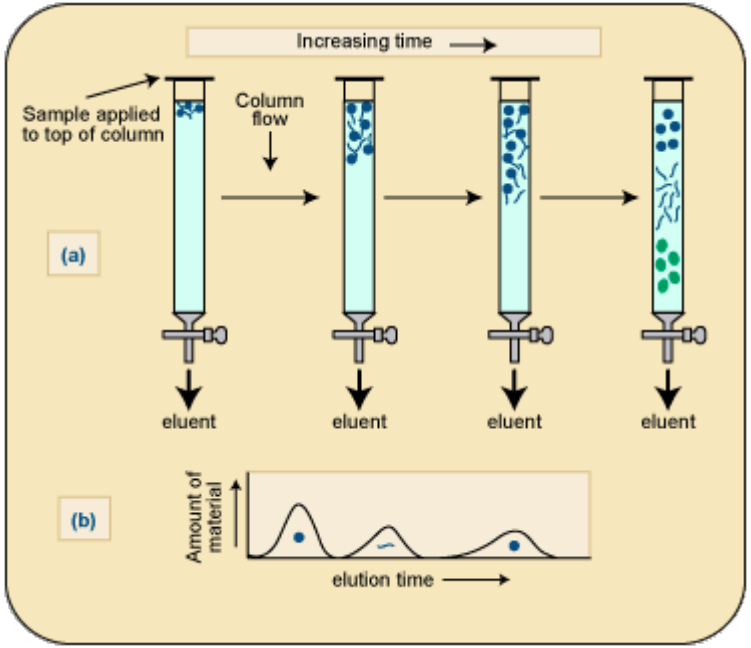
NCDEQ Surface Water Quality Standards: 1.8 mg/L

EPA MCL (Maximum Contaminant Level): 4.0 mg/L

Method for Measuring Fluoride: EPA Method 300.1

- Method Detection Limit (MDL): 0.01 mg/L
  - This is the minimum concentration of the target fluoride that can be measured, identified, and reported with a 99% confidence that the concentration of the fluoride is greater than 0.
- Last revised in 1997
- Utilizes ion chromatography

Ion Chromatography



In this method:

- Ions are separated by charge
- The column “holds” different ions for different lengths of time
- The time it takes for the ion to leave the column is the elution time which is then shown as a peak on the chromatogram.
- Interferences:
  - Substances with similar properties which lead to similar retention times
  - Any anion not retained by the column (or retained slightly) interferes with the elution of fluoride
  - Low molecular weight organic acids are conductive and will coelute with or near fluoride

NPDES Permit Questions from Badin Community & DWR Responses

1. **How does DWR make decisions about when to cite ABBP for a violation when it exceeds effluent limitations in its current NPDES Permit?**
    - **All violations are evaluated in accordance with current Division and Departmental policy and guidelines**
    - **Division and Departmental compliance/enforcement goal is to consistently apply current policies and guidelines across all programs and Regions**
    - **All violations are evaluated independently**

    How do the PQL and MDL influence those decisions?
    - **PQL stands for practical quantitation limit. Simply put, this is the lowest level at which the method can confidently discern between two different values. This is the level at which there is confidence in reporting results;**
    - **For parameters that have a PQL and/or compliance level that is higher than a permit limit, compliance is based on the PQL and/or compliance level. For Cyanide, per EPA approval, the PQL is 10ug/l and all values below 10ug/l are considered compliant, even if a permit limit is less than 10ug/l.**

2. **Why is Alcoa allowed to use a testing method for cyanide that does not detect to the standard of 5 micrograms/L and report the level as less than 6 micrograms/L? EPA has approved a PQL for compliance purposes of 10ug/l.**

3. **When cited for a violation, how does DWR determine the amount of fines levied? What criteria is use in assessing fines? For monthly effluent monitoring/reporting violations, DWR utilizes a set of criteria to establish a base penalty amount. In addition to an initial base penalty, DWR utilizes eight (8) case assessment factors, required by the NC General Statutes, that may increase the penalty amount above the base penalty. These eight (8) case assessment factors include: (1) was there any documented harm to natural resources; (2) was there any documented harm to surface waters; (3) what was the gravity and duration of the violation; (4) was there any**

associated cost of rectifying documented damage/harm; (5) was any money saved by non-compliance; (6) was the violation willful or intentional; (7) history of compliance; and (8) cost to the State of the enforcement proceedings.

4. Why is ABBP allowed to count only one sample per month as a monthly average? The permit requires a monitoring frequency of once per month. Would it be more representative to require them to sample more frequently during the month every month, not just when they are seeking to lower the average when they have a measurement above the effluent limitation? Monitoring frequencies are developed in accordance with rules/regulations. However, the rules/regulations do not preclude additional monitoring if the permittee decides to conduct such additional monitoring. All monitoring must be reported, whether it be required monitoring or elective additional monitoring.

5. Why is ABBP allowed to report a result of less than 6 micrograms/L as zero, when calculating monthly averages? Values reported as less than PQL are calculated at 0 when calculating averages (weekly or monthly). This is applicable to all parameters, including Cyanide. (The only exception is fecal coliform which utilizes a geometric mean as an average and values then are calculated using 1 instead of 0).

6. Is it reasonable to require more frequent sampling in future permits given ABBP's history of noncompliance? Future permit considerations require a completed application and historical data review.

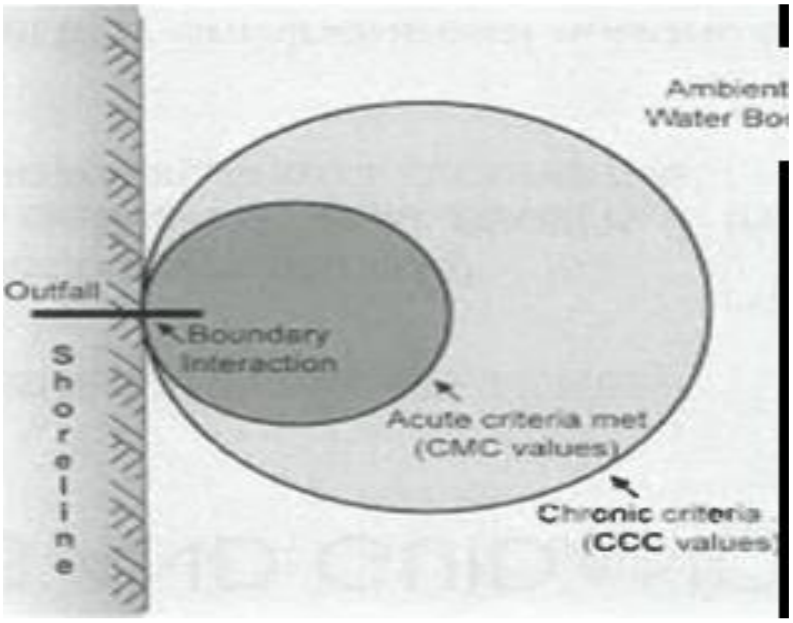
7. Considering the range of hazardous constituents in smelting waste, what process is used to determine what constituents ABBP should be monitoring at the different outfalls? Future permit considerations require a completed application and historical data review.

8. How does/will DWR assess whether or not to establish monitoring requirements and effluent limitations for aluminum, polyaromatic

hydrocarbons and PCBs, and other hazardous constituents currently not included in the permit? See #7 and 8.

9.

10. **How do regulatory mixing zones work and is it appropriate to use the regulatory mixing zone at Outfall 12, which is in a small cove? A regulatory mixing zone is a limited area of volume of water where initial dilution of a discharge takes place and does not have to meet specified water quality standards. The Clean Water Act does not require all criteria be met at the exact point where pollutants are discharged. Mixing zones are allowed with the idea that the area is as minimal in size as possible and meets all rules and statutes pursuant to their sizing and placement. In North Carolina, mixing zones are allowed as long as they don't: (1) result in acute toxicity to aquatic life, (2) result in offensive conditions, (3) produce undesirable aquatic life or result in a dominance of nuisance species outside of the assigned mixing zone; or (4) endanger the public health or welfare. There can be two types of mixing zones: 1) acute, and 2) chronic. In the acute mixing zone neither acute or chronic standards is met. In the chronic mixing zone, the acute standard is met, but the chronic is not.**



11. **Outfall 13 discharges directly into the public swimming area and has had exceedances of cyanide. Is it safe to have an Outfall discharging cyanide at a level right into a swimming area? Permit limits are set to protect aquatic life and/or human health. Public swimming falls within the jurisdiction of the Department of Health and Human Services (DHHS). DHHS is responsible for issuing public health warnings and/or a swim advisory.**

12. **Would it be possible for DWR to require independent, third party instream/in-lake monitoring for cyanide, fluoride and aluminum? The DWR Water Sciences Section conducts lake monitoring studies as deemed appropriate.**

13. **Can DWR monitoring Lake Badin, Falls Reservoir and Lake Tillery annually for cyanide, fluoride and aluminum.? The DWR's Water Sciences Section can consider conducting annual monitoring for cyanide, fluoride and aluminum. This consideration is based upon current staffing and laboratory resources.**