Thank you to our Patrons







Environmental Consultants and Contractors















We will begin our presentation in a few minutes...



Thank you to DSWA for sponsoring this event





The Delaware Solid Waste Authority (DSWA) was created in 1975 by the State of Delaware to manage solid waste for the entire state. Our mission is to "Define, develop and implement cost-effective plans and programs for solid waste management, which best serve Delaware and protect our public health and environment". Currently we manage over 1 million tons per year of waste and recyclables at our facilities which include a single-stream Material Recovery Facility, a Construction and Demolition Processing Facility, a Household Hazardous Waste Program, a battery recycling program, three Transfer Stations, five rural waste drop-off stations and three stateof-the-art Landfills.



Leadership and Excellence in Environmental Engineering and Science





Samik Bagchi, Ph.D., BCES Director of Innovation Digested Organics AAEES Board Certified Environmental Scientist with a specialty in Environmental Microbiology



Leadership and Excellence in Environmental Engineering and Science



Innovative membrane-based approach for highstrength industrial wastewater reuse

Samik Bagchi, Ph.D. BCES Director of Innovation





Industrial Wastewater

- ~ 800,000 GPD
- 1.5% Total Solids (TS)
- ~30,000 mg/L of Chemical Oxygen Demand (COD)
- pH 4.5



Why Zero Liquid Discharge (ZLD)?



How to make it a ZLD?



Dewatering



Dissolved Air Floatation (DAF)



Centrifuge

- Need polymer
- Poor Dewatering

Pre-treatment

• Expensive!



Stainless Steel Ultrafiltration

Self-Cleaning Screens





Superfiltration (SF)!

- 500-3,500 Daltons
- pore size 1.0 1.2 nm



A New Material Chemistry

- Zwitterionic co-polymer chemistry
- Low fouling
- Handle organic compound



SF Pilot Testing



SF Performance



SF Concentrate





Sub-Induction Time Reverse Osmosis[™] (SIT-RO)





SIT-RO Performance



Repeat batch RO processing reduces fouling and energy use

SIT-RO Performance



Parameters	Units	SIT RO Permeate
Total solids	%	0.01
Chemical oxygen demand (COD)	mg/L	880
Biochemical oxygen demand (BOD)	mg/L	426
Organic nitrogen	mg/L	10.3
рН	S.U.	3.16

Polishing RO











Take Home

- ~ 800,000 GPD of Industrial Wastewater
- > 80 % of it recovered as clean water for reuse
- Dry product would be sold as animal feed
- Skids under construction
- Would be operational in 2023





Reclaim Your Waste[™]

USA Offices: Plymouth, Michigan Middleton, Wisconsin







For more information, please contact: **Bobby Levine** |+1 847-707-8433 <u>robert.levine@digestedorganics.com</u>

http://www.digestedorganics.com



Q and **A**

If you have a question, just click on the Q and A icon on the bottom of the screen and type it in there.



Leadership and Excellence in Environmental Engineering and Science





Rosaleen B. Nogle, P.E., BCEE, CFM *Principal Sanitary Engineer* Buffalo Sewer Authority

AAEES Board Certified Environmental Engineer with a specialty in Water Supply and Wastewater.



Leadership and Excellence in Environmental Engineering and Science

Getting Creative with Engineering Management:

Why change is needed in engineering management; questions to ask to challenge the way we have always done things; potential solutions.

Who Am I?

- Principal Sanitary Engineer
- Buffalo Sewer Authority
- PE, BCEE, etc...



The generations defined



What do generational groups mean?

PEW RESEARCH CENTER

Births underlying each generation

Number of U.S. births by year and generation



Source: U.S. Department of Health and Human Services National Center for Health Statistics.

PEW RESEARCH CENTER

- Retirements
- Replacement
- COVID
- Experience

Need to diversify who gets hired Women and other underrepresented genders

Ethnic and racial minorities

Foreign born

Old model

- Drafting
- Surveying
- Calculations
- Design
- Reports



Date	Page	Division	Comments	Total length of section in contract	Amount completed to date	amount completed this week
			1. (8'2" horseshoe monolithic) COMPLETED			
			Repairing finishing and rubbing arch and invert			
12/20/1973	4411	.1	Overflow chamber at Masten and Northland Aves completed.	1598	1625	
			2. Shaft #1 (8'6" horseshoe monolithic) Shaft is now closed			
12/20/1973	4411	.1	This tunnel is now in the 11' hourseshoe monolithic section Progress shown under shaft #2	1748		
12/20/1973	4411	.1	arch concreted		1726.7	
12/20/1973	4411	.1	invert concreted		1726.7	
12/20/1973	4411	1	Scaiaguda Creek Inlet		one half completed. Erecting forms and	
12,20,1575			2. K-lill Ca M(Dalawar Ave and and and a filing and Ave) (a sticl so do		concreting	
12/20/1973	4411	1	s. Kallil CO W Delavan Ave east and west of Linwood Ave (partial rock section) (Circular shaft at Sta 33+24) - shaft now backfilled			
12/20/1973	4411		invert & arch concreted			
			4. shaft #2 (11' horseshoe, monolithic) Pumping pea gravel (earth section)			
12/20/1973	4411	.1	Grouting	3930		
12/20/1973	4411	.1	Concreting arch (11' horseshoe monolithic)			
12/20/1973	4411	.1	arch concreted		3896.5	
12/20/1973	4411	.1	invert concreted		3900.53	
			96" precast concrete pipe in Harvard PI -			
			Excavating at Harvard PI & Lafayette Ave			
			Driving steel sheet piling Opening top of sanitary sewers in Harvard PI & Lafavette Ave			
12/20/1973	4411	.1	Placing steel flume	509	455	

Problem

- Not enough engineers to do it
- Engineers cost too much to do it
- We are not great at everything

Multi-disciplinary Team

- GIS Specialists
- Clerks
- Grant Management Specialists
- Planners



Lowering the Bar?

- Skills critical
- Grants and strings
 - BIL
 - ARP
 - IRA
- But engineers not best at them



Little kids playing soccer



Professional Soccer


What skills do we need?

1

What work do we actually need to get done?

Who do we have on our team?

- Skills
- Knowledge
- Abilities
- Hobbies?
- Other Background Info?



What skills are we missing?





How do we pass the ball?

- Taking the pressure off?
- Ensuring consistency?
- Keep moving?

Success?



Five engineers, one LA 2019

- Two engineers; three GIS Specialists 2023
- Still gaps to fill
- Iterative process
- Need to look at job titles





GIS and Webpage being maintained



Stormwater permit work accelerated



Other tasks moving

My workload

- Engineering
- Management
- Web Design
- GIS App Development
- Grant Management?



Engineers

- Cost too much
- Are in too high demand
- Doing things that we are not good at

Solution

- Identify workload
- Lower paid supplemental titles
- Contract out to specialists
- Ensure transition



Q and **A**

If you have a question, just click on the Q and A icon on the bottom of the screen and type it in there.



Leadership and Excellence in Environmental Engineering and Science





Abhishek RoyChowdhury, Ph.D.

Assistant Professor, Environmental Science & Natural Resources Navajo Technical University AAEES Member



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Decade long water issues, spread of the COVID-19 pandemic, and the road forward: An untold story from the Navajo Nation

Abhishek RoyChowdhury, Ph.D. Assistant Professor, Environmental Science & Natural Resources Navajo Technical University





The Navajo Nation













Water scarcity on the Navajo Nation-Natural Causes





D0: Abnormally Dry; D1: Moderate Drought; D2: Severe Drought; D3: Extreme Drought; and D4: Exceptional Drought. (Source: The National Drought Mitigation Center, University of Nebraska-Lincoln, 2021)





Navajo Nation COVID-19 map. Darkest areas have higher COVID-19 cases



Esri, USGS | Esri, HERE, Garmin, SafeGraph, FAO, METL/NASA, USGS, Bureau of Land Management, EPA, NPS

Esri, HERE, Garmin, FAO, NOAA, USGS, Bureau of Land Management, EPA, NPS



Legend

- State Line
 - Navajo Chapter
- // Major Roadway
- Home without Access to Safe Drinking Water and/or Basic Sanitation *
- Former Bennett Freeze Home Potentially not Connected to a Public Water System (PWS) **
- Structure within 1 Mile of Abandoned Uranium Mines (potential homes without connection to a PWS) **

- EPA Sampled Well
- CDC Sampled Well
- Regulated Safe Drinking Water Hauling Point
- Unregulated Livestock Watering Point
- Navajo Tribal Utility Authority Existing Pressurized Water Main
- Proposed Western Navajo Pipeline Project
- Proposed Navajo-Gallup Water Supply Project



- Proposed Leupp-Dilcon Water Supply Project
- Proposed Ganado Groundwater Supply Project
- Proposed Farmington-Shiprock Water Supply Project
- Proposed Shiprock to Sweetwater Pipeline Project

* This map does not represent all the known homes lacking access to safe drinking water or basic santation in the IHS database. These are only those that had sufficient information to be mapped at the time of this study.
** Former Bennett Freeze homes, and Structures within 1 mile of Abandoned Uranium Mines were sorted to Identify potential homes without access to safe drinking water and/or basic santation.



Miles

10



Navajo Nation: Homes without Access to Basic Sanitation Facilities



Water Scarcity on Navajo Nation







Navajo Population: Pre-existing Health Issues



Leading causes of death by cancer site among the Navajo, counts of deaths 2005-2013, all ages Source: The Navajo Epidemiology Center





RESTÓRE

Restoring vital water on the Navajo Nation.

WPP NTU-NMT Navajo Nation

Water Purification Project



www.navajotech.edu/Restore



NTU-NMT Navajo Nation Water Purification Project (N⁴WPP)

www.navajotech.edu/restore

Hollow fiber membrane-based direct contact membrane distillation (DCMD) process









Basic principle of DCMD processes.

Schematic drawing of Janus hollow fiber membrane (J-HFM) for DCMD.

Preliminary Results- Lab Study





Desalination performance of the Janus HFM DCMD process



AMERICAN CADEMY OF ENVIRONMENTAL ENGINEERS & SCIENTISTS®



Water Filtration Unit Ready for Operational Testing



Student Training





We are working with the communities





IONATHAN NEZ. PRESIDENT MYRON LIZER VICE PRESIDENT

LAKE VALLEY CHAPTER

Mark Freeland, Council Delegate | Tony Padilla, President | Edison Tso, Vice President | Betty S. Dennison, Secretary/Treasurer Janice Padilla, Land Board | Lucinda Begay, Community Services Coordinator | Accounts Maintenance Specialist - Vacant

LVC-APR24-029

RESOLUTION OF LAKE VALLEY CHAPTER

SUPPORTING THE INVESTIGATION OF WATER QUALITY AND PERFORM SITE EVALUATIONS FOR INSTALLATION OF A WATER FILTRATION UNIT WITHIN LAKE VALLEY CHAPTER.

WHEREAS

- 1 Lake Valley Dhapter is a certified Navajo Nation Chapter Government, which was created pursuant to the Navajo Nation Council Resolution No. C-125-55, is delegated governmental authority with respect to local matters consistent with Navaja laws, including customs, traditions, and fiscal matters, and
- 2. Lake Valley Chapter is empowered by the Navajo Nation Council to review all matters affecting the community to make favorable decisions in the best interest for the general health, safety and welfare of chapter membership through implementation solutions for economic development, cultural preservation, recreation, solid waste management, elderly care, quality housing, public safety; read maintenance; educational support for community students; and
- 3 Lake Yalloy Chapter communities understand that in pursuant to the Navajo Nation Code (NNC) Title 26, Local Governance Act, which allows chapters to make decisions over local matters. This authority in the long run all imprave community decision-making by allowing committees to excel and flourish, enable Navajo leaders to lead feward a prosperous future, and improve the strength and sovereignty of the Navajo Nation; through adaption of this Act, chapters are compelled to govern with responsibility and accountability to the local citizens; and
- 4 Lake Velley Chapter community met on April 15, 2022 Planning Neeting to discuss and plan upcoming business items to be place on the agenda which Darlene Wilson, student at NTU (Dual Major-Biology/Environmental Science) provided information to conduct the whole water system tasting for Lake Valley Chapter; that the goal is to provide education to the community about drinking safe water and the main focus is one windmill located east of LVC acress the road. She also provided a resolution template for approval to do water testing at Lake Valley Chapter community for the Regular Chapter Meeting, and
- Lake Valley Chapter is aware that poor water quality has limited the use of some of its wells, acknowledges the need for additional water quality testing and 5 site assessments to determine the best treatment options for these impacted wells; and
- Lake Yolley Chapter furthermore acknowledges that the NSWPP (Navaja Tach-Naw Mexico Tech-Navaja Nation Water Purification Project) team has expressed interest in aiding the Chapter in documenting water quality and filtering one well if possible; and
- Lake Velley Chapter acknowledges that the research is free to the Chapter, but the extent of sampling will be limited by project funds; and with this 2 understanding, Lake Valley Chapter adopted Resolution No. LVC-APR24-029 on April 24, 2022 to support its request to install water filtration unit for testing which is the best interest of community people within Lake Valley Chapter.

NOW THEREFORE BE IT RESOLVED THAT:

Lake Vallay Chapter of the Navajo Nation hereby approves to support the Investigation of Water Quality and Perform Site Evaluations for Installation of a Water Filtration Unit within Lake Valley Chapter.

CERTIFICATION

WE HEREBY CERTIFY that the foregoing resolution was duly considered by the Lake Valley Chapter at a duly called chapter meeting at Lake Valley (New Mexico) Navajo Nation, at which a quorum was present and that same was passed by a vote of ten (10) in favors, zoro (0) opposed and three (3) abstained on this 24th day of April 2022. Motion by: Larry Montoya; and second by: Stella Valdez,

Mr. Mark Freeland, Council Deleo



Chapter Resolution











Q and **A**

If you have a question, just click on the Q and A icon on the bottom of the screen and type it in there.



Leadership and Excellence in Environmental Engineering and Science

A Voice for Biosolids





Maile Lono-Batura, BCES, MNPL Director of Sustainable Biosolids Programs Water Environment Federation AAEES Board Certified Environmental Scientist with a specialty in Sustainable Science.



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A Voice for Biosolids: Telling Our Story





Why Biosolids?





Image: Kitsap Sun



Grand Challenge





Image: King County Wastewater
Grand Challenge





Enter the Clean Water Act





Research-Based Regulations







Current Opinion in Environmental Science & Health

Municipal biosolids — A resource for sustainable communities Sally Brown¹, James A. Ippolito², Lakhwinder S. Hundal³ and Nicholas T. Basta⁴



The Clean Water Act and biosolids: A 45-year chronological review of biosolids land application research in Colorado

James A. Ippolito 💿 | Ken A. Barbarick

The Original - Pollution Control Centers





Recovered Resources









What We Know





What We Know





What We Know





What We ALSO Know





The Narrative - Internal





Biosolids Are Unique





Unique Approach





Engagement Examples





HEADLINES

Market alignment with products & messaging



STEELN FRENAN













Massive Poo emoji greets New Yorkers in East River for February 22, 2022 Day

Engagement Examples





London Is nost to the Royal Family, Thames River, London Loo Tours, and a creature of gigantic proportions beneath the city - a 130-ton fatberg slopped together from grease and wipes. Encountered in 2017 and estimated to possibly be the largest on record. A crew harnessing fatberg blasters, had to work around the clock to de-chunk it bit by bit.

WHAT SECRET WEAPON WOULD YOU WIELD TO BLAST THE FATBERG?

FUN FECAL FACT

LET'S GET PERSONAL

When you flush, computing your daily or annual contribution of the recovered poo pie is not likely on your radar. That is unless you are part of an elite audience seeking to lift the lid to understand the the power beyond the flush.

A few facts on annual production to stash in your back pocket: U.S. total = 5.823 million dry metric tons You = 37 lbs average per person

Flusher Engagement – Our Story





https://yearofpoo.org



https://www.viewpointproject.com/ptv-segments-biosolids/

New Challenge Opportunity





Power Beyond the Flush







Q and **A**

If you have a question, just click on the Q and A icon on the bottom of the screen and type it in there.



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AMERICAN

Need a PDH Certificate?

You will be emailed a PDH Certificate for attending this webinar within the next week.

Questions?

Email Marisa Waterman at <u>mwaterman@aaees.org</u> with any questions you may have.



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