Jordan Sub-TAG Biosolids

NC Division of Water Resources

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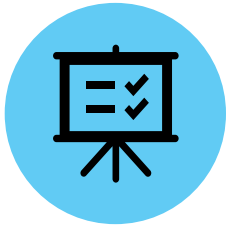
Thank you	Thank you for joining Biosolids Sub-Technical Advisory Group for the Jordan Rule Readoption process.
Introduce	Please introduce yourself – name and affiliation.
Open	Open the document emailed. We will be primarily answering questions today after review of current biosolid regulatory program.



Purpose of today's Biosolid Sub-TAGs: discuss biosolid land application and management in Jordan Watershed to inform the Jordan Watershed Rule Readoption process.

Stakeholders have expressed interest in learning more about biosolid management and how land application ***may impact nutrient loading***. The presentation aims to clarify how biosolids are currently regulated. I will provide a short poll at the end of the meeting.

Previous TAGs: Wastewater TAG April 2024, Agriculture TAG June 2024

Next TAGs: Wastewater TAG late October, Agriculture mid November

NC DWR Non-Discharge Branch

The Non-Discharge Branch is responsible for the **permitting and compliance of residual and wastewater effluent land application facilities.** The Branch is also responsible for permitting facilities for the beneficial use of reclaimed water for the purpose of conserving the state's potable water, surface water, and groundwater resources.

Regulations found on the DEQ Non-Discharge website.

- Types of Non-Discharge Permits:
    - Wastewater Irrigation
    - Single-Family Residence Wastewater Irrigation
    - High-Rate Infiltration
    - Other Wastewater
    - Closed-Loop Recycle
    - Reclaimed Water
    - **Residuals Management -** Byproducts of wastewater treatment

Residuals vs. Biosolids

- Federal and State rules operate independently (40 CFR Part 503 vs. 15A NCAC 02T .1100)
  - 02T .1100 rules borrow heavily from the Part 503 rules, but not always the same.
  - Regulated communities must comply with both
- North Carolina regulates the disposal of "residuals" in 02T .1100
  - Byproduct waste from wastewater, water treatment plant, and air pollution control facilities
- "Biosolids" are federally regulated via the Part 503 rules:
  - Regulates final use and disposal of byproduct waste generated during biological treatment of domestic wastewater (sewage sludge/biosolids) and septage
  - Does not include drinking water residuals and industrial residuals covered in 02T

- "Biosolids" is not used in our rules
- **Sewage sludge/biosolids are just one type of residual we permit in our program, w**

Type of biosolid land application permits

ND permits two types of residuals, **Class A and Class B**.

- **Class A residuals** are **treated to a higher quality**,
  - More stringent pathogen and vector requirements, and heavy metal limits.
  - Distribution is the final disposal method, meaning they can be distributed to third-parties and **the permit holder is not always the end user**.
    - Land application is the end use, but the final disposal area is not always known.
  - The recipient of Class A residuals must be recorded, and the recipients must be notified of application limitations.
- **Class B residuals** are not treated to such a high quality as Class A, but still must meet state and federal requirements before land application can occur.
  - **Land application is the final disposal method**, and all land application fields are permitted through DWR.
  - Class B residuals also have more stringent setbacks and land application limitations, monitoring of land application events, as well as public access and livestock grazing restrictions.

DWR recording and oversight

- All residual permits must **submit annual reports** detailing activities of the previous calendar year.
- **Annual reports include biosolids analysis for hazardous waste characteristics, nutrient and metal concentrations. Pathogen and vector reduction documentation must be provided.**
- Class B permit annual reports also require metals, nitrogen, and phosphorus loadings, and soil sampling for each field land applied during calendar year.
- Annual reports are inspected by DWR Regional Office staff – with specific review of PAN and metal testing.

CLASS A ANNUAL DISTRIBUTION AND MARKETING/ SURFACE DISPOSAL CERTIFICATION AND SUMMARY FORM

WQ PERMIT #: _____ **FACILITY NAME:** _____

PHONE: _____ **COUNTY:** _____ **OPERATOR:** _____

FACILITY TYPE (please check one): ☐ **Surface Disposal (complete Part A (Source(s) and "Residual In" Volume only) and Part C)**

☐ **Distribution and Marketing (complete Parts A, B, and C)**

Was the facility in operation during the past calendar year? **Yes** ☐ **No** ☐ → **If No skip parts A, B, C and certify form below**

Part A*:					**Part B*:**		
Month	**Sources(s) (include NPDES # if applicable)**	**Volume (dry tons)**			**Recipient Information**		
		Amendment/ Bulking Agent	Residual In	Product Out	Name(s)	Volume (dry tons)	Intended use(s)
January							
February							
March							
April							
May							
June							
July							
August							
September							
October							
November							
December							
	Total from FORM DMSDF (sup)						
Totals:	**Annual (dry tons):**						
Amendment(s) used:			Bulking Agent(s) used:				

ANNUAL LAND APPLICATION FIELD SUMMARY FORM

PLEASE MAKE A COPY OF THIS BLANK FORM TO BE COMPLETED AND SUBMITTED FOR EACH FIELD APPLIED ON

PLACE A "N/A" IN A BLANK OR BOX WHEN NOT APPLICABLE.

Facility Name: _____ **WQ Permit #:** _____ **Field #:** _____ **Acres Utilized:** _____

Land Owner: _____ **Annual Dry Tons Applied:** _____ **Site #:** _____ **Acres Permitted:** _____

Operator: _____ **Predominant Soil Series:** _____ **Cation Exchange Capacity (non 503):** _____

Crop 1 Name: _____ **Crop 1 Max. PAN:** _____ **Crop 2 Name:** _____ **Crop 2 Max. PAN:** _____

Date Mon	Volume applied **(enter one)** Solids/ Liquid		% Solids	Volume Applied per Acre	Residual Sources (NPDES #, WQ#, Fert., Animal Waste, etc)	Soil Cond. (Dry, Wet, Moist)	Precip. Past 24 Hrs.	Meets <	Meets <	Meets <	TKN	Nitrate >	Nitrate and Nitrite	PAN Applied (lbs/acre)		Name of Crop Type Receiving Residual Application	
	Cu. Yds	Gallons		(Dry Tons/Ac)			inches				mg/kg	mg/kg	mg/kg	Crop 1	Crop 2	Crop 1	Crop 2
					Residuals Applications totals on FORM FSF supp (attach FORM FSF supp to this form):												
TOTALS:				As	Cd	Cu	Cr	Pb	Hg	Mo	Ni	Se	Zn	P			Lime Applied	
Annual lbs/acre																	Date	lbs/ac
Prior Years Cumulative lbs/ac																		
Current Cumulative lbs/ac																		
Permitted C. P. L. R.****																		
Permit PAN Limit 1st/2nd Crop																		

Pollutant (Metal)	Ceiling Concentration (mg/kg) Class A *and* B	Monthly Average (mg/kg) Class A	Cumulative Loadings (lbs/acre) Class B
Arsenic	75	41	36
Cadmium	85	39	34
Copper	4,300	1,500	1,338
Lead	840	300	267
Mercury	57	17	15
Molybdenum	75	n/a	n/a
Nickel	420	420	374
Selenium	100	100	89
Zinc	7,500	2,800	2,498

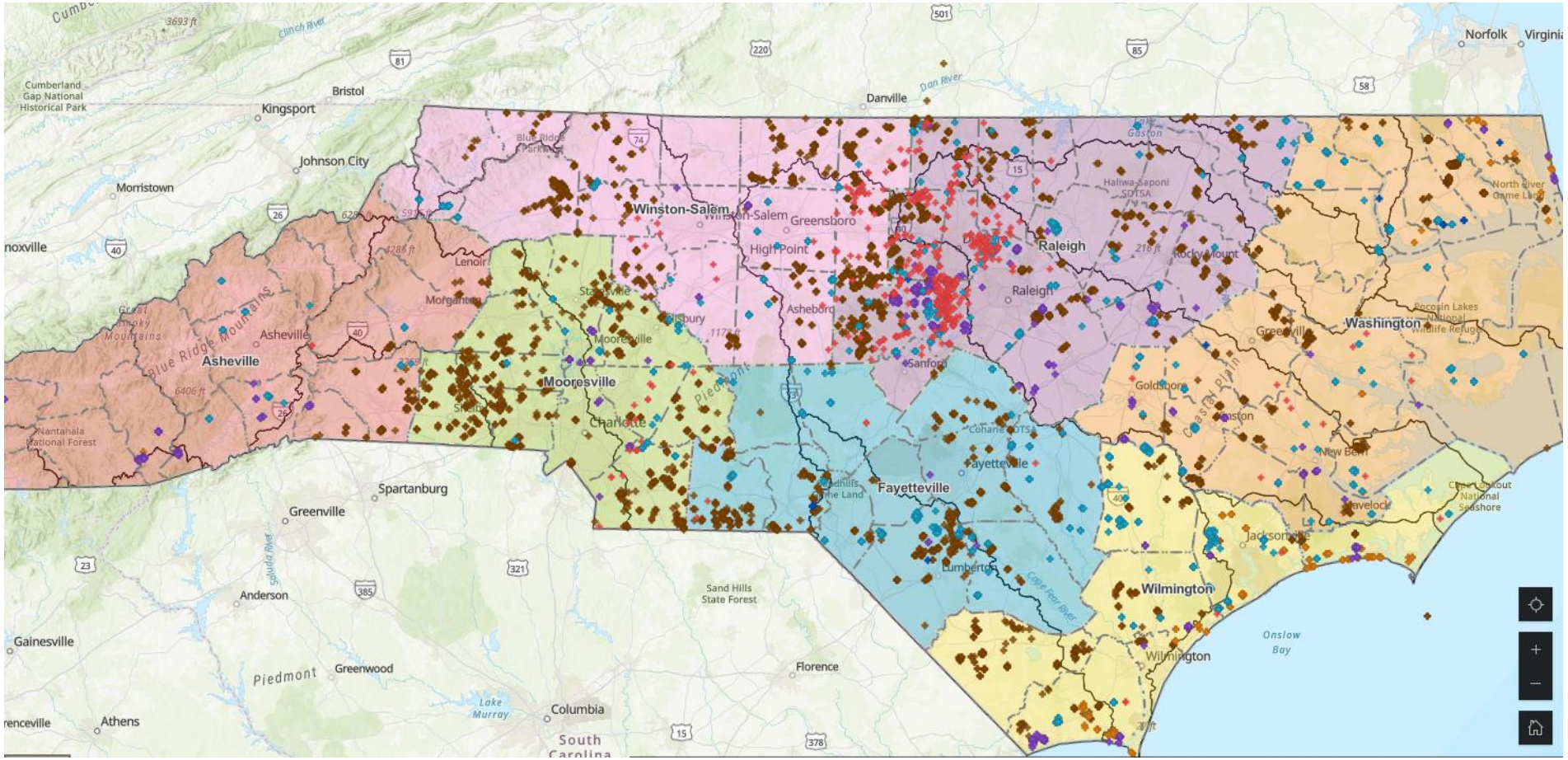
Soil Fertility Analysis

(Class B Only)

Acidity	Exchangeable Sodium Percentage	Phosphorus
Base Saturation (by calculation)	Magnesium	Potassium
Calcium	Manganese	Sodium
Cation Exchange Capacity (CEC)	Percent Humic Matter	Zinc
Copper	pH	

Permit Map

There is a permit facility map available online.



Biosolid land application

- Biosolids can be liquid, cake (>15% total solids), compost, or pellets depending on the treatment and/or dewatering processes.

Biosolid land application

- Class B land application rates are based on the intended crop nitrogen requirement for the permitted soil type of a specific field. Nitrogen requirements are most often based on the Realistic Yield Database published by NC State.
- Class B biosolid application rates must be reduced 25% if applied to pastures.
- For several reasons, **land applicators typically do not apply Class B biosolids to agronomic limits.** Liquid biosolids are hydraulicly limited as ponding and runoff from the application area is prohibited. Accessing a field after liquid biosolids are applied can also damage fields as large equipment is used for application. Cake biosolids are limited as they can prevent large equipment from entering fields until the biosolids are dried. This buffer also allows for any unusual circumstances, such as an abnormally high nutrient content, change of intended crop, or unknown outside nutrient sources.

Comments, Questions, Concerns

Select Jordan Municipal Biosolid Programs

City of Greensboro: https://www.greensboro-nc.gov/departments/water-resources/wastewater-system/treatment-process/wastewater-biosolids-disposal

- Greensboro primarily incinerates sludge in a fluidized bed incinerator. After several processes, the dewatered ash and sand mixture is hauled to the City's landfill for disposal.

City of Cary: https://www.carync.gov/services-publications/water-sewer/sewer/wastewater-treatment/biosolids-management-program

- Three wastewater treatment plants. All sludge is dried, pelletized, and sold to a third party. Most of the pellets are exported out of Jordan watershed.

Greensboro Incinerator, Source

Cary regional biosolids management facilities, Source

Select Jordan Municipal Biosolid Programs

Orange Water and Sewer Authority, OWASA: https://www.owasa.org/

- OWASA aims to liquid land apply 75 percent of what they produce and then the rest into a cake product and compost with a local facility.

City of Burlington: https://www.burlingtonnc.gov/545/Treatment-Plants

- South Burlington WWTP- 100% dewatered and sent to McGill Environmental; East Burlington WWTP – majority Class B land applied; in the Winter it is dewatered and sent to McGill Environmental; JD Mackintosh Water – Class A liquid land applied.
- The City of Burlington (WQ0000520) has the highest number of permitted field acres in the Haw River subbasin - 1,063 acres used for the land application of residual solids.

City of Durham: https://www.durhamnc.gov/1124/Wastewater-Treatment

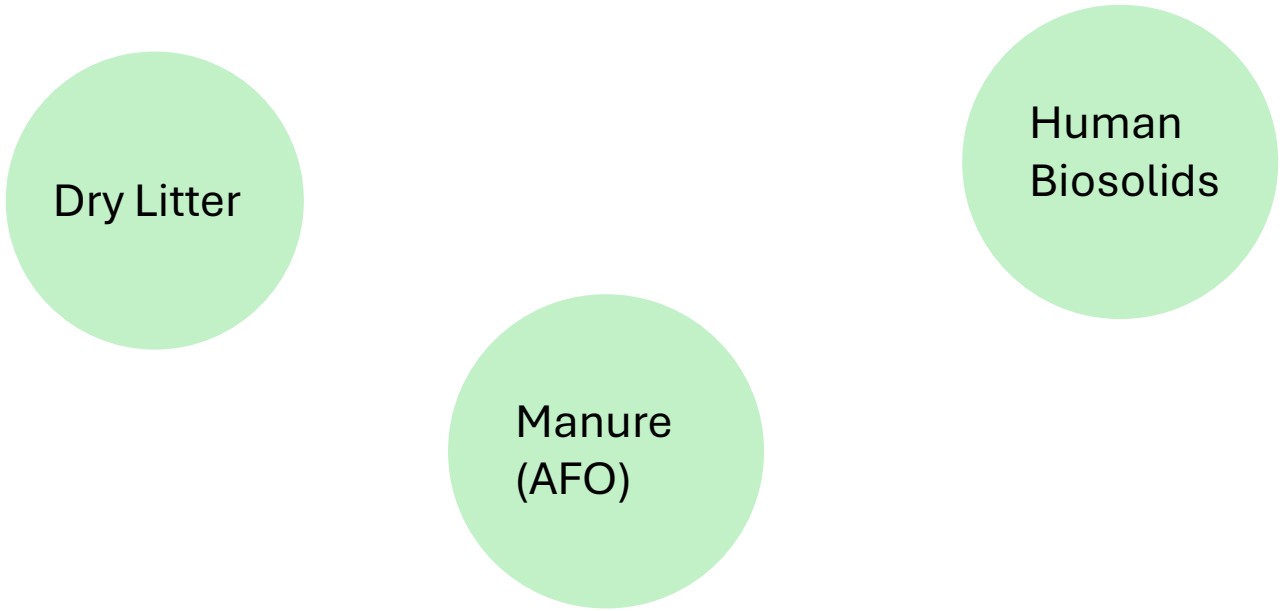
- Biosolids are applied to the fields of non-food crops grown by local farmers as a nutrient-rich soil amendment.

Comments, Questions, Concerns

Data limitations

Several studies point to organic land application as source of high soil P-I and potential ground and surface water degradation.

In Jordan, are biosolids contributing more to high soil P-I than other organic fertilizers that are land applied?



Data limitations

No soil test P-I in AFO reports, only required on-farm. No reports submitted from poultry dry litter land applications. Class A biosolid field P-I is not in the annual reports and Class B field P-I is in pdf annual reports. **Also, fields receiving Class B biosolids may be land applying other fertilizer types in the same growing season. Fields receiving Class B biosolids may also have legacy P from other fertilizer types.**

This data is not representative of all biosolid land application in Jordan. There are additional Class B Permit Annual Reports with administrative counties outside of Jordan importing biosolids for land application in Jordan. Original data may be found within NC DWR Laserfiche.

IF YOU KNOW OF BIOSOLID FIELDS THAT MAY BE CONTRIBUTING TO GROUND OR SURFACE WATER DEGREDATION, NOTIFY DWR!

<u>2023 Class B biosolids, originating from Jordan counties, Average P-I:</u>

- Chatham = 168.41
- Alamance = 155.75
- Caswell = 210.75
- Rockingham = 162.07
- Durham = 231.05 (City of Durham applied in Orange)
- Wake = 483.07 (outside Jordan)

All RLAP for Jordan Counties (P-I not pulled for 5 additional permits) -

- Orange – no data on P-I (WQ0001169 OWASA no land application in 2022 or 2023)
- Guilford – land application of biosolids from City Asheboro and one field zone from City Randleman
- Chatham – many field zones additional land application from City of Sanford and Synagro Western Piedmont Class B Residuals Program
- Wake – 5 field zone applications from GFI Class B Residuals Program

Quick stats on this ***subset*** of Class B Annual Report P-I data, for permit holders originating in Jordan Counties.

- 38% of the soil test samples without Wake Co had a P-I above 200 (51 field zones).
- 57% of soil test samples with Wake had a P-I above 200 (118 field zones).

NC Div of Agronomy Soil Sample Data for Jordan Counties, 2023, P-I (this does not include all soil samples in watershed and it does not report type of fertilizer applied)

- About 16% of soil samples had P-I above 200.
- 3% of the 3138 soil samples that are above P-I 200 might be related to this Class B biosolid land application (118/3138)

Osmond, D. L., & Neas, K. (2007). Delineating agriculture in the Lake Jordan River Basin. Final report to NCDENR, Division of Water Quality for USEPA 319 program, Raleigh, NC.

"Of the 74 fields to which animal waste was applied, 17 fields had soil test P levels of very high (>100 P index). Of these fields, 11 had P indices between 100 to 200. There were 2 fields in each of the three soil test categories: 200 to 300, 301 to 400, and >500. **Eight of the fields with soil tests of very high had biosolids applied representing 57% of the fields to which biosolids are applied, 7 fields had dairy waste applications (44% of the fields) and 2 fields had broiler litter (5%)."**

Table 17. Mean and Weighted Mean Soil Test P-Index by County.

County	Number of Fields	Soil Test P-Index			
		Minimum	Maximum	Weighted Mean	Mean
Alamance	120	1	559	78	60
Caswell	30	6	633	291	121
Chatham	44	9	103	30	28
Forsyth	9	5	120	50	41
Guilford	268	1	307	50	61
Orange	53	1	528	117	86
Randolph	10	29	178	44	50
Rockingham	67	5	223	94	78
Wake	11	30	152	80	87
Total	612	1	633	74	65

Anecdotal Evidence

Comments, Questions, Concerns

Data limitations

P-I 50 is recommended for crop needs. According to Div. Agronomy 2023 soil tests, about 54% of fields in Jordan Counties have a P-I above 50, 16% P-I above 200. Should all organic land application with P-I above x have a PLAT requirement, within nutrient sensitive watersheds? How start a P Drawdown Regime? (Continue discussion in next Ag TAG)

Can WWTPs be incentivized to make higher quality waste products, and would this improve biosolid management in Jordan Watershed?

Are their opportunities to reduce nutrients entering WWTPs?

(Continue discussion in WW TAG)

Short Poll: Please take 5 minutes now to complete the survey or can submit anytime in the next week.

LINK IN THE CHAT

https://forms.office.com/g/JYpHC2vTsg

I will wait 5 minutes while participants review the survey, and I can answer any questions.

Next TAGs: Wastewater and Agriculture TAGs in October and November – sending meeting poll shortly.

To Dos: Survey and email me any additional comments.

Thank you!

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Extras