Bio- Solids Composting Operations

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WWT Superintendent

LOS ALAMOS
Department of Public Utilities

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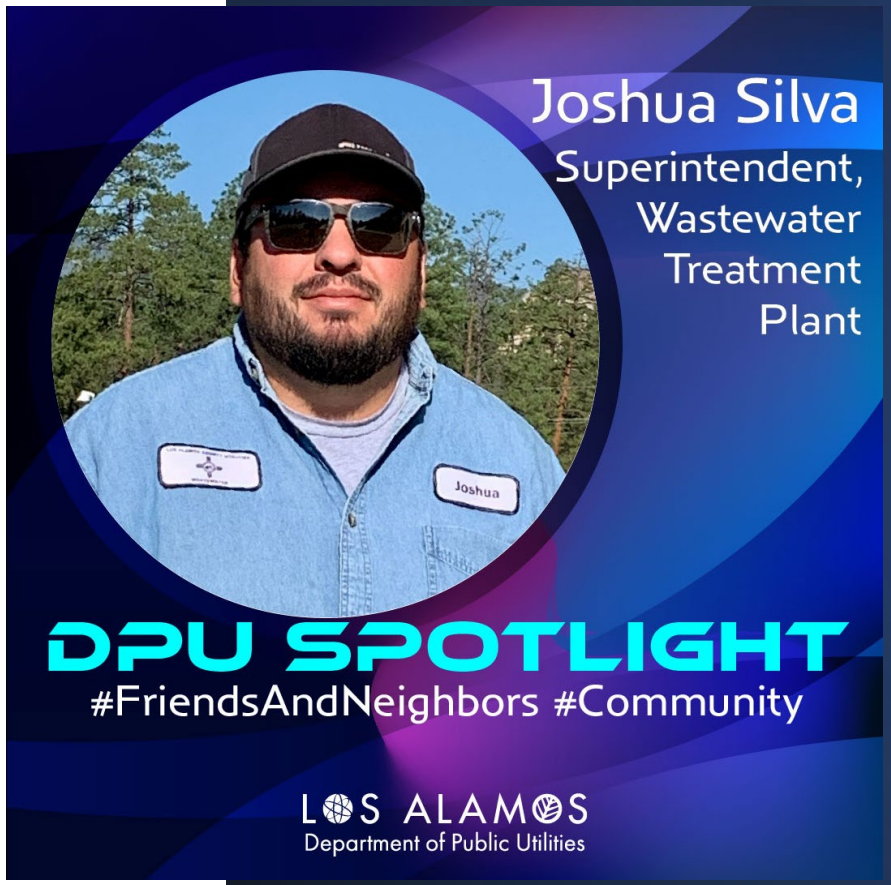
About Me

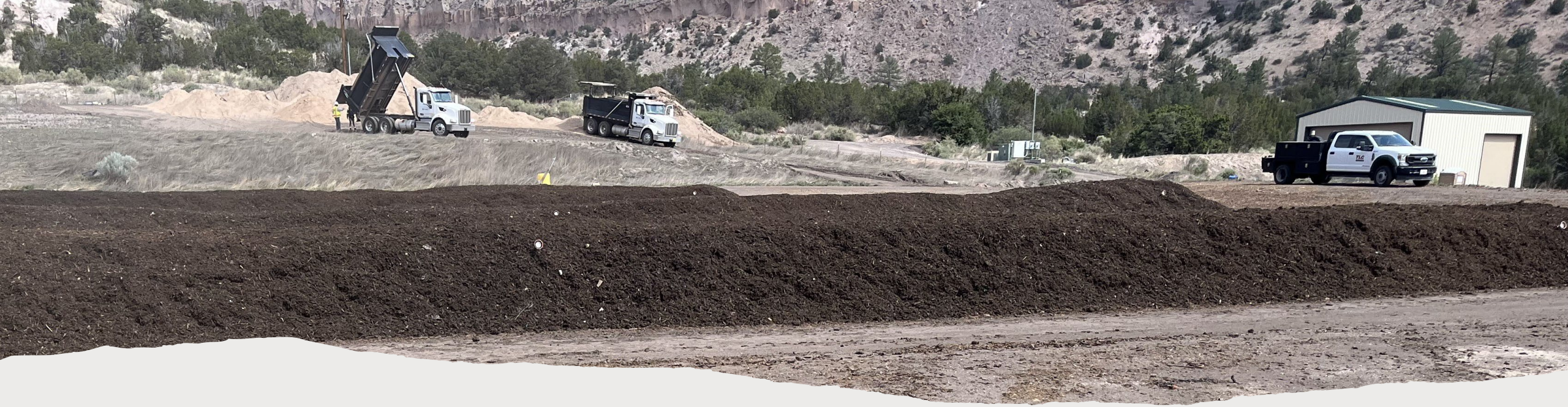
- My name is Joshua Silva I am currently the WWT Superintendent for the Department of Public Utilities
- Currently hold WW4 Certification and Compost Facility Operator Certification from NMED
- I have been in the Wastewater field for 11 years and with LAC for 8 of those
- I started at the Wastewater Treatment Plant for the City of Las Vegas NM in 2013 where I learned a lot of fundamentals of WWT and WW Collections
- I joined LAC in the fall of 2016 as a WW2 Operator and achieved a Composting Certification in 2017 as well as a WW4 in 2018
- I was promoted to WWT Supervisor in early 2019 and WWT Superintendent in April of 2023



What are bio solids and why compost them?

- Biosolids are a nutrient rich organic material that is generated from the treatment of wastewater and residential septage.

- 40 CFR Part 503 establishes requirements for the final use or disposal of sewage sludge [biosolids] when biosolids are: applied to land to condition the soil or fertilize crops or other vegetation grown in the soil; placed on a surface disposal site for final disposal; or fired in a biosolids incinerator



What is Compost?

- Composting is the natural process of recycling organic matter, in this case such as bio-solids, horse manure and wood chips. This is accomplished by mixing, and aerating to create a controlled environment suitable for bacteria to grow and thrive in-order to consume and break down the wastes.
- Anything that grows decomposes eventually, composting simply speeds up the process so that we can turn multiple wastes into a beneficial material for the citizens of Los Alamos County to grow grass, flowers etc.

Materials Used

Bio solids from WWTP

- Each year we process ~200 dry metric tons of bio solids from Los Alamos WWTP

Horse Manure

- Received by the Parks department at the North Mesa Stables horse manure gets included into our mix and ~450 tons are kept out of a landfill annually

Wood Mulch

- Grinded and hauled down from the Eco Station residential yard trimmings are turned into mulch and ~400 tons are composted annually

Process

Bio Solids (Sludge) is dewatered at WWTP and hauled to composting facility where it is then mixed with Horse manure (hauled down from the North Mesa stables) and mulch (grinded up at the Eco Station from residential yard trimmings)

Once all material is onsite it is combined and stacked into a long windrow then mixed with a Compost Turner (Scarab) so that the material is thoroughly mixed together.

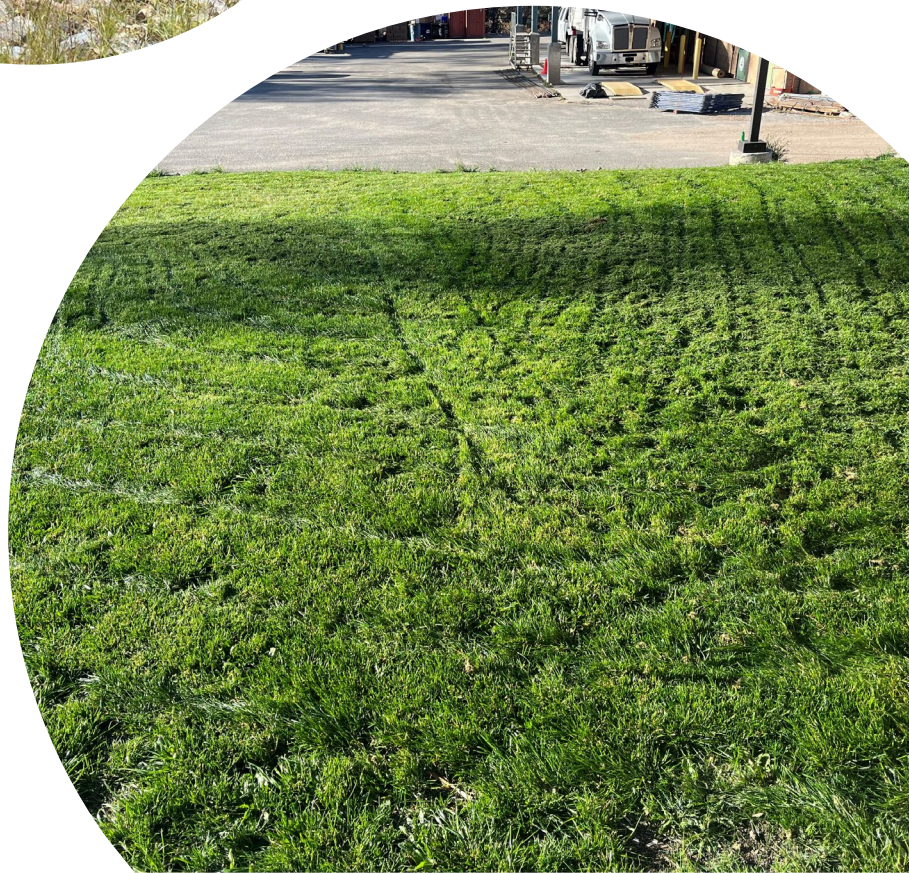
Microscopic organisms then start to feed on the carbon, nitrogen and bacteria that is all present in the windrow. During this process the internal temperature of the windrow will begin to rise due to the biological activity and the windrow will “come up to temp” Once the windrow reaches 130 F we are in the Active phase where we must mix it to aerate and keep the temp above 130 F for a minimum of 15 days.

After the 15 days have passed, the windrow will start to cool down in temperature. This is called the curing phase. During this phase the windrow cools down, due to the fact that a majority of the food has been consumed so the biological activity has dramatically reduced.

Final steps

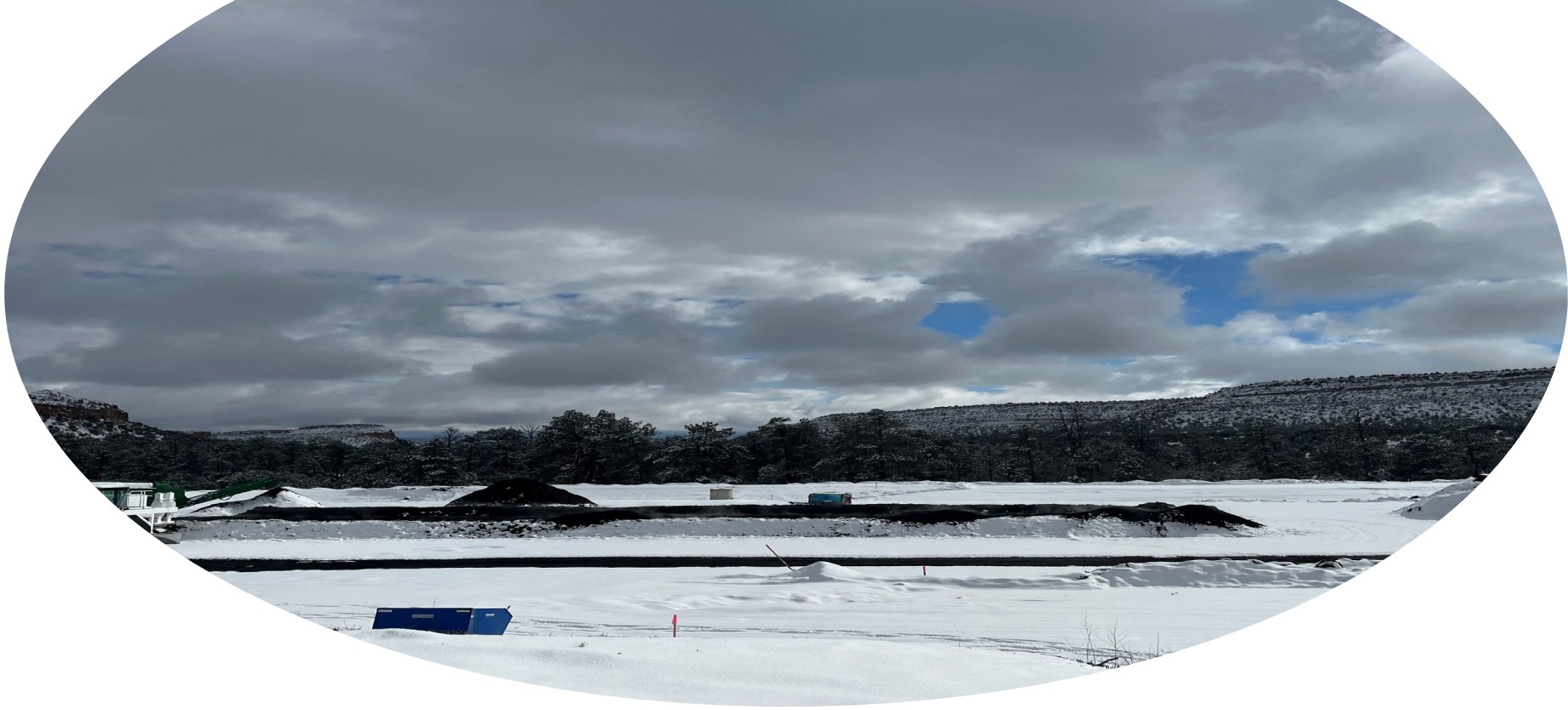
- After the windrow has completed the active phase and during the curing phase the windrow is then sampled and 8 random samples are composited forming a representative sample of the windrow.
- A dilution is performed and a series of vials are incubated for 24 hours in our Water Quality Lab
- If e coli is present bubbles will form in the vials and a calculation is done to determine E. Coli presence. Class 1A compost requires E. coli levels less that 1000 mpn/g
    - LAC is consistently less than 50 mpn/g
- Once results are determined to be “passing” the windrow is then screened onsite to sort out anything larger than ½ “ diameter.

Benefits of Composting



- Turning materials that are considered “waste” into a beneficial material
  - Producing a “soil amendment” that is rich in nutrients that will promote the growth of new plants and healthy soil since compost contains three primary nutrients needed by garden crops: nitrogen, phosphorus, and potassium. It also includes traces of other essential elements like calcium, magnesium, iron, and zinc. Instead of relying on synthetic fertilizers that contain harmful chemicals, composting offers an organic alternative.
- Reducing Greenhouse Gases
  - When compostable waste goes to a landfill, it gets buried under other trash, cutting off a regular supply of oxygen for the decomposers. The waste then ends up undergoing anaerobic decomposition. During anaerobic decomposition, biogas is created as a by-product. This biogas is about 50% methane and 50% carbon dioxide, both of which are potent greenhouse gases.
  - Reduces Truck emissions associated with a long haul to a landfill which are 80+ miles away
- Reduced Water Usage
  - How can compost help? Research has shown the water-retaining capacities of soil increase with the addition of organic matter, each 1 percent increase in soil organic matter helps soil hold up to 20,000 gallons more water per acre.

Challenges



Balancing moisture content with environmental conditions from summer to winter.

Excess water fills the pore spaces, impeding diffusion of oxygen through the compost materials and leads to anaerobic conditions.

Too little moisture and the windrow will lack heat and there will be little evidence of organic material break down.

Trash and plastics cross contaminated from various sources of materials.

How are we doing?

Top Table shows Max limits issued by the NMED/EPA

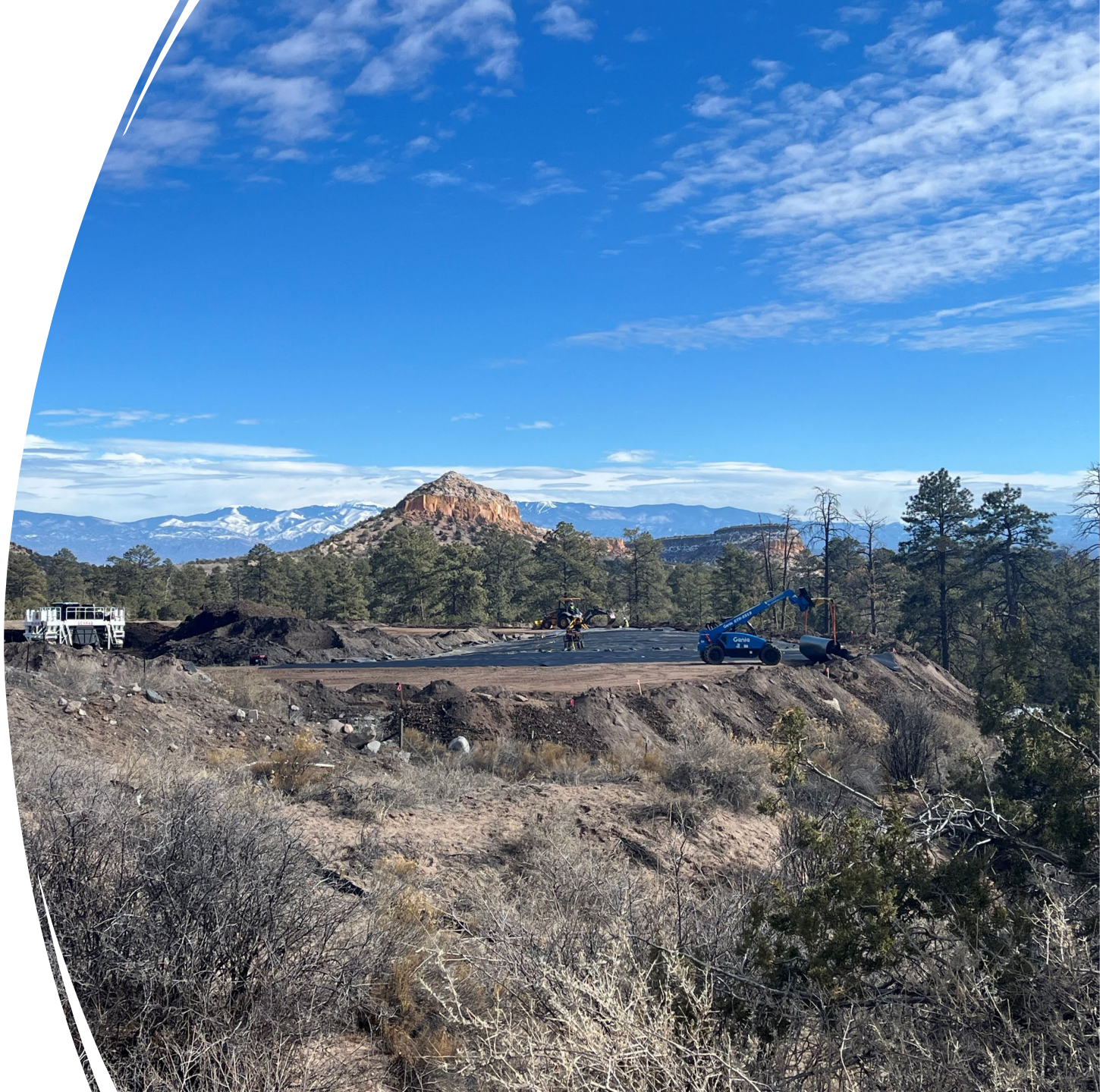
Bottom Table Shows LAC Results for 2023

Table 3 40 CFR Part 503 Annual and Cumulative Land Application Rates	
Pollutant	503.13 Table 2 Cumulative Pollutant Loading Rate (kg/hectare)
Arsenic	41
Cadmium	39
Copper	1,500
Lead	300
Mercury	17
Nickel	420
Selenium	100
Zinc	2,800

Sample Results for Biosolids 2023	
	Biosolids
Metal	Concentrations
	(milligrams/Kilogram)
Arsenic	ND
Cadmium	0.15
Chromium	3.5
Copper	42
Lead	1.7
Molybdenum	0.51
Mercury	ND
Nickel	1.3
Selenium	ND
Zinc	77
PCB's	ND

Future Challenges

- Increased Solids handling due to WR producing activated sludge
  - Anticipating 50% more sludge and materials to be hauled in and composted on existing site.
- On-going Compost Facility Expansion Project
  - Completion-First half 2024
- On-going New White Rock WWTP
  - Completion August 2024



Questions?