

Benson Aluminum Dynamics

Water Quality



Water Use and Quality

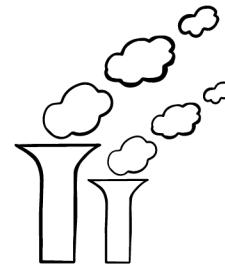
Background on Aluminum Recycling

Aluminum is classified as a highly reusable material.

- Due to recyclability, aluminum is the most sought-after material for the automotive, infrastructure, and energy industries.⁶
- The recycling process has the potential to use large amounts of water and with risks for water contamination.⁹

Potential for Water Contamination

- The potential sources for water contamination within the aluminum recycling process are waste products, stormwater runoff, and emissions.



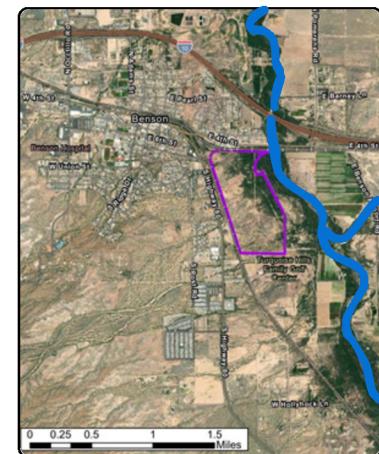
- Waste products like **aluminum dross** are created as a byproduct of the refining process.^{13, 12}
 - Dross is a mass of solid impurities that if exposed to water can generate harmful gases.^{12, 13, 14}
 - ADI has stated that dross will be sold to a third party and disposed of elsewhere. The disposal location is unspecified.
- **Stormwater runoff** from recycling facilities can vary in composition but may contain Total Suspended Solids (TSS).³
 - If gone untreated, stormwater runoff from a recycling plant can contain TSS that ranges from 100 to 1,000 mg/L.^{3, 2}
 - ADI has a temporary permit that states they will not emit stormwater during construction. Further permitting will be required during operation.

- **Particulate matter and other emissions** can enter water sources through atmospheric deposition or the transfer of air pollutants to the Earth's surface.^{16, 14, 7}
 - Impacts could be far-reaching due to water's movement within the watershed.

What is a Watershed?

Watersheds are land areas that drain to low points like rivers, valleys, or lakes.

- Water in the ground moves as it would above ground – by flowing!
- Pollution in watersheds can be categorized into two groups:
 - Point source is an identifiable source of direct pollution discharge.⁵
 - Nonpoint source comes from multiple sources and is mostly a result of runoff but can also be a result of atmospheric deposition.^{4, 16}
- Depending on a landscape's characteristics, like slope or soil composition, pollution introduced close to a body of water has a higher likelihood to move through a watershed.^{11, 10}



Picture of the proposed Aluminum Dynamics facility site show a less than one half mile distance from the San Pedro River.¹⁶



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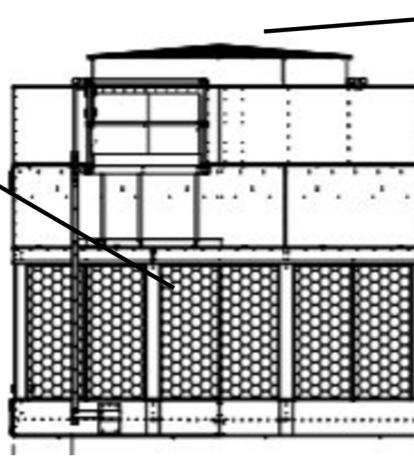
Water Quality

Water and Aluminum Recycling

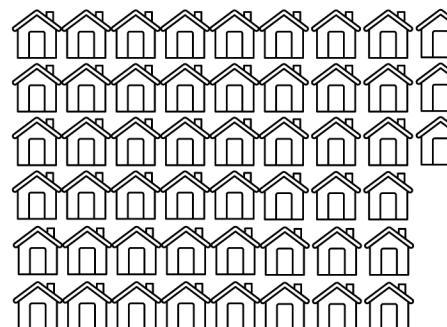
Water Usage

- Cooling towers account for 20 - 50% of a facility's available water supply.¹ The towers at the Benson facility will be used to cool the casting machine and other ancillary equipment.¹⁶
 - The first will have a recirculating flow rate of 3,500 gpm, while the second will have a flow rate of 1,500 gpm.¹⁶
- When operating cooling towers, water is lost through evaporation, drift, and blowdown.¹

- **Drift** is the process where water is dispelled from the tower as mist or droplets.¹
 - Generally, unaddressed drift losses can range from 0.05 to 0.2 percent of the recirculated flow rate.¹
- **Blowdown**, or the removal of water within the tower system, occurs when it becomes too highly concentrated with contaminants.^{1,15}
 - Removal depends on levels of alkalinity, biocides, and corrosive inhibitors or cycle of concentration ultimately dictating operational efficiency.¹⁵



ADI has stated that at full capacity, **180,000 gal/day, or 65.7 million gal/year**, will be used for all process-related water consumption. In **1 hour**, ADI will use the same amount of water as about **51 Arizonan homes use in a single day.**⁸



Without knowing the specifics of the ADI facility, a local cooling tower manufacturer provided conservative water use estimates based on similarly-used towers and settings.

- **Tower #1:** 3,500 gpm recirculating flow rate
 - Evaporative loss: 84 gpm
 - Delta Temp.: 30° F
- **Tower #2:** 1,500 gpm recirculating flow rate
 - Evaporative loss: 12 gpm
 - Delta Temp.: 10° F
- Assumed Cycles of Concentration for both towers: 3
- Wet Bulb of Benson, AZ: 78° F

**Cooling Tower #1
Estimated Annual Water
Consumption:**
45,070,200 gals

**Cooling Tower #2
Estimated Annual Water
Consumption:**
6,701,400 gals



- **Evaporative losses** depend on the inlet and outlet temperature of the water processed in the cooling tower, or Delta Temperature.¹⁶
 - Generally, for every change in temperature of 10 degrees Fahrenheit, there is a 1% loss of the recirculating flow rate.¹⁶

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