

Uranium Treatment

Residuals Management and Disposal

AdEdge AD92 IX Treatment Systems



Q: What is the AD92 Technology

A: AD92 is an ion exchange based technology (made up of an integrated system and media treatment package) that is very effective for uranium removal from water. In typical waters, the uranium exists as a negatively charged anion that can be removed with this IX based media technology to very low levels to achieving drinking water MCLs or even lower as desired.

Q: What are the Treatment Options for Removing Uranium Using the AdEdge AD92 IX Process?

A: AdEdge Technologies offer two different treatment options using the AD92 IX technology for the two main site specific scenarios:

Option 1: Continuous Use with On-site Regeneration

A simple option is to re-use the media by periodically regenerating the IX resin. This is accomplished with a non-hazardous brine consisting of sodium chloride (NaCl) similar to a softener. The regeneration process removes the uranium from the resin into the brine solution while replacing with chloride. The ion exchange resin would then be regenerated prior to exhaustion (typically once per month or less frequently) so that the uranium does not accumulate on the resin. This option is ideal for sites with a discharge option available such as a sanitary sewer, drain or leach field, wastewater plant, or other.



AdEdge AD92 Media

Features of This Option Include:

- Use of Sodium Chloride brine for regeneration
- Media can be reused for multiple years
- Low uranium concentration in liquid residuals for discharge
- Ideal for sites with sewer discharge, wastewater plants, or leach field
- Lowest overall capital and operating cost option



AdEdge APU System

Q: What Type and Quantity of Residuals are Generated with Option 1?

A: The liquid residuals or wastewater consists of a salt (NaCl) brine containing low levels of the naturally occurring uranium that is exchanged from the media similar in principle to a water softener. Wastewater volumes are dependent on the project size and design flow rate. The relative radioactivity as usually measured in picocuries per liter (pCi/L) is low in these residuals and can be calculated or provided to regulators for discharge permitting decisions.

Q: How are Those Residuals Safely and Properly Managed?

A: This liquid waste stream can be managed in one of the following ways (1) evaporation pond or lagoon; (2) to a sewer or POTW (if available); (3) direct discharge to a drain or leach field or (3) discharge via an NPDES permit. AdEdge has multiple installations exercising this option. These residuals are not hazardous nor do they present significant risk to human health or the environment. Feel free to contact us for details on how this may apply to your site.

Option 2: Disposal Option (One Time Use)

The AD92 resin has a very high affinity and capacity for uranium. Therefore, the resin can be run alternatively to exhaustion without any regeneration or on-site wastewater discharges. The media capacity will vary depending on site

specific water quality, and uranium concentration, but is often 1-5 years before replacement is needed. Upon exhaustion, the media can be packaged, transported, and disposed offsite at a licensed facility that accepts the media, which is classified as Technically Enhanced Radioactive Materials (TNORM).

Features of this Option Include:

- Use of media to final exhaustion or capacity
- Off-site management of all residuals (spent media)
- AdEdge turnkey management of off-site disposal
- Ideal for sites with no on-site wastewater discharge options available
- Higher overall operating costs compared to on-site option

Q: How are Those Residuals Classified by NRC or EPA?

A: This can be a somewhat complex topic, but in summary there are a couple of categories of waste to be considered. If accumulated uranium is less than 0.05% by weight, the material is considered essentially non-regulated or what is considered an “unimportant quantity” by NRC and residuals can be disposed in a local disposal facility. If greater than 0.05% threshold is exceeded but less than 15 lbs of uranium is accumulated on site (which would apply to many small systems), some additional requirements would apply such as transportation and disposal of the spent media as a Low Level Radioactive Waste in a permitted facility. The third category is for typically larger systems that may (due to the quantity of media and uranium present), accumulate in excess of 15 lbs at any one time. A specific NRC license would be required for such systems. The site would need to apply for and obtain a site specific license from NRC that would require the category 2 elements, but also trigger more extensive recordkeeping, training, and administrative duties.

Q: How is the Spent Media Properly and Safely Managed by AdEdge?

A: Monitoring of the effluent (treated water) periodically (as dictated by the site’s operating permit) will always be a requirement for proper operations of the AD92 system. This is typically accomplished by site personnel, the certified operator, or in some cases AdEdge if such a service contract is desired. At some point, the resin will reach its capacity for effectively removing uranium below the treatment criteria and will need to be replaced. This is simply measured by grabbing samples (at frequencies to be determined) and measuring the uranium concentration exiting the AD92 treatment unit. Most commonly this is done on a quarterly basis. As the time approaches for media replacement, AdEdge coordinates closely with the site owner or operator to provide turnkey services to: (1) properly profile the waste for disposal at an appropriate facility; (2) remove, package, transport, and dispose of the residuals at a licensed Low Level Radioactive Waste (LLRW) facility; and (3) replace the resin in the vessels with new media and re-commission the system for operation. There are several available options for disposal of spent media. Primary ones to be utilized by AdEdge at this time include Energy Solutions in Clive, Utah or US Ecology in Richland, WA.

Q: How Long Does the Media Last Before Replacement is Needed?

A: The media life is based on several primary factors including specific site water quality (anions, TDS, pH and other parameters, uranium concentration, treatment objectives, and water usage). Capacity predictions are run by AdEdge using a proven predictive model for calculating run life and media capacity at the proposal stage prior to installation to establish expectations for performance.

Q: How do I Obtain a Site Specific Proposal or Determine the Best Option for my Water System?

A: For specific information or cost and sizing proposal, contact AdEdge Technologies, Inc at 678-835-0052 or visit our website at www.adedgetechnologies.com. You will be asked to provide some site specific information and a complete water analysis upon which a proposal can gladly be provided by our technical staff.