Savannah River Site Citizens Advisory Board

Recommendation 161

Passive Treatment of F/H-Area Groundwater

Background
The F- and H-Area Seepage Basins Groundwater Operable Units consist of the groundwater impacted by operations of the F- and H-Area Hazardous Waste Management Facilities (HWMFs). The solutions disposed in these HWMFs (Seepage Basins) originated from processing of uranium slugs and irradiated fuel. Disposal of these solutions in the basins began in 1955 and continued through 1988. The solutions were generally acidic with average pH values below 3.0. Though the seepage basins essentially functioned as designed, groundwater was contaminated with tritium [above Groundwater Protective Standards (GWPS)], some metals, and various other radionuclides (Ref 1).

In 1986, the determination was made that the basins should be regulated under the Resource Conservation and Recovery Act (RCRA) as hazardous waste disposal facilities, and closure plans were initiated. The basins were closed by dewatering, physically and chemically stabilizing the remaining sludge, and by covering them with a protective multi-layer system to reduce rainwater infiltration. In 1993, the Savannah River Site (SRS) submitted a RCRA Part B Permit Application that proposed ongoing monitoring requirements and a Corrective Action Plan (CAP) to remediate the contaminated portions of the uppermost aquifer. In 1997, SRS designed and built two water treatment units (WTUs). The systems were designed to treat metals, radionuclides, and to reduce the migration of tritium to Fourmile Branch by trapping it in an extraction/re-injection loop until it decayed to regulatory limits.

The WTUs became fully operational in 1999, and the effectiveness of both systems was evaluated in 2001. The evaluation found two primary issues associated with the groundwater collection systems that affect the ability of the systems to meet their objectives: (1) diminishing effectiveness of the treatment systems, and (2) spreading and mobilizing contaminants (RCRA metals and metallic radionuclides) (Ref. 2).

SRS is recommending that the WTUs be permanently shut down with no restart requirements and replaced with a new passive treatment system that will meet the CAP goals. The combined yearly operational cost for both WTUs is over $7 million (in direct, unescallated dollars). The estimated operational cost for the passive systems is less than $1 million per year, with a projected capital cost between $15-20 million. In addition, the passive system will not generate additional waste streams and radioactive groundwater will not be pumped to the surface (Ref.3).

Comment
The SRS Citizens Advisory Board (CAB) has had significant questions and concerns about the efficacy of the F- and H-Area extraction/re-injection system to achieve significant risk reduction, and ecological and regulatory benefits (Ref. 4). In 1995, the SRS CAB contracted an Independent Scientific Peer Review (ISPR) of the proposed treatment systems and the resulting report outlined several recommendations for proceeding with the groundwater pump and treat systems (Ref. 5). The SRS CAB supported the implementation of the F- and H-Area extraction/re-injection system but requested resolution of the issues raised in the ISPR report (Ref. 6). In 1999, the SRS CAB contracted another ISPR to look at selected subsurface remediation activities at SRS (Ref. 7) and requested an open forum to establish cleanup goals and an estimated timeline to achieve those goals (Ref. 8).

The difficult issues surrounding the treatment and regulatory aspects of tritium in groundwater

has been a concern of the SRS CAB. The costly expenditures of a pump and treat system have never appealed to the SRS CAB, and the ultimate success was questionable. Another concern with the current system is that risks are greater to workers with the current system because they are exposed, with the re-injections and the handling of contaminants. Furthermore, the waste generation from the systems have created costly and difficult to handle waste streams (iodine contaminated ion exchange columns). The SRS CAB sees the move toward a more passive technology as a favorable approach, one that offers lower operational costs, reduced risks to SRS workers and the environment and no waste generation.

Recommendation

The SRS CAB supports the shut down of the F- and H-Area extraction/re-injection system and offers the following recommendations:

1. The three (3) agencies (EPA-IV, SCDHEC, and DOE-SR) support the F- and H-Area extraction/re-injection system shut down and in a cooperative effort, insure that the passive alternatives meet remediation standards and schedules.
2. SRS, with SCDHEC concurrence, should as soon as possible permanently shut down the F- and H-Area extraction/re-injection system to allow the groundwater system to return to natural conditions (equilibrium) before beginning the construction of the passive treatment systems.

References

1. F/H-Area Seepage Basins Groundwater, SRS Fact Sheet, January 2002
2. H-Area HWMF Postclosure, Volume V Rev. No.19, April 2003 and F-Area HWMF Postclosure, Volume IV Rev. No.18, April 2003.
3. F-/H-Area RCRA Part B Permit Modification, presentation to the ER Committee by Ed McNamee, May 13, 2003.
4. Citizens Advisory Board Recommendation No. 3 (adopted March 28, 1995), "ISPR of Groundwater Remediation at F/H Area".
5. Independent Scientific Peer Review, Groundwater Remediation Technologies, Evaluation of Proposed Groundwater Corrective Actions, F- and H-Area seepage Basins, Savannah River Site, prepared by Joel Massmann, drafted October 15, 1995.
6. Citizens Advisory Board Recommendation No. 9 (adopted September 26, 1995), "F/H Groundwater Project".
7. Independent Scientific Peer Review, Selected Subsurface Remediation Activities, Savannah River Site, prepared by Joel Massmann, drafted August 15, 1999.
8. Citizens Advisory Board Recommendation No. 96 (adopted September 28, 1999), "Independent Scientific Peer Review Selected Subsurface Remediation Activities Savannah River Site".

Agency Responses

Department of Energy-SR (PDF)
Environmental Protection Agency (PDF)
South Carolina Department of Health and Environmental Control (PDF)