



## Recommendation No. 146

January 15, 2002

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### PUREX Recovery Alternatives

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#### **Background**

PUREX solvent is currently used in F-Canyon; a similar solvent, with lesser extractant (TBP), is used in the HM process in H-Canyon. For simplicity, both canyon processes and their solvents are referred to as "PUREX" in this recommendation.

In addition to the 37,006,670 gallons of PUREX legacy waste, an additional 100,000 gallons of PUREX will become a waste product and require treatment for disposal in the next ten years. The PUREX process consists of several major operations, referred to as "unit operations", which recover plutonium and uranium from irradiated reactor targets and spent fuel elements.

One of the unit processes in both canyons is called solvent recovery. A separate solvent recovery process is used with each extraction process, or "cycle". The primary purpose of the solvent recovery is to wash the solvent to remove impurities and to recover the solvent for reuse in its particular cycle.

#### **Comment**

In the current continuous PUREX recycle process, the PUREX solvent becomes more and more radioactive as a result of breakdown of a small portion of the solvent and its pickup of radioactive contaminants. While the radioactivity levels of this future waste stream will be significantly lower than the current legacy waste, the anticipated levels will still present treatment challenges. The SRS CAB believes the PUREX recovery process should be reexamined to more optimally balance its continued usefulness in the process versus the criteria it must meet for subsequent treatment and disposal as a waste.

The SRS CAB believes there is a "break point" in the solvent recovery process where continuation of solvent recovery actually hinders the ultimate treatment options. If the radioactivity level of PUREX is kept at a sufficiently low level, to the extent possible under current canyon operations and safety procedures, the waste solvent could possibly meet the waste acceptance criteria (WAC) of off-site commercial vendors who treat and dispose of it.

With the pending shutdown of F-canyon (perhaps in 2002), the SRS CAB believes it is not too early for SRS to be making plans about the disposition of the F- and H-Canyon process solvent. The SRS CAB is very concerned that the treatment/disposal of CIF legacy PUREX via alternative treatment, the closure of CIF, and the ultimate disposition of canyon PUREX are headed toward a funding "bottleneck". The SRS CAB is troubled that there may not be enough funds to do all three unless proper planning and timely budget requests are in place.

#### **Recommendation**

The SRS Citizens Advisory Board recommends that a cost benefit analysis to select the optimum treatment/disposal route for canyon PUREX solvent be prepared and presented to the SRS CAB by April 23, 2002. The SRS CAB recommends that SRS include the following in its analysis:

1. Determine the maximum or limiting levels of solvent impurities that can be shipped to a commercial off-site vendor for treatment and disposal; with these maximum or limiting levels, establish a waste acceptance criteria (WAC) for disposal via a commercial vendor for all or part of the SRS canyon PUREX.
2. Determine the contamination levels of each PUREX solvent feed/storage tank in each chemical separation process (F-Canyon and H-Canyon) and relate existing commercial off-site treatment WAC to the contamination results by storage tank. In comparison, use both radioactive and "cold" chemical species that could impact the WAC.
3. Determine the optimum total volume of PUREX that can be treated/disposed by either

commercial vendors or SRS treatment facilities, either in total or in some combination between treatment options.

4. Evaluate the PUREX solvent recovery cycles in the cost benefit analysis.
5. Include canyon operational plans and management controls to support the decisions of the cost benefit analysis.

#### **References**

1. PUREX Solvent, presentation to the CIF Focus Group by Michael Chandler, December 4, 2001.

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#### **Agency Responses**

[Department of Energy-SR](#)