



## Department of Energy

Richland Operations Office  
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DEC 23 1994

94-RTI-051

Mr. Douglas Sherwood  
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Technical Assistance and  
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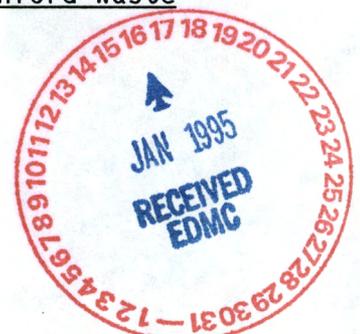
Dear Messrs. Sherwood and Stanley:

HANFORD FEDERAL FACILITY AGREEMENT AND CONSENT ORDER MILESTONE M-50-01-T01,  
"ISSUE REPORTS ON CESIUM REMOVAL PERFORMANCE OF RESORCINOL AND CS-100 ON  
MULTIPLE FEEDS"

This letter provides notification of the completion of Hanford Federal Facility Agreement and Consent Order Milestone M-50-01-T01, "Issue Reports on Cesium Removal Performance of Resorcinol and CS-100 Resins on Multiple Feeds."

Four enclosures are submitted to document completion of the subject milestone. The enclosures are:

1. Enclosure 1, Summary of Hanford Laboratory Testing Progress and Preliminary Flowsheet Development with Resorcinol and CS-100 Resins for Cesium Removal.
2. Enclosure 2, WHC-SD-WM-TI-667, Preliminary Flowsheet: Ion Exchange for Separation of Cesium from Hanford Tank Waste Using Duolite CS-100 Resin.
3. Enclosure 3, WHC-SD-WM-TI-638, Preliminary Flowsheet: Ion Exchange Process for the Separation of Cesium from Hanford tank Waste Using Resorcinol-Formaldehyde Resin.
4. Enclosure 4, PNL-10187, Experimental Data and Analysis to Support the design of an Ion Exchange Process for the Treatment of Hanford Waste Tank Supernatant Liquids.



The following table summarizes cesium (Cs) ion exchange processing of neutralized current acid waste (NCAW) and double-shell slurry feed (DSSF) waste types with resorcinol formaldehyde (R-F) and Duolite™ CS-100 resins.

These waste types contain one-half of the <sup>137</sup>Cs inventory in Hanford Site waste tanks; they also represent bounding cases for removal of Cs from Hanford Site waste tanks.

Summary of Preliminary Cs Ion Exchange Flowsheets  
for NCAW and DSSF Waste Types Using R-F and CS-100 Resins

Waste Type	Total Mass, MT	Amount <sup>137</sup> Cs, Mci	Decontamination Factor R-F/CS-100	Mass Spent IX Resin, MT R-F/CS-100
NCAW	10,800	11.1	8490/8300	3.7/18
DSSF	100,000	11.2	400/375	51.6/1071

MT = Metric Ton  
Mci = Mega curie

The NCAW contains the highest concentration of Cs and the DSSF contains the highest concentration of sodium and potassium salts, each of which impact cesium removal. Ion exchange processing is based on a feed rate of 108 l/minute through the ion exchange column system, which meets the preliminary functions and requirements for the low-level waste (LLW) pretreatment facility. This rate allows pretreatment processing of all tank waste in 14 years.

Nitric acid and sodium hydroxide chemicals are added to the processes during the elution and regeneration steps. The Cs eluate is concentrated to minimize volume before transfer to high-level waste (HLW) interim storage. The Cs depleted stream is concentrated before transfer to LLW interim storage. The HLW and LLW streams will be made into glass waste forms for final disposal. Methods for spent resin storage and disposal need to be developed.

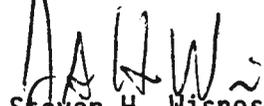
Messrs. Sherwood and Stanley  
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If you have any questions or require additional information, please contact  
Mr. R. A. Gilbert at (509) 372-0618.

Sincerely,



Steven H. Wisness  
Hanford Project Manager

RTI:RAG

Enclosures:

- 1) Summary of Hanford Laboratory Testing Progress and Preliminary Flowsheet  
Development with Resorcinol and CS-100 Resins for Cesium Removal
- 2) WHC-SD-WM-TI-667
- 3) WHC-SD-WM-TI-638
- 4) PNL-10187

cc w/encls:

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Subject: HANFORD FEDERAL FACILITY AGREEMENT AND CONSENT ORDER MILESTONE  
M-50-01-T01, "ISSUE REPORTS ON CESIUM REMOVAL PERFORMANCE OF  
RESORCINOL AND CS-100 ON MULTIPLE FEEDS"

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