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**SIMULANT COMPOSITION FOR THE MIXED WASTE
MANAGEMENT FACILITY (MWMF) GROUNDWATER
REMEDATION PROJECT (U)**

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Simulant Composition for the Mixed Waste Management Facility
(MWMF) Groundwater Remediation Project (U)

SUMMARY

A project has been initiated at the request of ER to study and remediate the groundwater contamination at the Mixed Waste Management Facility (MWMF). This water contains a wide variety of both inorganics (e.g., sodium) and organics (e.g., benzene, trichloroethylene). Most compounds are present in the ppb range, and certain components (e.g., trichloroethylene, silver) are present at concentrations that exceed the primary drinking water standards (PDWS). These compounds must be reduced to acceptable levels as per RCRA^V orders.

and CERCLA

This report gives a listing of the important constituents which are to be included in a simulant to model the MWMF aquifer. This simulant will be used to evaluate the feasibility of various state of the art separation/destruction processes for remediating the aquifer.

INTRODUCTION

Elevated concentrations of various inorganic and organic constituents have been observed in the groundwater at the MWMF. For example, the trichloroethylene (TCE) concentration has been measured and the average level is 164 ppb. The primary drinking water standard (PDWS) for TCE is 5 ppb. Forty years of operations have resulted in substantial amounts of solvents and metals entering the soil and reaching shallow aquifers. The simulant described in this document is designed to closely model the aquifer under consideration. This will provide a study of the feasibility of several standard wastewater treatment schemes to remediate this aquifer.

SIMULANT COMPOSITION

The simulant used in these experimental studies has been developed based on analyses from actual groundwater wells at the MWMF [reference: Dames & Moore (1991)]. Several RCRA-regulated species are present in this waste stream, but the concentrations are low enough to permit normal laboratory practices to occur. Standard carcinogen-handling practices have to be observed when using the pure organic liquids to prepare the simulant. The species to be tested, along with typical concentrations, are listed below (numbers in parentheses are for the ion of interest):

<u>Species</u>	<u>Concentration, ppb</u>
AgNO ₃	104 (66 as Ag)
Al ₂ (SO ₄) ₃	12,700 (2,000 as Al)
Ca(OH) ₂	1.067E6 (576,000 as Ca)
Cd(NO ₃) ₂ •4H ₂ O	10,500 (3,817 as Cd)
FeCl ₃ •6H ₂ O	55,700 (11,508 as Fe)
Fe(NO ₃) ₃ •9H ₂ O	19,900 (2,751 as Fe)
Fe ₂ (SO ₄) ₃	9,560 (1,335 as Fe)
KOH	206,500 (144,000 as K)
Mg(OH) ₂	7,470 (3,107 as Mg)
NaOH	1.5E6 (862,130 as Na)
Na ₂ S•9H ₂ O	11,500 (2,202 as Na)
Na ₂ SO ₄	65,800 (21,300 as Na)
Pb(NO ₃) ₂	112 (69.8 as Pb)
Zn(NO ₃) ₂ •6H ₂ O	395 (87.1 as Zn)
Benzene	46
Carbon tetrachloride	41
1,2 DCE	23
Trichloroethylene (TCE)	164
Tetrachloroethylene (PCE)	30

These species were chosen for specific individual reasons. All of the listed organics, along with Cd, Pb, and Ag are present in excess of their PDWS. The remainder of the cations (other than K and Na) were chosen because of low solubilities, which could result in deposition/fouling and possible upset of the proposed process.

These compounds will be blended in various combinations and tested in the following laboratory-scale unit operations:

1. filtration
2. reverse osmosis

No testing is planned for a chemical oxidation system to evaluate destruction of the organics because a large number of vendor studies and case histories are available.

QUALITY ASSURANCE

The work described in this report will be performed according to the guidelines in the SRS QA manual. This simulant recipe and various other tests feeds, along with the data collected during these tests, will be recorded in laboratory notebook #WSRC-NB-90-256.

REFERENCES

Dames & Moore, "Westinghouse Savannah River Site Mixed Waste Management Facility Review of Remedial Technologies", Job #10805-537-009, March 7, 1991.

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