INORGANIC SEED MATERIALS FOR THE
DECONTAMINATION OF PWR AQUEOUS WASTES

Keywords: CONTAMINATION REMOVAL; WASTE FILTRATION;
INORGANIC SEED MATERIAL

Principal Investigator:  Project Manager:
E. Hooper R. Sellers
AEA Technology Nuclear Electric plc
B465 Harwell Timpson Road
Didcot, Oxfordshire OX11 0RA Wythenshawe, Manchester M23 9LL
U.K. U.K.
Phone: +44 235 435555 Phone: +44 61 946 4202

Objectives: Study the use of several inorganic sorbents, used in combination with crossflow
membrane filtration, for the reduction of Cr-51 and Sb-125 levels in a PWR waste stream.

Comments: By adding to the waste effluent small quantities of solid "seed" materials onto
which dissolved radionuclides can become absorbed, soluble contaminants can be removed to
produce a clean effluent. Seeds specific to a number of different radionuclides have been
identified (e.g. nickel hexacyanoferrate (II) for Cs-137). By employing a mixture of different seed
materials, a wide spectrum of radionuclides can be dealt with. A mixture of titanium oxide,
zirconium phosphate, and sodium nickel hexacyanoferrate (II) gave an overall decontamination
factor of 20 at a solution pH of 4.5.

Remarks/Potential for dose limitation: Ultrafiltration is a filtration process that enables
particles as small as 2nm in size to be removed from liquid suspension. Some aqueous waste
streams arising at nuclear power plants are contaminated with very low levels of radioactive
nuclides typically in the sub-μg.kg⁻¹ range. Many of the radionuclides in the wastes are present
as colloidal or insoluble material and can therefore be potentially removed using ultrafiltration.
Soluble species cannot be filtered directly, and inorganic seed materials must be used.

References: Hooper, E.W., Kavanagh, P. and Sellers, R.M., "Inorganic Seed Materials for the
Decontamination of PWR Aqueous Wastes," Water Chemistry of Nuclear Reactor Systems 6, Vol. 1,

Duration: from: 1991 to: 1992 Funding: N/A
Status: Completed Last Update: June 14, 1993