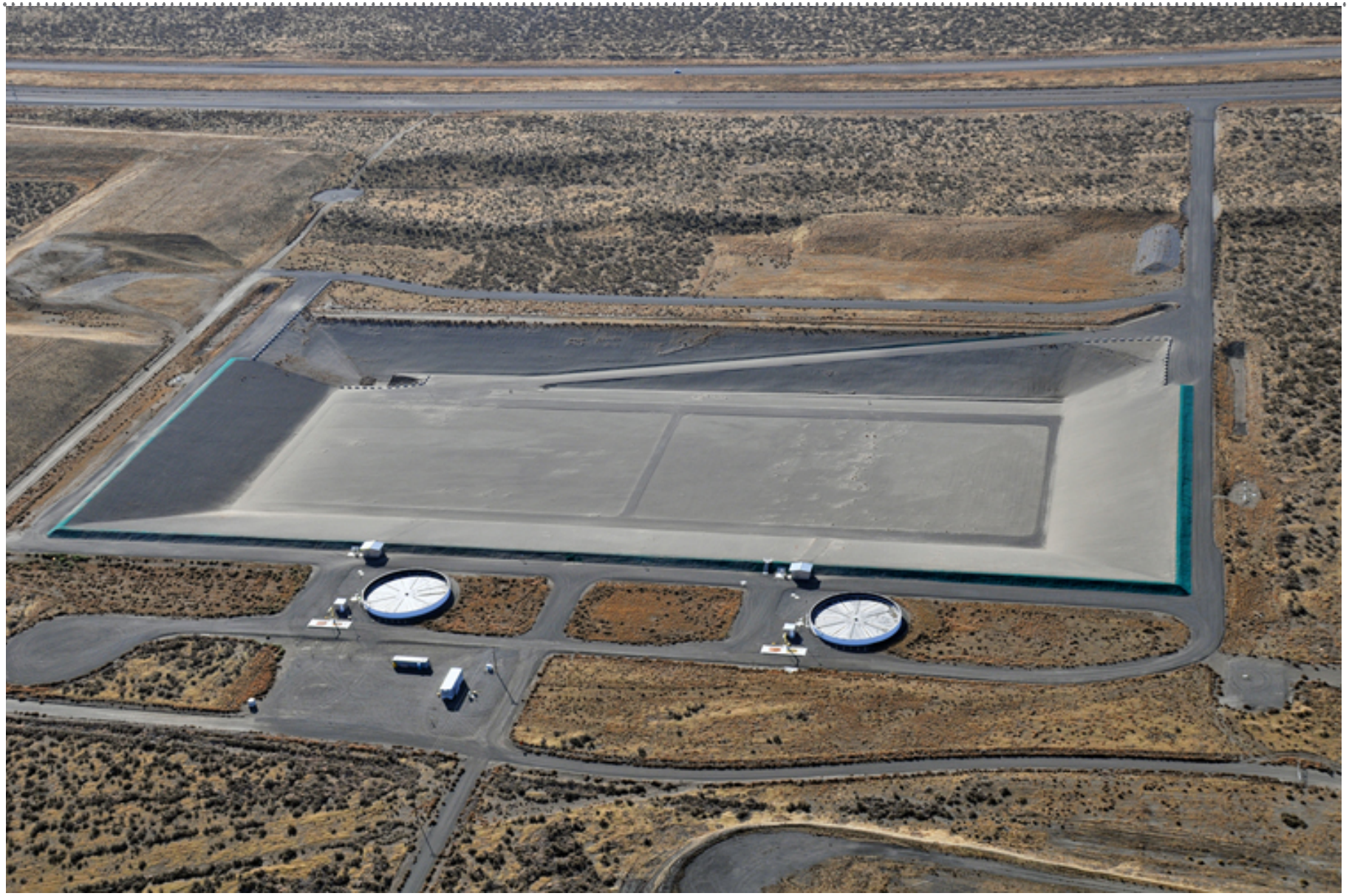
Backup Slides

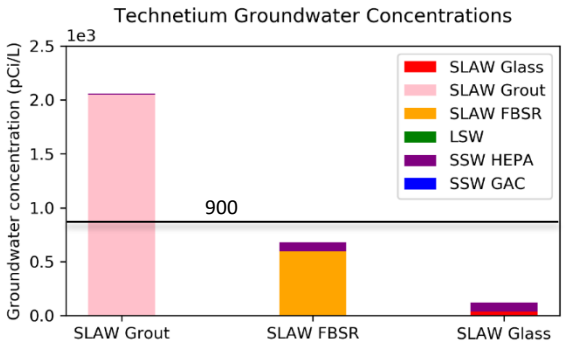
IDF



Projected Peak Groundwater Concentrations for All Cases

- Tc-99

Low Performing



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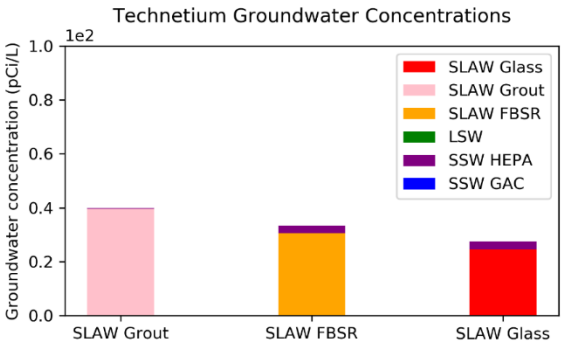
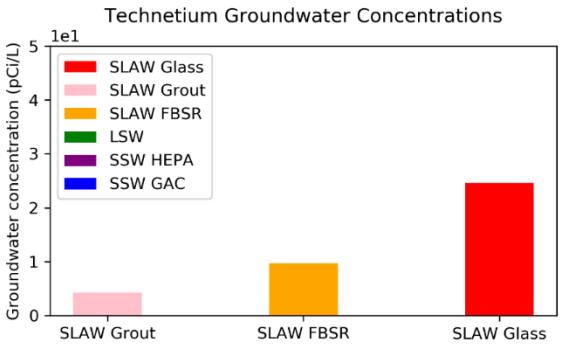
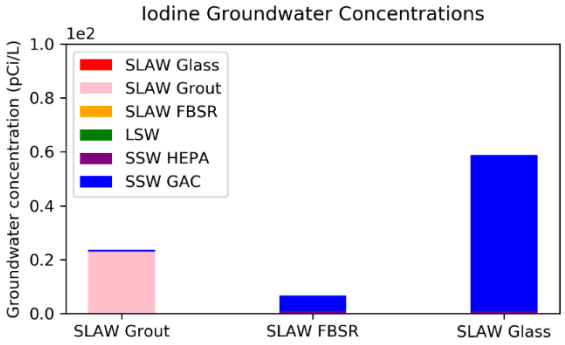


Projected Best

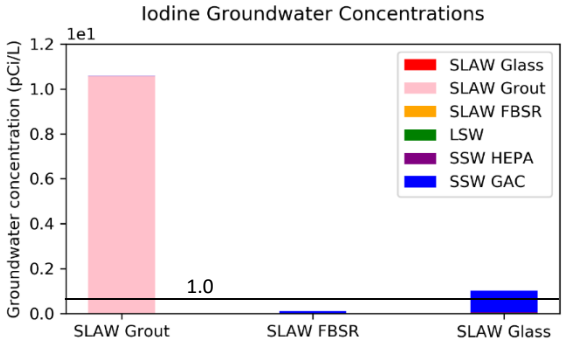


- I-129

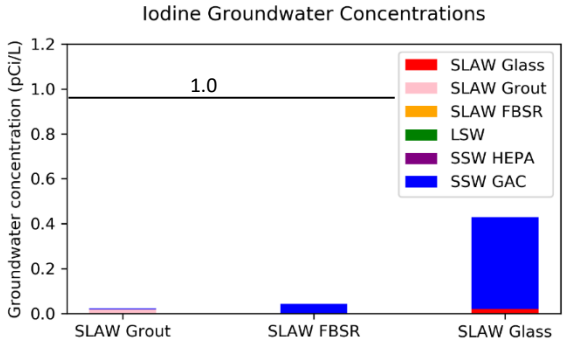
Low Performing



High Performing

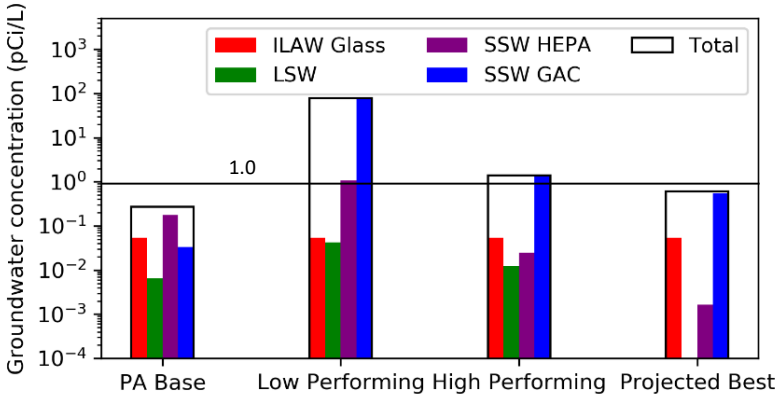


Projected Best

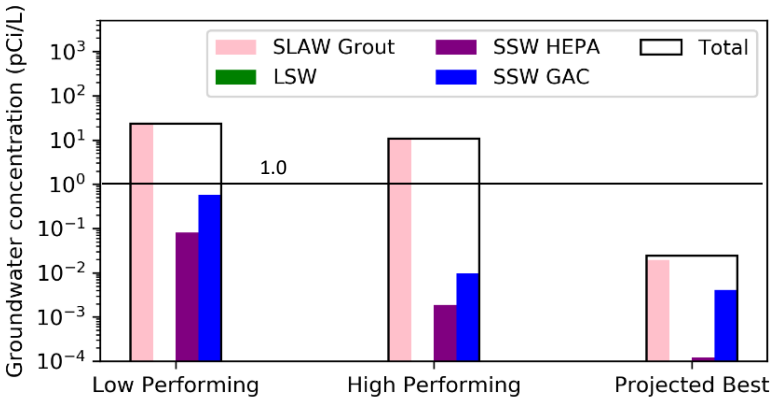


Performance Evaluation Results – Cumulative Groundwater Impacts for ILAW + SLAW

Iodine-129 for ILAW Glass Waste Forms

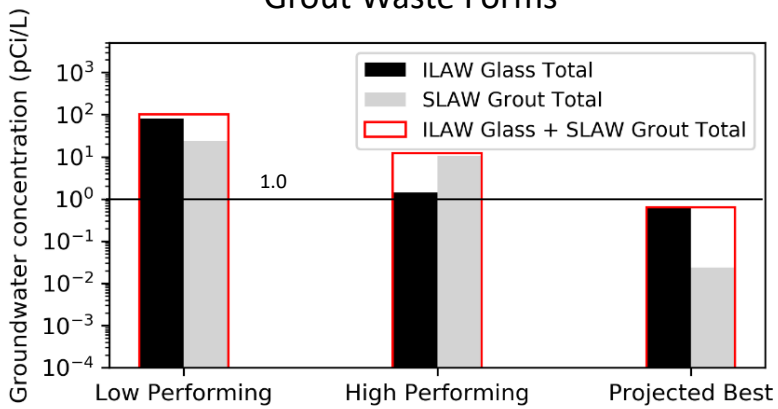


Iodine-129 for SLAW Grout Waste Forms



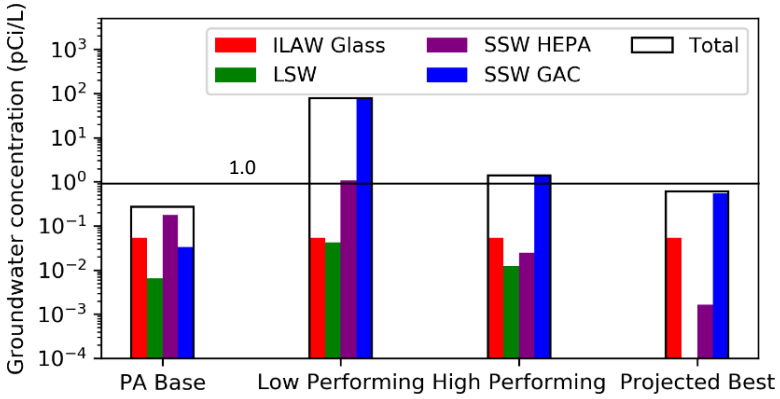
- The total potential impact to groundwater of disposal of immobilized LAW must include both the ILAW fraction produced by LAW Vit at WTP and the immobilized SLAW fraction.
- Shown here is cumulative impact for ILAW glass plus SLAW grout waste form systems only

Iodine-129 for ILAW Glass + SLAW Grout Waste Forms

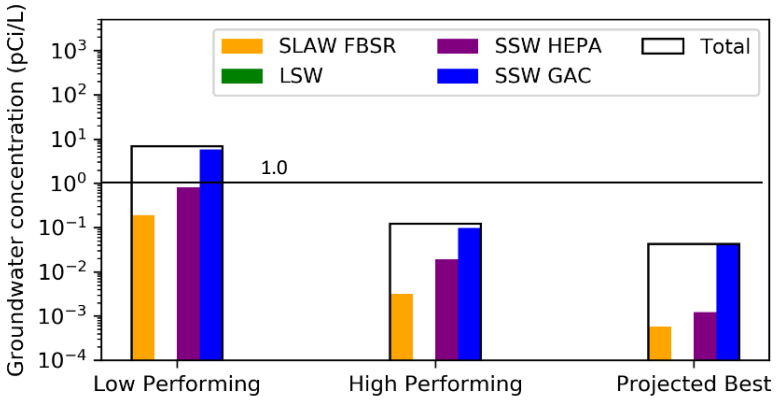


Performance Evaluation Results – Cumulative Groundwater Impacts for ILAW + SLAW

Iodine-129 for ILAW Glass Waste Forms

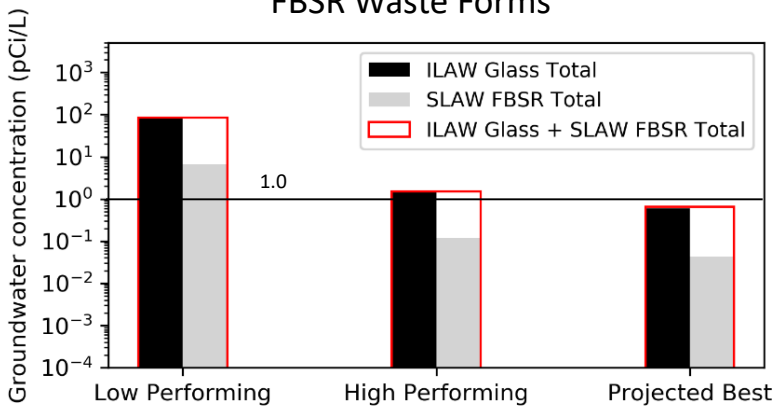


Iodine-129 for SLAW FBSR Waste Forms



- The total potential impact to groundwater of disposal of immobilized LAW must include both the ILAW fraction produced by LAW Vit at WTP and the immobilized SLAW fraction.
- Shown here is cumulative impact for ILAW glass plus SLAW FBSR waste form systems only

Iodine-129 for ILAW Glass + SLAW FBSR Waste Forms



Waste Form Volumes and Number of Containers

Waste Forms	Vitrification (ILAW+SLAW Glass)		Grout (ILAW Glass+SLAW Grout)		Steam Reforming (ILAW Glass+SLAW FBSR)	
	Volume (m3)	Number of Containers	Volume (m3)	Number of Containers	Volume (m3)	Number of Containers
Primary ILAW (glass)	**123,013**	**56,688**	**123,013**	**56,688**	**123,013**	**56,688**
LSW - ETF	5,004	24,055	5,004	24,055	5,004	24,055
SSW - HEPA filters	81	389	81	389	81	389
SSW - GAC absorber	730	3,510	730	3,510	730	3,510
Primary LAW SSW+LSW total	**5,814**	**27,954**	**5,814**	**27,954**	**5,814**	**27,954**
Immobilized SLAW	**93,490**	**43,083**	**367,902**	**44,326**	**245,268**	**29,550**
LSW - ETF	3,803	18,282	-	-	-	-
SSW - HEPA filters	61	295	6	30	61	295
SSW - GAC absorber	555	2,668	55	266.79	555	2,668
SLAW SSW+LSW total	**4,419**	**21,245**	**62**	**296**	**616**	**2,963**
Primary ILAW + SLAW Total	**216,502**	**99,771**	**490,915**	**101,013**	**368,281**	**86,238**
Primary+SLAW Sec. Waste Total	**10,233**	**49,199**	**5,876**	**28,251**	**6,431**	**30,917**
All	**226,735**	**148,970**	**496,791**	**129,264**	**374,711**	**117,156**

Long-Term Grout Degradation

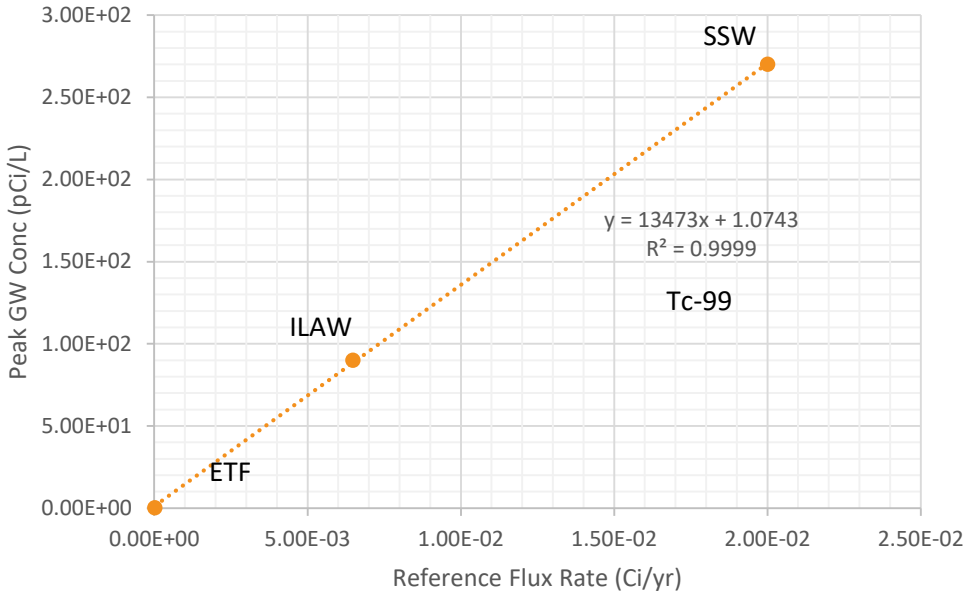
- Hanford 2017 IDF PA (pg. 4-14)
  - With time, the waste form is expected to physically degrade, which affects the diffusive and hydraulic characteristics of the waste form, which may allow for dominantly advective transport of COPC through the degraded waste form. Aging of the waste form has been correlated with the amount of water that interacts with the waste form. The assessment of potential degradation mechanisms, described in SRNL-STI-2016-00175, Section 10, indicates that SSW grout degradation from chemical attack can be expected to be minimal under IDF disposal conditions due to the limited amount of recharge pore volumes that are expected to be exchanged within the waste form.
  - Although physical degradation of the waste form due to deformation cracking may be significant, the adverse effect of cracks is expected to be minimal with respect to moisture and solute transport due to the low saturation in the surrounding backfill material.

Estimating Peak Groundwater Concentrations

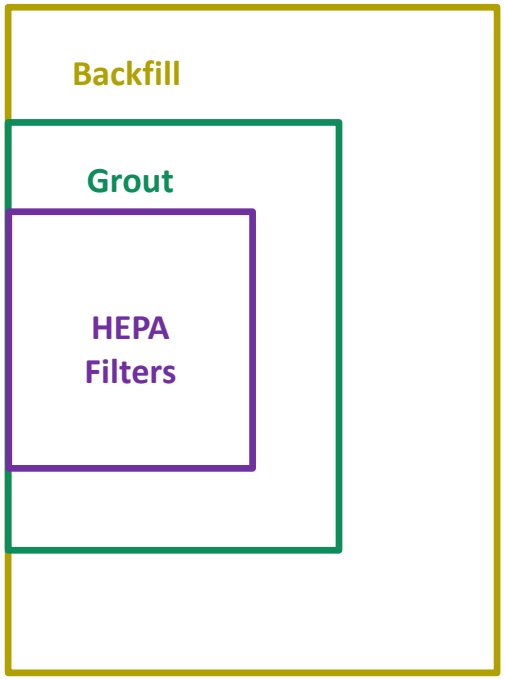
- Linear relationship identified between flux rate exiting facility and peak concentration (to be published (RPP-CALC-63176, unpublished[1])
- Based on physics-based simulations of vadose zone flow and transport to groundwater

Reference Flux Rate[1] = [Corrosion Rate (Ci/yr)] · Inventory

Peak GW Conc = (Flux Rate/Reference Flux Rate[1]) · Peak GW Conc[1]



Encapsulated Waste Form Conceptual Model – SSW HEPA



$D = 5.0 \times 10^{-6}$ (cm^2/s)

$\tau = 0.0058$

$D_{eff} = 2.9 \times 10^{-8}$ (cm^2/s) $\cdot \theta s$

$D = 5 \times 10^{-6}$ (cm^2/s)

$\tau = 0.0058$

$D_{eff} = 2.9 \times 10^{-8}$ (cm^2/s) $\cdot \theta s$

$D = 5 \times 10^{-6}$ (cm^2/s)

$\tau = 1$

$D_{eff} = 5 \times 10^{-6}$ (cm^2/s) $\cdot \theta s$

$$D_{eff} = D \tau \theta s$$

D_{eff} = effective diffusion coefficient (cm^2/s)

D = free water diffusion coefficient (cm^2/s)

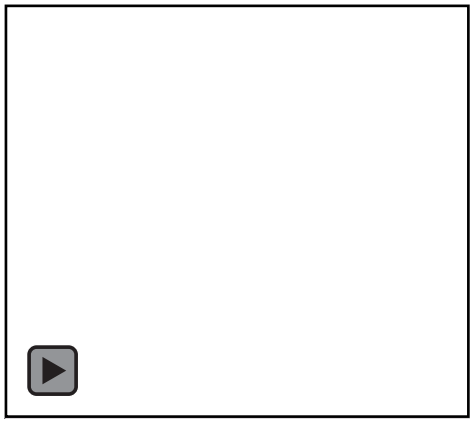
θ = diffusive porosity

τ = aqueous phase tortuosity

s = aqueous liquid saturation

Performance Evaluation in Progress – Approach and Status (continued)

- Simulating full stack of SSW, LSW, and SLAW containers within the IDF
  - ILAW Glass already modeled for full height (four lifts) of IDF
  - Primary difference associated with LSW and SSW - factor of ~1.2 to 3X lower peak flux



2 Containers Represented in IDF PA

8 Containers Represented in NDAA Analysis