Savannah River NUCLEAR SOLUTIONS℠

FLUOR • NEWPORT NEWS NUCLEAR • HONEYWELL

Z-Bed Recovery Water Disposal

Louis Boone
Josh Segura
Tritium Programs Engineering
Savannah River Nuclear Solutions, LLC

Purpose

- Provide detailed explanation of the plan to capture and dispose of Z-Bed Recovery (ZR) water.

Agenda

- New Technology
- Background
- Z-Bed Recovery Water Disposal
- Cost Saving
- Alternatives

New Technology

- Dry Disconnect Fittings
- Double Door Transfer Container (DDTC)
- Bucket (Stainless Steel ASME pressure Vessel)
- Super Absorbent Polymer (SAP)

Some of this is new to Tritium & some new to SRS.

Background

- Water Trap #1 has a pin hole leak in one nozzle. It maintains pressure and is still in use for low activity Z-beds.
- Water Trap #2 has similar corrosion but no detectable leaks.
- ZR recirculation fan has failed. Open Glovebox Maintenance (OGM) is required to replace it.
- One large OGM to be planned for: WT, PS Z-bed & ZR fan.

Background

Tritium recovered from recent Primary and Purge Stripper Z-beds

Z-Bed (Regen Date)	g T from each bed	STP-L T from each bed		Value per bed @ $30,000/g T
P2-ZA (09/06/2013)	0.322921888	2.399925904		$9,687.66
P1-ZB (01/25/2013)	0.429691085	3.193424799		$12,890.73
P2-ZB (10/02/2012)	0.281791255	2.094246808	Estimate	$8,453.74
PS-ZA (09/11/2012)	0.055181197	0.4101016		$1,655.44
P1-ZC (07/29/2012)	0.42168819	3.133948014		$12,650.65
P2-ZC (06/17/2012)	0.205332127	1.526009563		$6,159.96
Total T	1.716605742	12.75765669		amount of Tritium hypothetically discarded from April 2012 thru October 2013
	$51,498.17		Total cost of discarded Tritium (based on $30,000/g)	

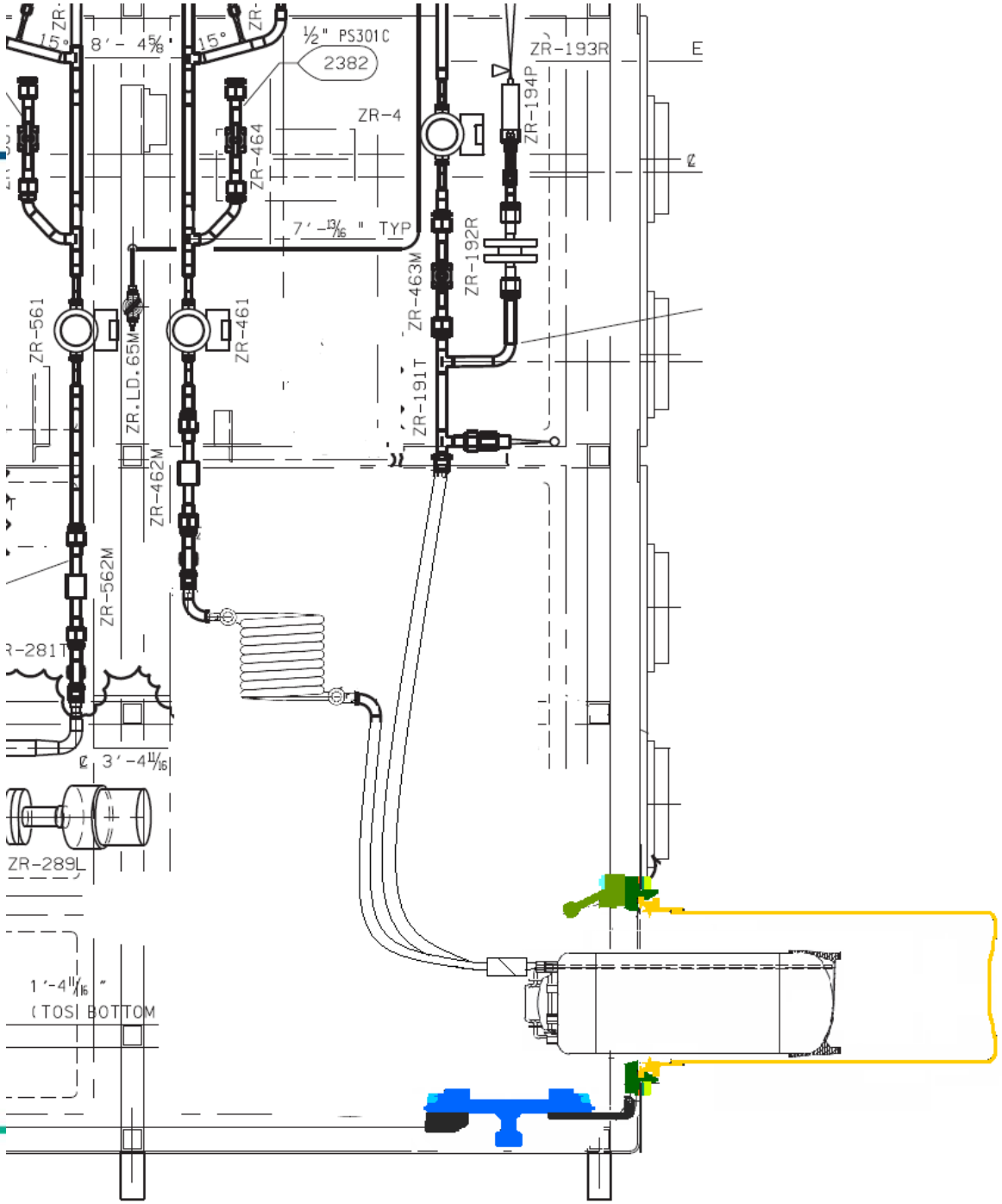
Background

Tritium concentration levels from recent Primary and Purge Stripper Z-beds

BED	DATES	Tritium (mole or volume %)
P1-ZC	7/29/12 - 9/9/12	0.016
PS-ZA	9/11/12 - 9/28/12	0.014
P2-ZB	10/2/12 - 11/16/12	0.011
P1-ZB	1/25/13 - 2/27/13	0.017
P2-ZA	9/6/13 - 11/2/13	0.032
PS-ZB	11/11/13 - 12/12/13	0.0096
P2-ZC	12/28/13 - CURRENT	0.0065

Z-Bed Recovery Water Disposal

- Work inside ZR Blister.
- Replace 12” waste port with DDTC.
- Remove WT #1 & minor piping mods.
- Add chilled water heat exchanger.
- Reconnect PCW.



Savannah River NUCLEAR SOLUTIONS™

Z-Bed Recovery Water Disposal

Blister with 12” waste port

Concerns

HTO exposure

- Water concentration is expected to be 0.03% T2 or less.
- The process for loading will all but eliminate any water in the lines during the break.
- The drip free disconnect are the final assurance that there is no exposure.
- Summary of recent HTO handling issues
- RPD does not expect any additional PPE requirements (for example plastic suits) for this evolution.

Disposal Concerns

First:T2 is a valuable commodity
This proposal will result in disposal of 1 to 1.5 grams of T2 per year

Second: Actual disposal of the material needs to meet waste requirements. AquaSorb-HB is approved for use on site and is already in use.

Cost $avings

The estimated value of T2 per primary Z-bed is $10,000 on average. Based on $30,000 per gram (Canadian Price)
A typical regen will use 1.25 Mg-beds @ $35,000 (unburdened) each for a total cost of $43,750
For each primary Z-bed that the water is solidified and disposed of the net savings is $33,750
Anticipate and average of 2.5 to 3 primary Z-beds per year and generally 1 Purge Stripper Z-bed per year.
Purge stripper are about 1/4 the size and the saving would be proportionate - about $8,500 per bed.

Cost of vessel estimated @ $2,500 to $4,000 each (assume $3,500)

Annual Saving Estimate:
2.5 * (33,750-3,500) + (8,500-3,500) = $**80,625**

Cost $avings

Additional savings accrue from:

- Avoid the replacement cost of WT #1
- Reduce installation & removal of Mg-beds
- Reduce energy usage
- No time effort or energy expended in HT-TCAP
- Reduced disposal cost water collector tank vs. Mg-bed
- Anticipated cost of new Mg-beds will drive the cost savings much higher: $166,500/year assuming $60,000 per bed.

Alternatives

Option 1
Do nothing.

Option 2
Replace one or both water traps with new all Hastelloy models.