

“Dried Material” in the 241-AY-102 Annulus



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Tank Construction



Tank Construction

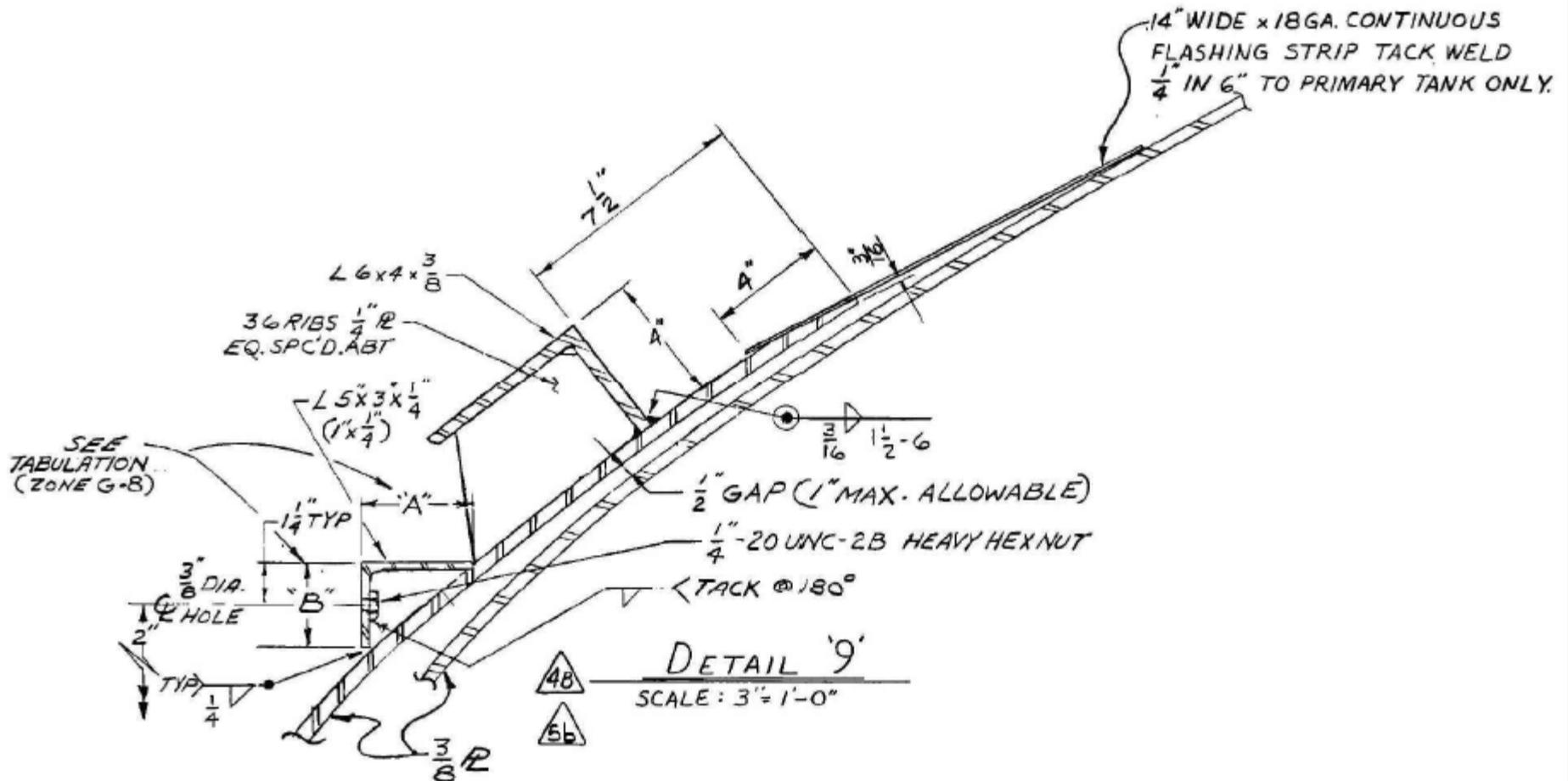
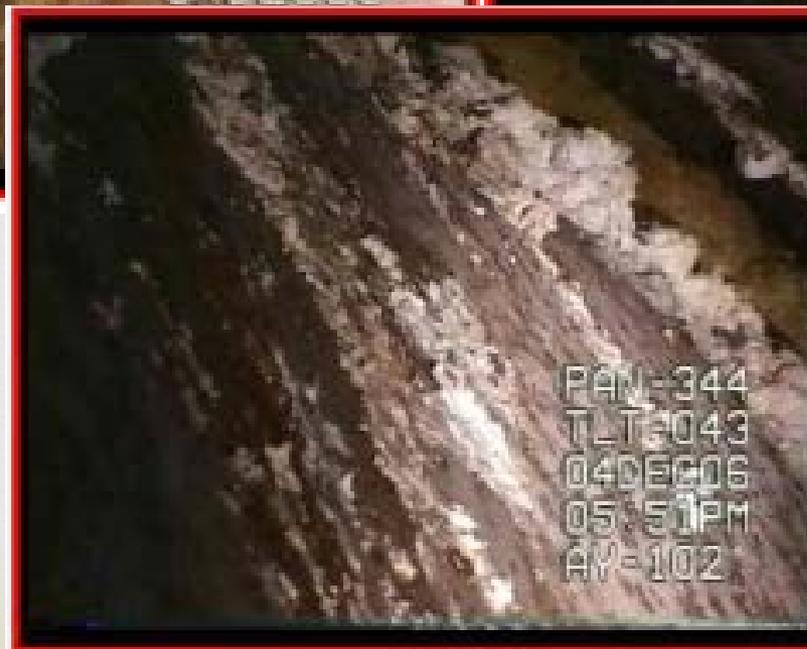


Figure 1: Converging Section of the Primary Tank and Secondary Liner

Crystals in Haunch



241-AY-102 Waste Transfer Operations



- ❧ Constructed 1968 to 1970 (first DST Farm)
- ❧ Contained water for 242-A Evap Feed 1970 to 1977
- ❧ 1977 Routed Waste to the 242-A Evap
- ❧ Received Aging waste from B-Plant in March 1977 to 1978
- ❧ 1978 to 1980 sent Double-Shell Slurry Feed to A Farm and BX-104 and received waste from A-102
- ❧ 1981 to 1985 received Plutonium Uranium Extraction Misc Waste, Low-Level Sr/Cs from B-Plant (non-complexant), salt well liquid and dilute 100-N wastes

241-AY-102 Waste Transfer Operations



- ❧ 1985 to 1996 received B-Plant (non-complexant) vessel clean-out and process waste, 100-N reactor waste, T-Plant waste, 200/300/400-Area laboratory wastes, and transfers from AW-102/106, and AP-103/104/106/108
- ❧ 1997 transfer of complexant waste from AY-101
- ❧ 1998 to 1999 received approximately 97% of high-heat sludge from C-106
- ❧ 1998 to 2003 became condensate receiver tank
- ❧ 2003 received C-106 flush water and 244-AR Vault liquid

Waste Characteristics



- ❧ **TANK STATUS (as of 7/1/2005)**
- ❧ Total Waste Volume 3550 kL (938 kgal)
- ❧ Supernatant Volume 2979 kL (787 kgal) – BBI reports 2705 kL
- ❧ Sludge Volume 571 kL (151 kgal) – BBI reports 451 kL
- ❧ BBI reports 120 kL of Sludge Interstitial Liquids

- ❧ Surface Level (7/1/2005) 866.3 cm (341.1 inches)
- ❧ Temperature (10/13/2005) 16.2°C - 70.1°C (61.2°F - 158.2°F)
- ❧ Waste Group Designation B

Waste Characteristics



- ❧ No other tank contains the same mix of wastes
- ❧ Closest is 241-AY-101
- ❧ One of the most radioactive HLW tanks at Hanford
- ❧ Sludge in 2002 read 200 Rad/hr on sample bottle
- ❧ Most Cs is associated with dry solids not leached by washing (aluminumsilicates)
- ❧ Dilute layer of supernatant tops the convective currents of solids in the tank resulting in thermal gradients in the tank
- ❧ Very thermally hot (ventilation shut-down in 2000 increased the temperature)

Tank Chemistry



☞ According to the AY Integrity Report, “The waste chemistry in AY-102 was also out of specification since December 1999 (RPP-7795, Technical Basis for Chemistry Control Program) for pH and Hydroxide, and later Nitrite parameters.

☞ Several additions of sodium hydroxide and one addition of sodium nitrite to AY-102 took place in February 2001, May 2005, July 2005, and November 2001, respectively, to bring the tank back into specification.

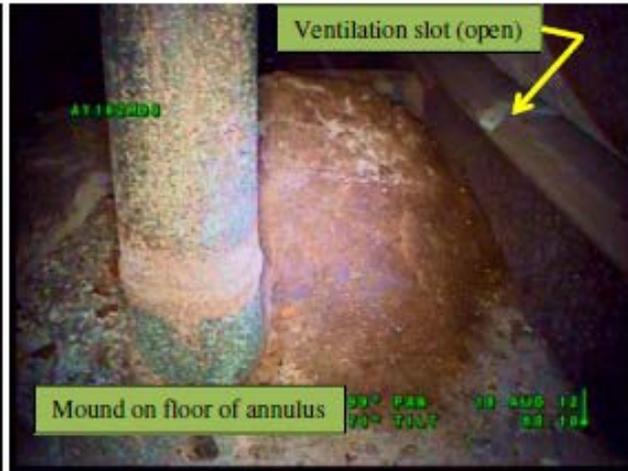
Sampling History



- ❧ 2002 Six grab samples from Riser 54 *Tank 241-AY-102 FY 2002 Grab Samples Analytical Results for the Final Report* (Baker 2002b)
- ❧ 2003 one core sample from Riser 65 letter report *Tank 241-AY-102 FY 2003 Core Samples Analytical Results for the Final Report, Reissue 3* (Bishop 2003)
- ❧ 2003 Corrosion Product Sample Collection in Riser 80
- ❧ *Additional core samples in 2003, 2005 and on data found in TWINS*
- ❧ *Additional grab samples in 2005 and on data found in TWINS*
- ❧ *1998 and 2004 Vapor samples found in TWINS*

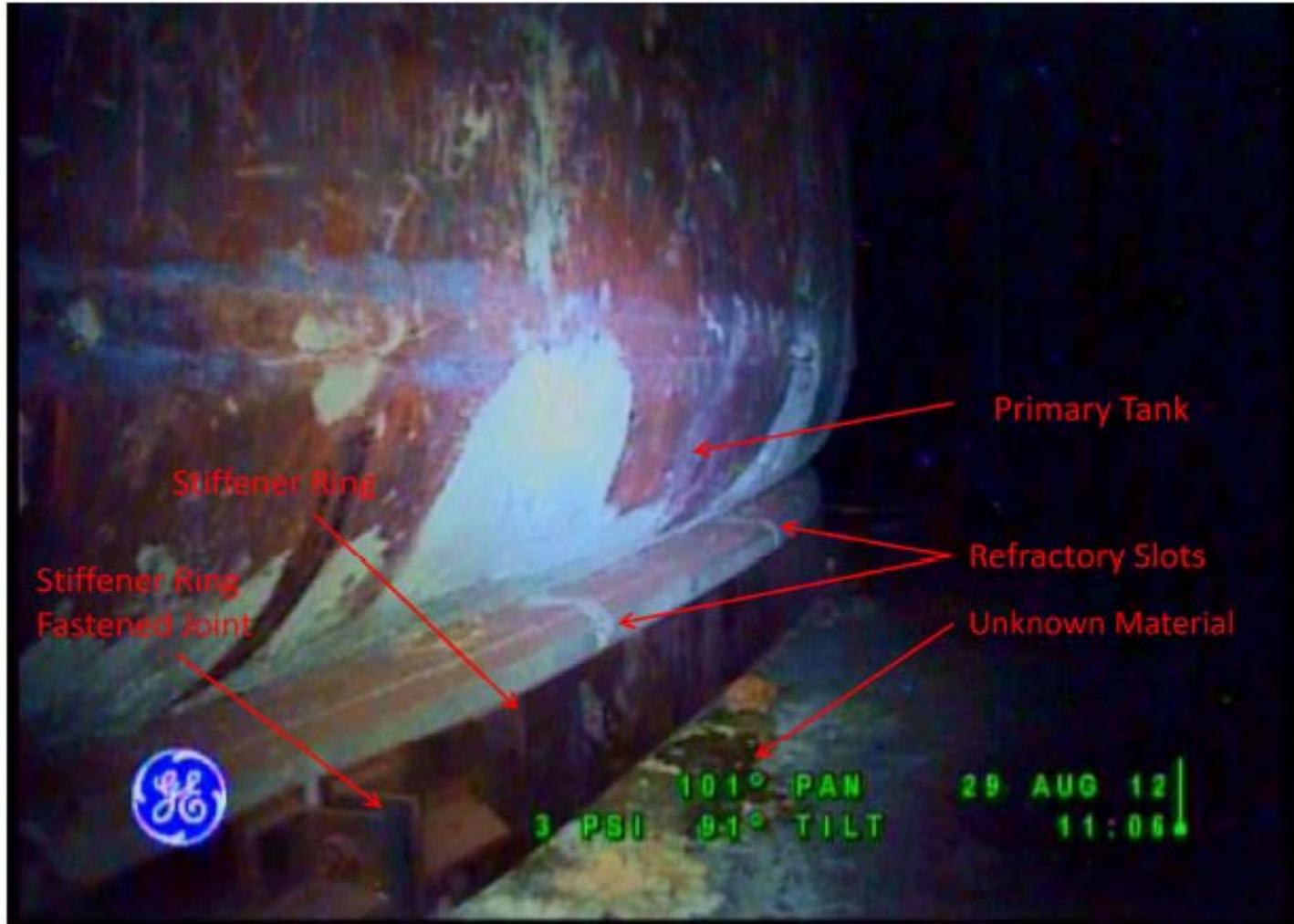
Photos from USDOE-ORP

Inspection Photographs from Riser 90 – August 10, 2012



Photos from USDOE-ORP

Overview of Region Viewed from Riser 83 – August 29, 2012





AY-102 Quadrant Map

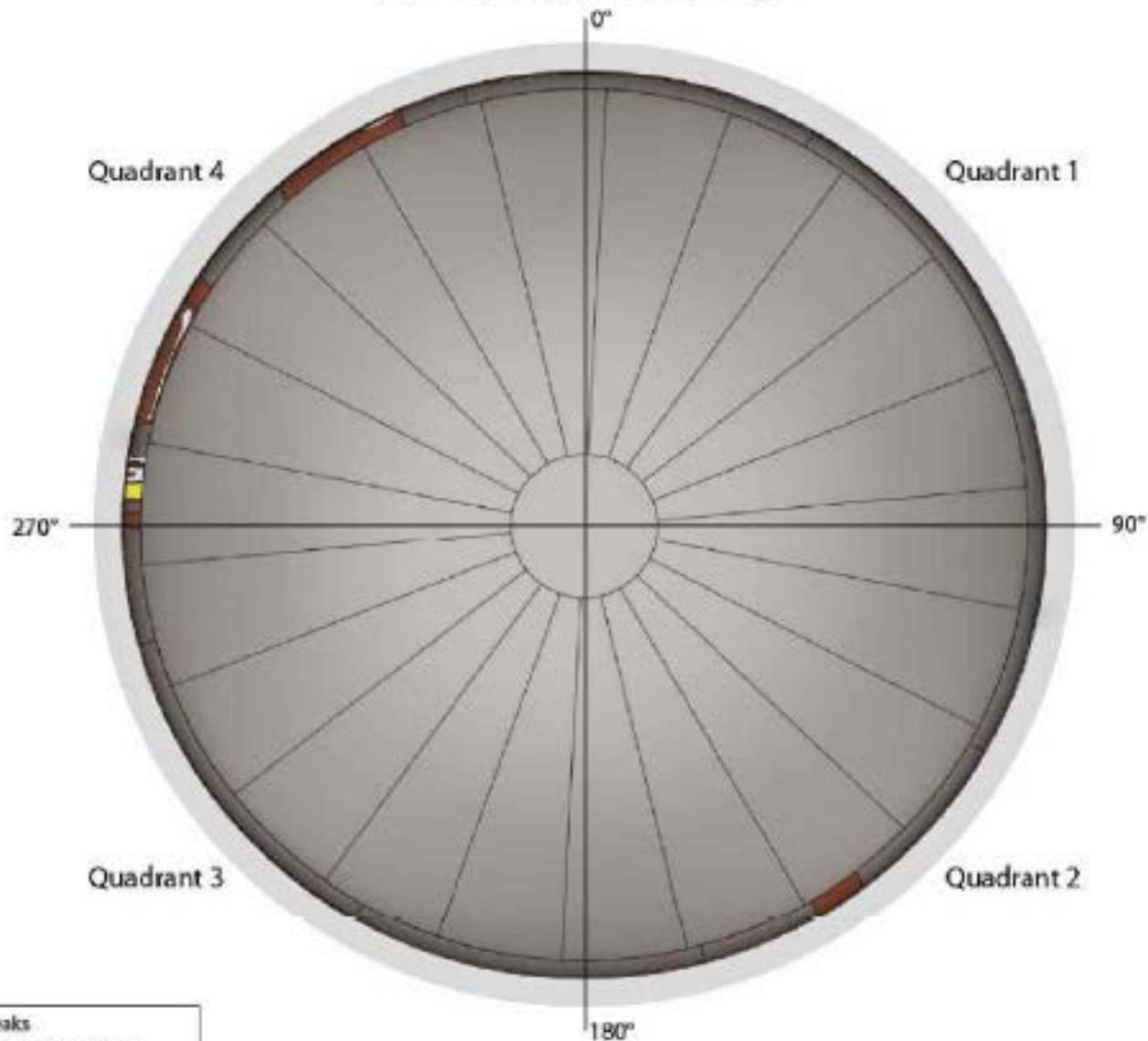
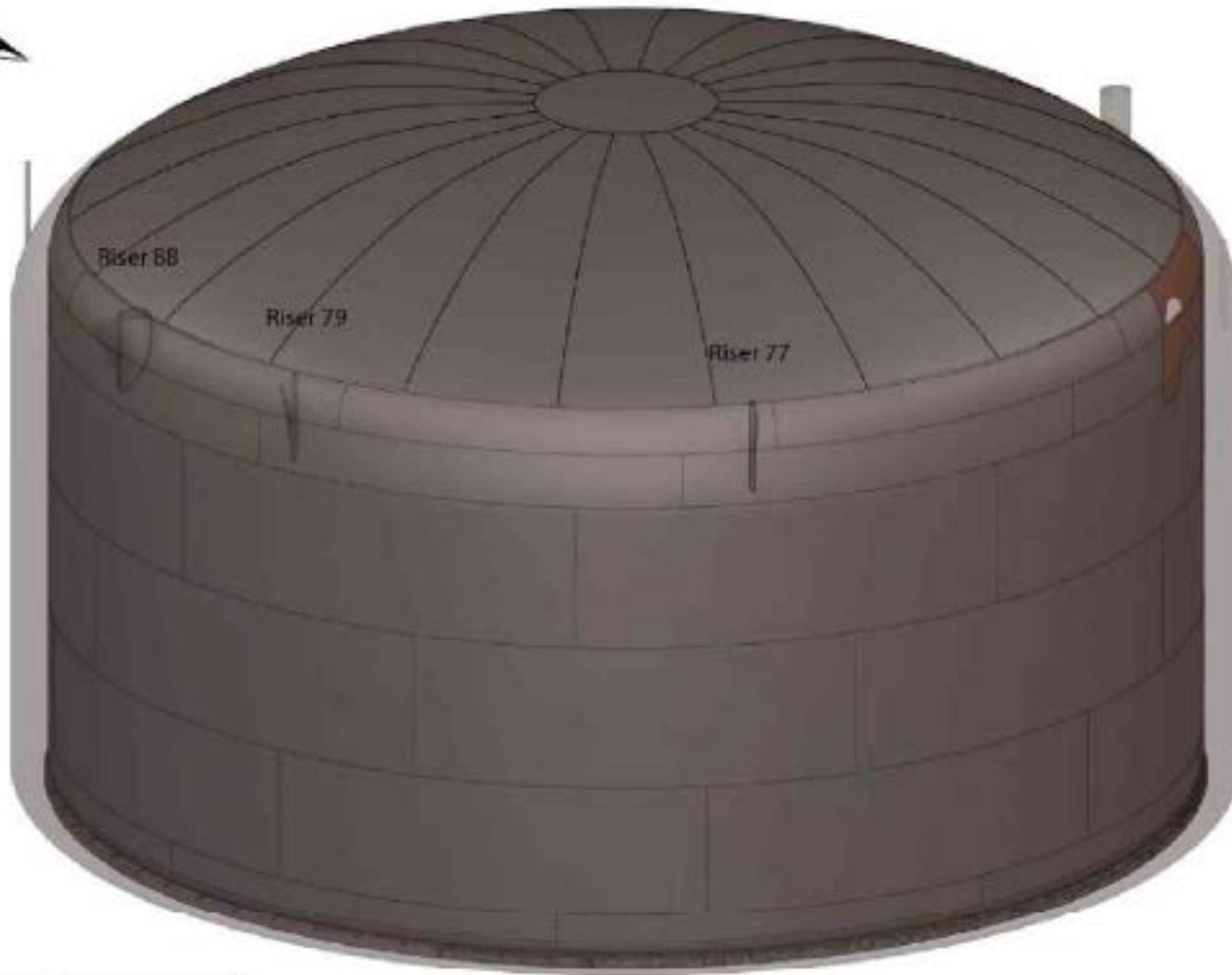


Figure C-6: 241-AY-102 Top View Corrosion

AY-102 Quadrant 1

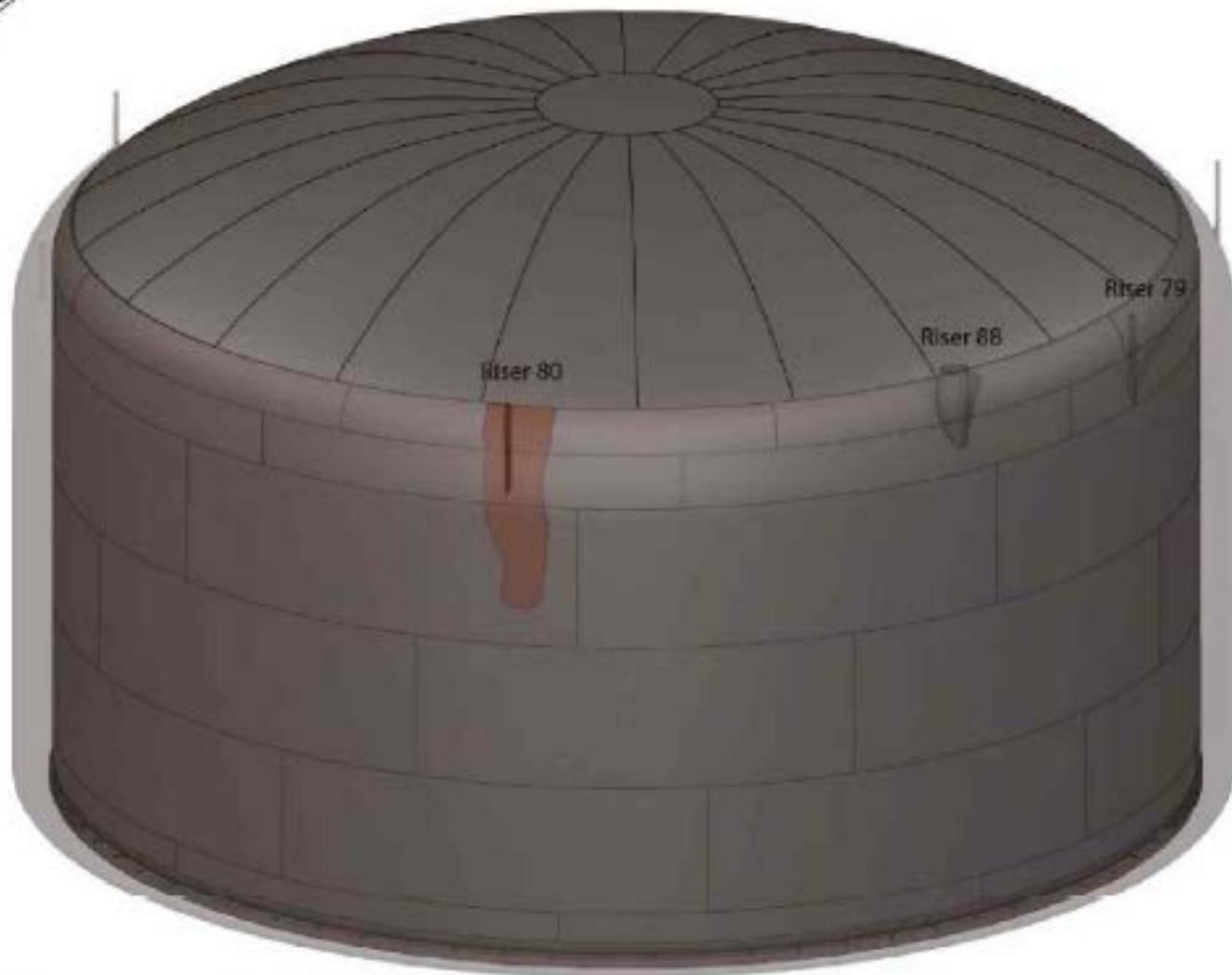


LEGEND

	Corrosion Streaks
	White Mineralization Build-up
	Yellow Mineralization Build-up

Figure C-7: 241-AY-102 Quadrant 1 Corrosion

AY-102 Quadrant 2

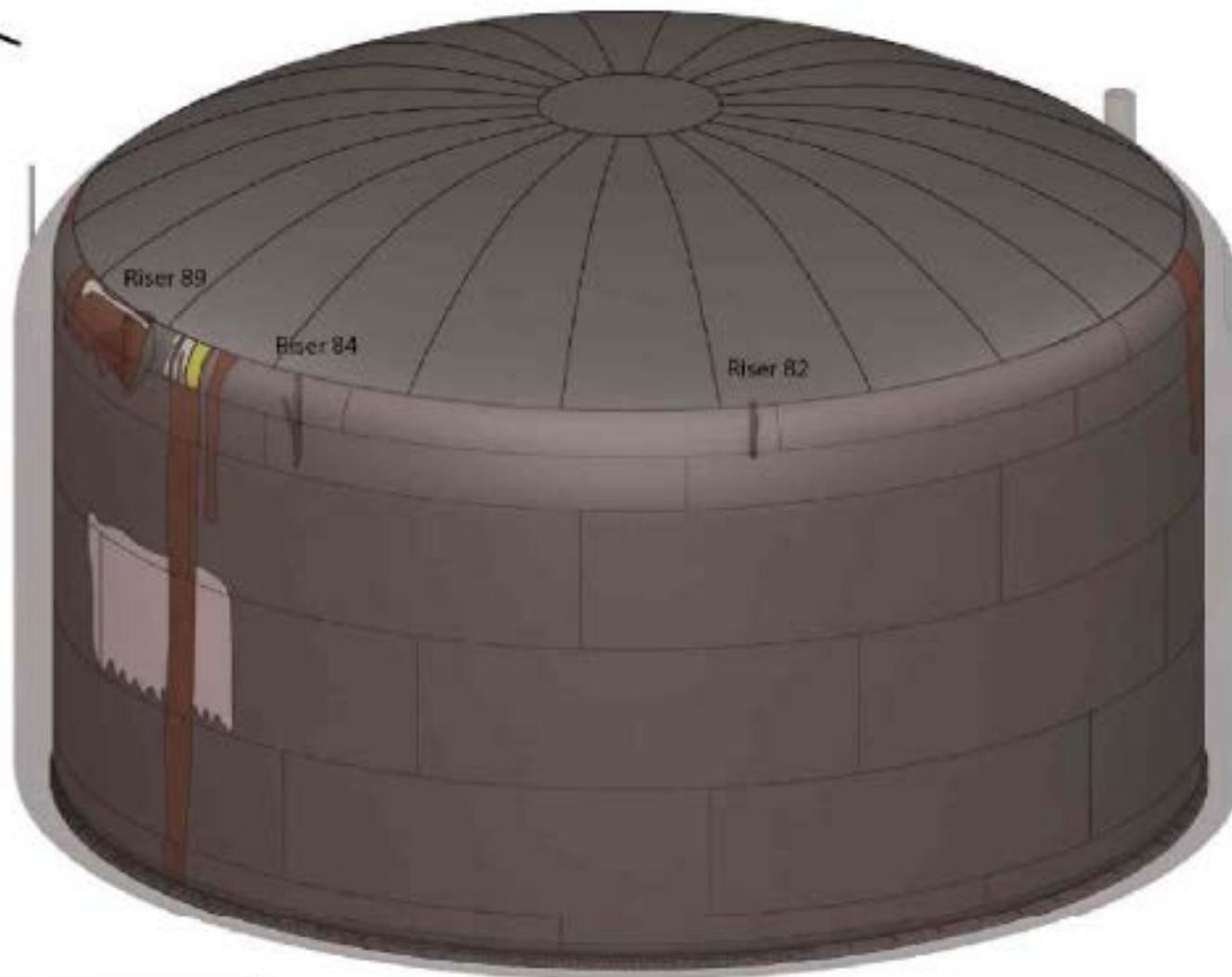


LEGEND

	Corrosion Streaks
	White Mineralization Build-up
	Yellow Mineralization Build-up

Figure C-8: 241-AY-102 Quadrant 2 Corrosion

AY-102 Quadrant 3

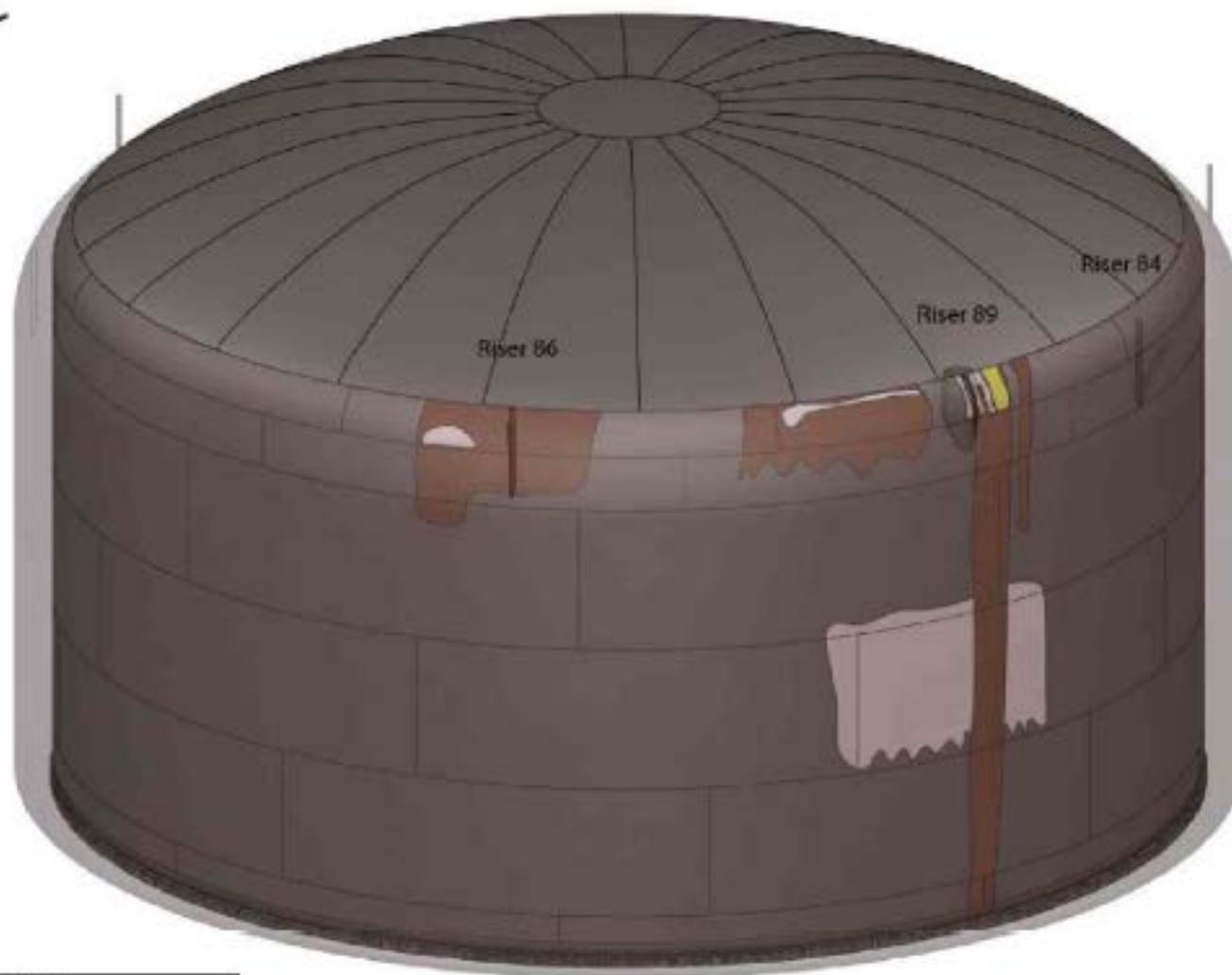


LEGEND

	Corrosion Streaks
	White Mineralization Build-up
	Yellow Mineralization Build-up

Figure C-9: 241-AY-102 Quadrant 3 Corrosion

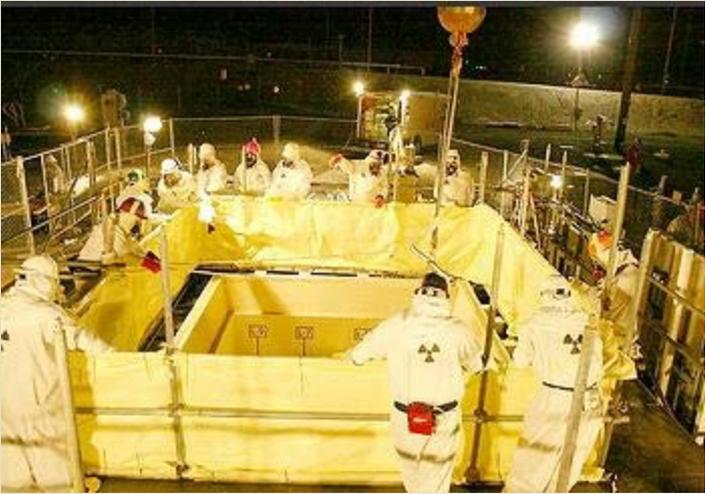
AY-102 Quadrant 4



LEGEND

	Corrosion Streaks
	White Mineralization Build-up
	Yellow Mineralization Build-up

Figure C-10: 241-AY-102 Quadrant 4 Corrosion



Path Forward



⌘ Engineering Reviews:

⌘ Schedule:

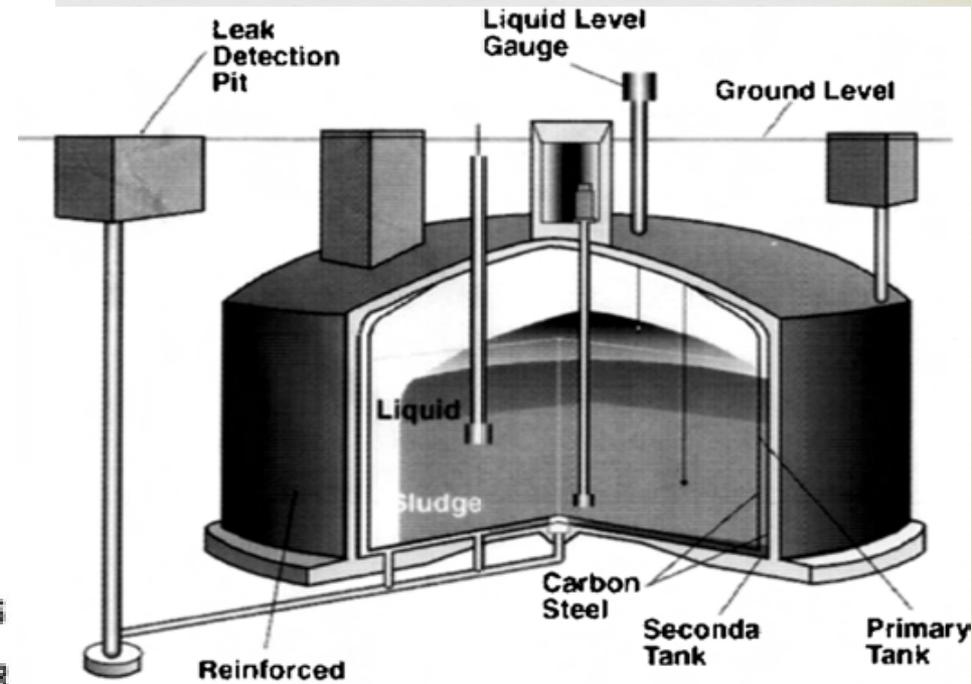
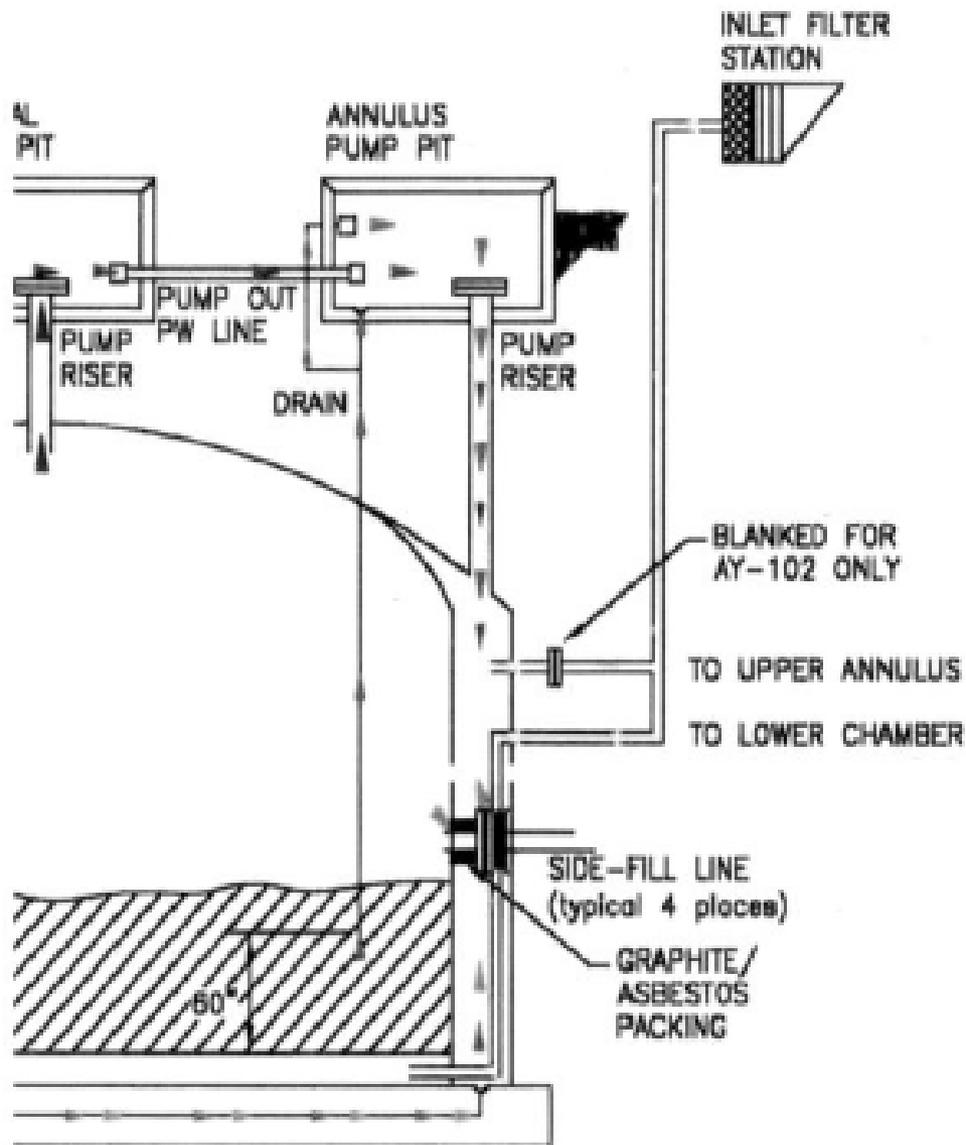
⌘ Sampling determine what the dried material is, find the leak/source of intrusion?

⌘ Emergency Pumping Guide requirement

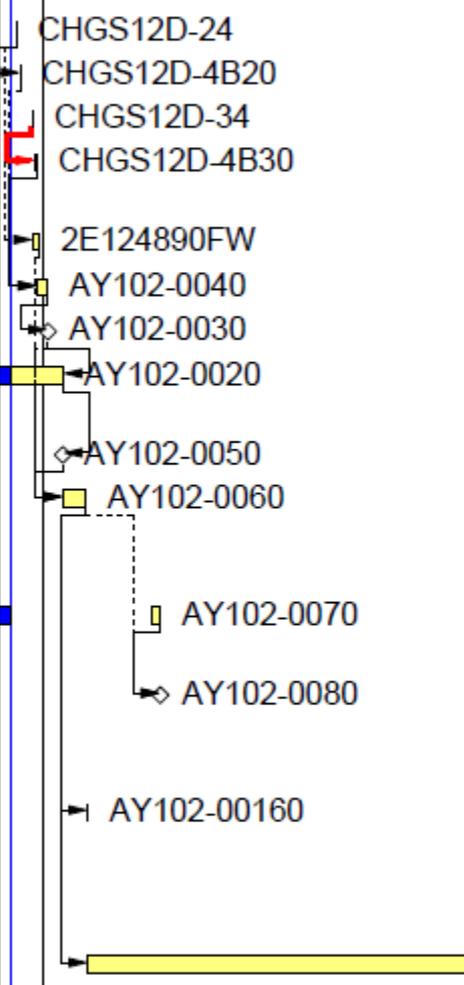
⌘ Have pumped out the Leak Pit Pump and nothing is getting out of the secondary Tank

⌘ Regulations anticipate the annulus to be cleaned and the tank recertified as “fit or use” by an IQRPE per our Dangerous Waste Requirements for Tank Systems.

Sources of Intrusion??



#	Activity Name	Forecast Start	Forecast Finish	CSLW	Total Float	FY2013																	
						F	F	F	F	F	F	F	F	F	F	F	F						
-102 Decision Point																							
Decision																							
	AY-102 Grab Sample (Leak Detection)	07-Sep-12*	07-Sep-12	0	6																		
	AY-102 Grab Sample Shipment (Leak Detection)	10-Sep-12	11-Sep-12	0	6																		
	AY-102 Grab Sample (Annulus Sample)	21-Sep-12*	21-Sep-12	0	-3																		
	AY-102 Grab Sample Shipment (Annulus Sample)	24-Sep-12	25-Sep-12	0	-3																		
	FW - AY-102 Pump Leak Detection Pit	21-Sep-12*	27-Sep-12		194																		
	Analyze Samples	26-Sep-12	04-Oct-12	-1	183																		
	Sampling RESULTS		04-Oct-12	-1	183																		
	Tank Leak Assessment	13-Aug-12 A	16-Oct-12	-1	296																		
	Issue Report		16-Oct-12	-1	183																		
	DECISION: Option 1, 2, or 3	17-Oct-12	06-Nov-12	-1	183																		
OPTION 1: Pump Supernate																							
	Prepare to Pump Supernatant	16-Aug-12 A	09-Jan-13	-1	2403																		
	DECISION: PUMP Supernatant		09-Jan-13	-1	2403																		
OPTION 2: Empty AY-102																							
	Additional Information Required Before Any Actions Taken	07-Nov-12	07-Nov-12	-1	2439																		
OPTION 3: Do Not Pump AY-102																							
	Continue SURVEILLANCE & MONITORING	07-Nov-12	07-Nov-13	-1	2210																		



Future Implications



- ❧ 241-AY-102 is the feed tank for WTP
- ❧ Increased Monitoring & Sampling
- ❧ Loss of DST Tank Space – should it require
Emergency Pumping and Repair
 - ❧ Retrieval severely impacted.
 - ❧ Never pumped a DST out before
 - ❧ How does one repair (technically, logistically while preventing a release to the environment and protecting human health?

Emergency Pumping



☞ Emergency Pumping Guide of a Minor Leak (cont.):

STRATEGY: Begin pumping primary tank contents via existing underground supernatant transfer pipelines with the existing transfer pump already installed in the central pump pit. In parallel, install and prepare an annulus pump. Identify location of leak point by performing video surveillance of annulus. Continue pumping the primary tank until the waste level is sufficiently below the leak path. When and if pumpable quantities of liquid accumulate in the annulus, the annulus will then be pumped through the annulus pump pit, via the submersible or reciprocating pump, to the designated receiving tanks.

BENEFITS OF STRATEGY: For minor leaks, this strategy minimizes the amount of waste that will be leaked to the annulus by using transfer pumps and pipelines already installed and serviceable to lower the waste level in the primary tank. If pumpable quantities accumulate in the annulus, they will be removed as expeditiously as possible. Scenario: Primary steel tank corrosion causes small breach. Waste dribbles into annulus and the annulus Continuous Air Monitor alarms. Leak rate is so slow that dried waste will form on side of tank. Liquid accumulates in the bottom of the annulus very slowly over a period of weeks or months, if at all.

