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ENGINEERING DATA TRANSMITTAL

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1	WHC-SD-W236A-TI-011	- - -	- ① -	Position Paper, W236A/MWTF - Tank Temperature Element Location	SQ	1,2		

16. KEY									
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17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)									
(G)	(H)	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN
1,2	1,2	Cog.Eng. - ME Hughes	<i>[Signature]</i>	13 Dec 94	84-08				
1,2	1,2	Cog. Mgr. - RL Fritz	<i>[Signature]</i>	13 Dec 94	84-07				
1,2	1	QA - LR Hall	<i>[Signature]</i>	13/94	84-08				
1,2	1	Safety - SE Chalk	<i>[Signature]</i>	14/14/94	84-08				
		OSTI (2) 48-07							
18. ME Hughes <i>[Signature]</i> Signature of EDT Originator		19. ME Hughes <i>[Signature]</i> Authorized Representative for Receiving Organization		20. RL Fritz <i>[Signature]</i> Cognizant Manager		21. DOE APPROVAL (if required) Ctrl. No. N/A ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments			
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RELEASE AUTHORIZATION

Document
Number:

WHC-SD-W236A-TI-011 Rev. 0

Document
Title:

Position Paper - Tank Temperature Element Location

Release Date:

January 4, 1995

This document was reviewed following the
procedures described in WHC-CM-3-4 and is:

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

V. L. Birkland

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January 4, 1995

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SUPPORTING DOCUMENT		1. Total Pages <i>84</i>
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7. Abstract Position Paper to develop and document a position on the number and location of temperature elements to be used in the Project W-236A, MWTF waste storage tanks.		
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March 16, 1994
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POSITION PAPER ON PROJECT W-236A
TANK TEMPERATURE ELEMENT LOCATION

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POSITION PAPER ON PROJECT W-236A TANK TEMPERATURE ELEMENT LOCATION

Purpose

The purpose of this paper is to develop and document a position on the number and location of temperature elements to be used in the Project W-236A, Multi-Function Waste Tank Facility (MWTF) waste storage tanks. A recent value engineering study of waste tank instrumentation identified the number of tank temperature elements as having the potential to be reduced.

Background

The current preliminary design for the temperature element (TE) placement in the MWTF waste tanks is essentially a copy of the TE placement in existing Double-Shell Tanks (DST). The basis for the placement of these TEs in existing farms is not widely documented and was arrived at by consensus of participating engineers. Current designs call for 194 TEs in each tank on the primary tank bottom, sides, support pad, foundation, and on the secondary tank concrete walls, dome, and haunch (see ref. 1). An additional 18 TEs are located in the waste itself on a temperature tree.

Temperature is monitored in these areas to assure limits established for structural integrity by the structural analysis are not exceeded. These temperature limits include absolute temperature, and heat-up and cool-down rates.

Discussion

The thermal hydraulic analysis (ref. 2) conducted for the preliminary (Title I) design utilized a two-dimensional axi-symmetric model of the tank and surrounding soil. The reason for this is that it is very unlikely that there are any significant temperature gradients from one axial location to the next. There are two factors that contribute to this fact:

- 1) The tank waste in most circumstances will be well mixed using an installed mixing pump. Even if the pump is not used, the likelihood of having the waste settle with a higher radionuclide (heat) load on one axis as opposed to another is not a credible event. The MWTF tank limit of a maximum 30% solids by volume was established so that mixing could be performed relatively easily.

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POSITION PAPER ON PROJECT W-236A TANK TEMPERATURE ELEMENT LOCATION

2) The primary heat removal methods are primary ventilation and annulus ventilation. The use of active ventilation assures these two air/vapor spaces are well mixed and that little if any temperature gradients occur axially. Typically a temperature gradient will collapse very quickly in a gas space due to convection currents.

Conclusions

Based on the discussion above, the MWTF project office has determined and is seeking concurrence that temperatures in the primary tank bottom and walls, in the secondary tank concrete walls and dome, and in the primary tank support pad, and in the tank foundation, be monitored primarily in one quadrant instead of all four. Some TEs will be added in a few key locations (such as the upper haunch) in the other quadrants.

It has also been recommended by personnel performing the thermal hydraulic analysis of the tanks that it would be desirable to know the temperature in the annulus air space above the air inlet manifolds where air mixing occurs with air coming from underneath the tanks. TEs will be added in this location.

This approach will not only provide a savings in initial capital costs, but will also result in a reduction in future operating and maintenance costs.

References

1. Drawing H-2-815812, "Instrumentation, Piping & Instrument Diagram TK-101 Temp Monitoring Sys".
2. WHC-SD-W236A-ER-006, Rev. 0, "Multi-Function Waste Tank Facility Thermal Hydraulic Analysis For Title I Design", E.R. Cramer and B.A. Crea, November, 1993.