St 4.2
JUL 19 2000

ENGINEERING DATA TRANSMITTAL

Page 1 of 1
1. EDT **629682**

2. To: (Receiving Organization) Distribution		3. From: (Originating Organization) Equipment Engineering		4. Related EDT No.: N/A	
5. Proj./Prog./Dept./Div.: RPP Corrosion Probe		6. Design Authority/Design Agent/Cog. Engr.: EC Norman <i>Resp.</i>		7. Purchase Order No.: N/A	
8. Originator Remarks: This document satisfies the requirements of Milestone A.4-1 of FY 2000 TTP # RLO-9-WT-41				9. Equip./Component No.: N/A	
				10. System/Bldg./Facility: N/A	
				12. Major Assm. Dwg. No.: N/A	
				13. Permit/Permit Application No.: N/A	
11. Receiver Remarks: Summary report of technical committee meeting				14. Required Response Date: N/A	
15. DATA TRANSMITTED					
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator
1	RPP-6187		0	FY 2000 Tanks Focus Area	N/A
				Corrosion Monitoring	
				Technical Committee	
				Meeting Summary Report	
16. KEY					
Approval Designator (F)		Reason for Transmittal (G)		Disposition (H) & (I)	
E, S, Q, D OR N/A (See WHC-CM-3-5, Sec. 12.7)		1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)		1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged	
17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)					
(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
		Design Authority			
		Design Agent			
1	1	<i>Asst. Cog. Engr.</i> EC Norman	<i>E.C. Norman</i>	6/27/00	
1	1	<i>Resp. Cog. Mgr.</i> AH Friberg	<i>AH Friberg</i>	7/13/00	
		QA			
		Safety			
		Env.			
18. Signature of EDT Originator <i>E.C. Norman</i>		19. Authorized Representative for Receiving Organization <i>E.A. Fredenburg</i>		20. Design Authority/Cognizant Manager <i>AH Friberg</i>	
Date: 6/27/00		Date: 7/13/00		Date: 7/13/00	
21. DOE APPROVAL (if required) Ctrl No. _____ ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments					

FY 2000 Tanks Focus Area Corrosion Monitoring Technical Committee Meeting Summary Report

E. C. Norman

CH2M HILL Hanford Group, Inc.

Richland, WA 99352

U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 629682

UC: 2030

Org Code: 74700

Charge Code: 112671

B&R Code: EW4010000

Total Pages: 2822

28 7-19-00

Key Words: corrosion monitoring, electrochemical noise, probe,
Raman Spectroscopy

Abstract: Summary report of technical committee meeting

This document meets the requirements of TTP-RLO9-WT-41 Milestone A.4-1

TRADEMARK DISCLAIMER. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

Printed in the United States of America. To obtain copies of this document, contact: Document Control Services, P.O. Box 950, Mailstop H6-08, Richland WA 99352, Phone (509) 372-2420; Fax (509) 376-4989.

Release Approval 7/19/00
Date

Approved For Public Release

FY 2000 Tanks Focus Area Corrosion Monitoring Technical Committee Meeting
Summary Report

G. L. Edgemon
Hiline Engineering and Fabrication, Inc.
2105 Aviator Drive
Richland, Washington 99352

Introduction

An information exchange on corrosion monitoring was held on March 28, 2000 as required by Milestone A.4-1 of TTP RL0-9-WT-41. The goal of the meeting was to communicate the status of the corrosion monitoring efforts at the Hanford Site, Savannah River Site, and at Oak Ridge National Laboratory. The meeting was attended by Mr. Glenn Edgemon from Hiline Engineering and Fabrication, Mr. Michael Harper from Oak Ridge National Laboratory (ORNL), and Dr. Graham Bell from M. J. Schiff and Associates. Dr. John Mickalonis from the Savannah River Site was unable to attend but sent a set of overview slides which were presented by Mr. Glenn Edgemon. A summary of topics discussed and products of the meeting are shown in this report. The agenda and hard copies of presentation materials are shown in the Attachment.

Meeting Summary

The meeting was called to order at 5:00 p.m. on March 28, 2000 by Glenn Edgemon. Mr. Edgemon presented the overview slides provided by Dr. Mickalonis on the status of the SRTC (Savannah River Technology Center) effort to design, fabricate and install a combined corrosion monitoring and chemistry monitoring system into a waste tank at the Savannah River Site (SRS). Dr. Mickalonis serves as the Principle Investigator for the corrosion monitoring portion of the probe and Dr. David Hobbs serves as Principle Investigator for the chemistry species monitoring portion of the probe.

The objective of the task is to install this system into SRS Tank 43. The two technologies (chemistry monitoring and corrosion monitoring) have been combined into one in-tank system due to tank space limitations. The system designer is EIC Laboratories. An initial design review was held in December 1998. Fabrication of the system is underway. Cold testing is expected to start within the next few months. Installation of the final system is expected in FY 2001. A weekly conference call between all concerned parties helps keep communications in order for this complex project.

Raman spectroscopy has been selected for the chemistry species monitoring portion of the probe. Electrochemical Noise (EN) has been selected for the corrosion monitoring portion of the probe. Currently, mockup testing of both systems is underway. Probe head fabrication was completed in March 2000. Probe head is now at EIC laboratories where it will be fitted and assembled with the Raman instrumentation and corrosion monitoring cabling. The design of the lifting/drive mechanism for the probe head is near completion with fabrication expected to start within a few months. Bids are currently being taken by the Savannah River Site for the design and fabrication of the control panels that will be used to operate the lifting/drive mechanism, the Raman instrumentation and the corrosion monitoring equipment. Final test plans and training schedules for this system are currently being developed.

The second presentation was made by Mr. Glenn Edgemon on the status of the multi-function corrosion probe that was deployed into tank 241-AN-105 on the Hanford Site on January 13, 2000. Mr. Edgemon serves as the technical point of contact for the current corrosion monitoring effort at Hanford. Dr. Edgar Norman serves as the Hanford site PI for this effort and as the site point of contact for corrosion monitoring.

One of the principle objectives of last year's TTP (TTP RL0-8-WT-21) at Hanford was to design, fabricate and install a multi-function corrosion probe into DST 241-AN-105 during FY 1999. Design work for the multi-function probe was completed in April 1999. The focus of the redesign effort was to improve upon the existing corrosion probe design and to add new capabilities to the in-tank probe. The redesign effort resulted in a multi-function instrument that contains several features not seen on previous Hanford corrosion monitoring systems. In addition to the eight channels of EN corrosion monitoring electrodes incorporated on previous probes, the new system is also fitted with an array of 22 thermocouples, a verification thermocouple, a tank waste high level detector, three ports for pressure/gas sampling and a set of strain gauges to monitor the effects of tank operations on the downhole instrumentation. These features add a great deal of functionality to the probe, provide for a better understanding of the relationship between corrosion and other tank operating parameters, and optimize the use of the riser that houses the probe. This system was installed in January 2000 and has been operating continuously since installation.

Several data quality issues were identified after the first few weeks of operation. These problems stemmed from the type of cable used between the corrosion monitoring instrumentation and the top of the in-tank probe. Specifically, the driven shields provided by the instrumentation were creating cross-talk between channels in Belden 8178 cable. Shields were recently modified to correct this problem. The system is operating normally now. Data from the system is posted periodically on the internet at <http://www.hanford.gov/twrs/corrosion/data.htm>.

The third presentation was made by Mr. Mike Harper from Bechtel Jacobs at Oak Ridge National Laboratory. Mr. Harper updated the group on the status of the Oak Ridge National Laboratory corrosion monitoring effort. The goal of the program is to adapt the Hanford type electrochemical noise based corrosion monitoring system to the 304L stainless steel waste tanks at ORNL. Funding for the work comes from the TFA. Bechtel Jacobs Co. LLC is the EM M&I contractor. Hiline Engineering and Fabrication is responsible for system design and fabrication. ORNL is responsible for facilities and buildings. Waste Management Federal Services is in charge of system operations.

The tank selected for system deployment is tank W-23, a 50,000 gallon low-level radioactive waste tank used primarily for storage of evaporator concentrate. The tank was installed in the mid-1970's in an underground stainless lined concrete vault. The tank is approximately 12 feet in diameter by 61.5 feet long. Sludges were removed in 1999 during a tank cleaning campaign. Waste is generally caustic with pH maintained at approximately 12.5. Major anions are nitrates, nitrites, and sulfates.

Corrosion monitoring system design, equipment selection, equipment checkout, and laboratory baseline testing in simulated wastes is scheduled for FY 2000 and will be performed by Mr. Glenn Edgemon at ORNL. Finalized design and system fabrication is scheduled for FY 2001 at Hiline Engineering.

Conclusions

The primary purpose of the annual meeting between the corrosion monitoring personnel at the various DOE sites is to facilitate communications and promote technology transfer between the two sites. The close communications and good spirit of teamwork being exhibited between the parties representing the Hanford and Savannah River Sites has helped the Savannah River Site effort avoid many of the problems encountered during the initial development effort at Hanford. Similar benefits can be expected over the next few years as the ORNL program is developed.

Expected products of this meeting as defined in Milestone A.4-1 of TTP RL0-9-WT-41 are reports on the status of technical work at the sites, discussions of emerging technical issues, and results of laboratory experiments and field trials. The formal meeting, informal discussions throughout the week, and the presentation materials shown in the attachment to this document fulfill the expectations of this meeting.

At the conclusion of the meeting it was agreed that close communications should continue between the concerned parties at ORNL, SRTC and Hanford. Tentative plans were made to hold a similar meeting in approximately one year.

Attachment A: Agenda and Presentation Materials from FY 2000 TFA Information
Exchange

**CORROSION/2000
TFA INFORMATION EXCHANGE
ELECTROCHEMICAL NOISE BASED CORROSION MONITORING
TUESDAY, MARCH 28, 2000
IMMEDIATELY FOLLOWING T-2A COMMITTEE MEETING – SAME ROOM
SO...APPROXIMATELY FROM 5:00 PM – 7:00 PM
ORLANDO CONVENTION CENTER
ORLANDO, FLORIDA**

Contact: Glenn Edgemon
e-mail: glenne@hilineeng.com
Phone: 509-943-9043
Fax: 509-943-0856

- 1.0 Call to order
- 2.0 Introduction of meeting attendees
- 3.0 New business
 - .1 Information exchange: status of technical activities at SRS, Hanford, ORNL, and other DOE sites.
 - .2 Open discussion and questions from floor on new technology, successes, corrosion control issues, challenges, infuriations, etc.
- 4.0 Old business
- 5.0 Adjournment

SRS Corrosion and Chemistry Probe

Basic Description

- Techniques of detection
 - EN for corrosion of A537 and A106
 - Raman for chemistry (primarily NO_3^- , OH^- , NO_2^-)
- Height adjustable in tank - cable and reel
- Probe head dimensions - 6 in (w) $\times$ 14 in (l)
- Stainless steel housing and cable sheathing

SRS Corrosion and Chemistry Probe

Basic Description

SRS Corrosion and Chemistry Probe Project Status

- Jointly being developed and fabricated by government and private sectors: SRS, EIC Labs (Raman), Adriel Brothers (deployment system), HiLine Engineering (EN)
- Probe head fabricated but not assembled
- Deployment apparatus being fabricated
- Deployment planned for FY01

SRS Corrosion and Chemistry Probe Project Status

- Developing baseline data and checking instrumentation for Raman and EN in actual SRS waste samples
- Raman data has shown a slight increase in data variability in actual waste
- EN instrumentation difficulties which are currently being resolved.

105-AN Corrosion Monitoring Status

TFA Information Exchange

March 28, 2000

G. L. Edgemon
Hiline Engineering & Fabrication

Introduction

- System installed 1/13/00
 - 8 channels corrosion monitoring
 - C-rings and bullet shaped electrodes
 - 22 thermocouples
 - Verification thermocouple
 - High level detector
 - Pressure/gas sampling ports
 - Strain gauges

System Issues: Probe Hookup Response

- Channel 7 responded poorly to hookup

System Issues: Channel 6 & 8 Duplication

- Channels 6 and 8 periodically show same signal behavior

System Issues: Sensitivity/Data Quality?

- Some channels often at limit of detection/low resolution

Troubleshooting to Date

- 2/15/00 all channels checked out with constant current and voltage source
- 2/15/00 channels 6-8 swapped with 1-3
 - Problems transferred to new channels
 - Channel 7 data not unrealistic
- Channels 3-5 operating normally with exception of periods at limit of detection

Channel 6 & 8 Data Review

- Data collected before probe install

Channel 6 & 8 Data Review

- Data collected after probe install

Conclusions

- System problems do not lie with probe
 - Probe design is o.k.
 - Probe is not damaged or failed
- Data duplication not seen on system without intrinsic safety barriers
 - Problems likely lie here
- Issues remain with data quality and/or sensitivity

Plans for FY 2000 - 2001

- Continue troubleshooting/system improvement
 - Working with vendors/instrument techs.
- Add new system hardware to 105-AN
 - New EN system recently became available
 - Moves barriers to digital side of instrumentation
 - Flammable gas design review to start 3/00
- Compare old system with new

Corrosion Monitoring System at ORNL

- Adapt electrochemical noise (EN) corrosion monitoring technology developed for Hanford and SRS to 304L stainless steel radioactive waste tanks @ORNL.
- Project Team:
 - Tanks Focus Area – Funding Authority
 - Bechtel Jacobs Co. LLC – EM M&I Contractor
 - Hiline Engineering – System Design & Fabrication
 - Oak Ridge National Laboratory - Facilities
 - Waste Management Federal – System Operation
- While general corrosion @ ORNL stainless steel tanks has not been a problem, there is a benefit to understanding potential corrosion conditions, particularly at welds.
- A 50,000-gallon liquid low-level radioactive waste (LLLW) tank, W-23, used primarily for storage of evaporator concentrate has been selected for corrosion monitoring system deployment.
- Tank W-23 was installed in mid-1970s in underground stainless steel lined concrete vault.
- Tank is 12' in diameter by 61.5' long.
- Sludges were removed from W-23 in a 1999 tank cleaning campaign.
- LLLW in W-23 is generally caustic, with pH values approximately 12.5.
- Major anions are nitrates, nitrites, and sulfates.
- Design is scheduled for FY00, with system fabrication and deployment in FY01.

[illegible]