

## HLWYM HEmails

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**From:** Dennis Galvin  
**Sent:** Thursday, July 22, 2004 11:13 AM  
**To:** 'DDUNN@cnwra.swri.edu'; 'DGUTE@cnwra.swri.edu'; 'gcragno@cnwra.swri.edu'; Ken Chiang; Lietai Yang; Osvaldo Pensado; 'VJAIN@cnwra.swri.edu'; Xihua He; Yi-Ming Pan; Aladar Csontos; Tae Ahn  
**Cc:** Asadul Chowdhury; Sitakanta Mohanty; Andy Campbell; 'Abou-Bakr Ibrahim'; Bret Leslie; 'Dan Rom'; Gregory Hatchett; Marissa Bailey; Mysore Nataraja; Richard Codell; Timothy Kobetz  
**Subject:** TBD-6 and CLST Agreements Meeting  
**Attachments:** CLST Agreements Associated with TBDs 071204.wpd; Status of CLST 1-14 & 1-15 References.wpd

### CLST and Associates

I have scheduled a meeting for Friday 7/23/04 from 10:00 to 11:00, though the room is reserved until 12:00.

The first purpose of the meeting is to discuss the selection of authors, technical leads, and the agreement outline due dates. To the extent possible, I would like to identify dates for the first draft of letters based on the results of the second half of the meeting.

The second part of the meeting is to discuss our first impression of the appendices to see which agreements may be readily closed or are likely to lead to a request for references. The CNWRA is scheduled to provide a compilation of initial impressions of the appendices by close of business Thursday 7/22/04. Please try and read the appendices assigned to you last Tuesday by tomorrow morning's meeting.

The Bridge line is 1-800-638-8081 or 301-231-5539, pass code 5447#. I have reserved 4 lines.

I have also attached the TBD-6 Agreements table. Note for Appendix L, I had provided the ADAMs # for the transmittal letter. I have now provided the ADAMs number for the appendix.

Note that in our January 24, 2003 letter to DOE (ML030270065), we accepted the DOE approach to provide the information for CLST 1.05 with CLST 1.04 and CLST 2.07 with CLST 2.04. Please consider this when reviewing CLST 1.04 and CLST 2.04.

Also, references for CLST 1.14 and 1.15 should be available to in the DOE local office (see attached).

Thanks,

Dennis

**Hearing Identifier:** HLW\_YuccaMountain\_Hold\_EX  
**Email Number:** 1681

**Mail Envelope Properties** (s0ffa126.028)

**Subject:** TBD-6 and CLST Agreements Meeting  
**Sent Date:** 7/22/2004 11:12:35 AM  
**Received Date:** 7/22/2004 11:16:58 AM  
**From:** Dennis Galvin

**Created By:** Dennis.Galvin@nrc.gov

**Recipients:**

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<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	1469	7/22/2004 11:16:58 AM
CLST Agreements Associated with TBDs 071204.wpd		42046
Status of CLST 1-14 & 1-15 References.wpd		7547

**Options**

**Priority:** Standard  
**Return Notification:** No  
**Reply Requested:** No  
**Sensitivity:** Normal  
**Expiration Date:**  
**Recipients Received:**

### CLST Documents and Agreements Status

Document	Document Name	Document Date	Agreement	Rank	Review Team - Lead First	Comment Date	Draft Date	Document Status
TBD-6 Appendix A ML033450501	Measurement of Corrosion Rates of Waste Package Materials	12/09/03	CLST 1.07 AIN-1 (High)	High	Dennis Galvin Darrell Dunn Dick Codell			With Senior PM - Closing the Agreement
TBD-6 Appendix B ML033450501	Distribution of Stresses	12/09/03	CLST 1.13 (Low) GEN 1.01 Comment 120	Low	Al Csontos Tae Ahn Darrell Dunn Doug Gute		07/23/04	CNWRA will prepare first draft of letter
TBD-6 Appendix C ML033450501	Rockfall and Dead-Weight Affects	12/09/03	CLST 1.14 (Medium)	Medium	Tae Ahn Al Csontos Darrell Dunn Doug Gute			Tae Ahn preparing response - Work with Greg to obtain references
TBD-6 Appendix D ML033450501	Effects of Fabrication on the Susceptibility of Alloy-22 and Titanium Grade 7 to Corrosion and Stress Corrosion Cracking	12/09/03	CLST 1.15 (Medium)	Medium	Tae Ahn Al Csontos Darrell Dunn			Tae Ahn preparing response - Work with Greg to obtain references
TBD-6 Appendix E ML033450501	Thermal Profile of the Waste Package Material Due to Induction Annealing	12/09/03	CLST 1.16 (Low)	Low	Dennis Galvin Darrell Dunn Dick Codell			With Senior PM - Closing the Agreement
TBD-6 Appendix F ML033450501	Stress Measure for Assessing the Susceptibility of Various Engineered Barrier System Materials to Stress Corrosion Cracking	12/09/03	RDTME 3.18 (Low)	Low	Al Csontos Tae Ahn Darrell Dunn Doug Gute			Al Csontos preparing response

### CLST Documents and Agreements Status

Document	Document Name	Document Date	Agreement	Rank	Review Team - Lead First	Comment Date	Draft Date	Document Status
TBD-6 Appendix G ML033450501	Quantification of the Resistance of Alloy 22 and Titanium Grade 7 to Environmentally Assisted Cracking Phenomena	12/09/03	CLST 1.12 (Medium) Gen 1.01 Comment 119	Medium	Tae Ahn Al Csonotos Darrell Dunn		07/23/04	CNWRA will prepare first draft of letter
TBD-6 Appendix H ML033450501	Expected Behavior of Alpha Titanium Alloys	12/09/03	CLST 6.02 AIN-1 (Low) CLST 6.03 AIN-1 (Low)	Low	Al Csonotos Tae Ahn Darrell Dunn		07/23/04	CNWRA will prepare first draft of letter - Supports Appendix K
TBD-6 Appendix I ML041600043	Surface Analysis of Corrosion Test Specimens for Dealloying	05/28/04	CLST 1.02 (Medium)	Medium	Lietai Yang Ken Chiang Dennis Galvin			Provide initial assessment by 7/22/04*
TBD-6 Appendix J ML041600044	Waste Package Effects of Silica on Corrosion	05/28/04	CLST 1.06 AIN-1 (Medium)	Medium	Lietai Yang Kien Chiang Dennis Galvin			Provide initial assessment by 7/22/04*
TBD-6 Appendix K ML041910139	Point-Loading Rockfall Evaluations and the Effects of Seismic Excitation on the Drip Shield and Waste Package	07/02/04	CLST 2.02 (Low) CLST 2.08 (High) CLST 2.09 (Low)	High	Doug Gute Al Csonotos Louis Ibarra Darrell Dunn Buck Ibrahim			Provide initial assessment by 7/22/04*
TBD-6 Appendix L ML041590369	Waste Package and Drip Shield Stress Corrosion Cracking	05/28/04	TSPA I 3.03 AIN-1 (Low)	Low	Doug Gute Yi-Ming Pan			Provide initial assessment by 7/22/04*



## CLST Documents and Agreements Status

Document	Document Name	Document Date	Agreement	Rank	Review Team - Lead First	Comment Date	Draft Date	Document Status
TBD-6 Appendix T ML041900513	Microstructural and Compositional Variations of Alloy 22	06/30/04	PRE 7.03 (Medium)	Medium	Al Csontos Yi-Ming Pan Tim Kobetz			Provide initial assessment by 7/22/04*
TBD-6 Appendix U ML041810021	Waste Package: Mechanical Properties of Alloy 22 Welds	06/24/04	PRE 7.05 (Medium)	Medium	Al Csontos Yi-Ming Pan Tim Kobetz			Provide initial assessment by 7/22/04*
TBD-6 Appendix V ML041810023	Waste Package - Corrosion Rate Measurements on Alloy 22	06/24/04	CLST 1.03 (Medium)	Medium	Lietai Yang Gustavo Cragolino Tae Ahn			Provide initial assessment by 7/22/04*
TBD-14 Appendix A ML041880126	Rockfall and Vibratory Loading Effects on the Mechanical Failure of Cladding and Methodology Used to Implement the Effects of Seismic Effects on Cladding	06/29/04	CLST 3.10 (Low) TSPAI 3.06 (Low)	Low	Doug Gute			
TBD-14 Appendix D ML041880126	Documentation of Seismic Fragility Curves and Seismic Risk Analyses	06/29/04	SDS 2.04 AIN-1 (Low)	Low	Doug Gute			
TBD-5 Appendix A ML033520270	Credible Range of Brine Water Chemistry and Consistency Between Corrosion Testing Environments and Models	11/30/03	CLST 1.01 (High) TSPAI 3.12 (High) TSPAI 3.13 (Medium) GEN 1.01 Comments 50, 113, 118, 122, 124	High	Dave Brooks Bobby Pabalan			Dave Brooks Preparing Response

## CLST Documents and Agreements Status



## CLST Documents and Agreements Status

### Appendix I: Surface Analysis of Corrosion Test Specimens for Dealloying

CLST 1.02 (Medium) Provide the documentation for the path forward items listed on slide 12. [

- surface elemental analysis of alloy test specimens is necessary for determination of selective dissolution;
- surface analysis of welded specimens for evidence of dealloying;
- continue testing including simulated saturated repository environment to confirm enhancement factor]

DOE will provide the documentation in a revision to AMR “General and Localized Corrosion of Waste Package Outer Barrier” by LA.

### **Listed Documents:**

General and Localized Corrosion of Waste Package Outer Barrier AMR: ANL-EBS-MD-000003  
- on DOE Website

## CLST Documents and Agreements Status

### Appendix K: Point-Loading Rockfall Evaluations and the Effects of Seismic Excitation on the Drip Shield and Waste Package

CLST 2.02 (Low) Provide the documentation for the point loading rockfall analysis. DOE stated that point loading rock fall calculations will be documented in the next revisions of AMRs ANL-XCS-ME-000001, Design Analysis for the Ex-Container Components, and ANL-UDC-MD-000001, Design Analysis for UCF Waste Packages, both to be completed prior to LA.

CLST 2.08 (High) Provide documentation of the path forward items in the “Subissue 2: Effects of Phase Instability of Materials and Initial Defects on the Mechanical Failure and Lifetime of the Containers”? presentation, slide 16.

*[future rockfall evaluations will address*

*(1) effects of potential embrittlement of WP closure material after stress annealing due to aging,*

DOE stated that the rockfall calculations addressing potential embrittlement of the waste package closure weld and rock falls of multiple rock blocks will be included in the next revision of the AMR ANL-UDCMD-000001, Design Analysis for UCF Waste Packages, to be completed prior to LA.

*(2) effects of drip shield wall thinning due to corrosion;*

*(3) effects of hydrogen embrittlement on titanium drip shield; and*

*(4) effects of multiple rock blocks falling on WP and drip shield;*

Rock fall calculations addressing drip shield wall thinning due to corrosion, hydrogen embrittlement of titanium, and rock falls of multiple rock blocks will be included in the next revision of the AMR ANL-XCS-ME-000001, Design Analysis for the Ex-Container Components, to be completed prior to LA.

*[Future seismic evaluations will address the effects of static loads from fallen rock on drip shield during seismic events]*

Seismic calculations addressing the load of fallen rock on the drip shield will be included in the next revision of the AMR ANL-XCS-ME-000001, Design Analysis for the Ex-Container Components, to be completed prior to LA.

CLST 2.09 (Low) Demonstrate the drip shield and waste package mechanical analysis addressing seismic excitation is consistent with the design basis earthquake covered in the SDS KTI. DOE stated that the same seismic evaluations of waste packages and drip shield (revision of AMRs ANL-UDC-MD-000001 and ANL-XCS-ME-000001) will support both the SDS KTI and the CLST KTI, therefore consistency is ensured. These revisions will be completed prior to LA.

Listed Documents:

## CLST Documents and Agreements Status

Design Analysis for the Ex-Container Components: ANL-XCS-ME-000001

Design Analysis for UCF Waste Packages: ANL-UDC-MD-000001

## CLST Documents and Agreements Status

### Appendix M: Corrosion Rates, Uncertainty and Variability Determination, and Propagation of Uncertainty

TSPA1.3.01 Propagate significant sources of uncertainty into projections of waste package and drip shield performance included in future performance assessments.

Specific sources of uncertainty that should be propagated (or strong technical basis provided as to why it is insignificant) include:

- (1) the uncertainty from measured crevice and weight-loss samples general corrosion rates and the statistical differences between the populations,
- (2) the uncertainty from alternative explanations for the decrease in corrosion rates with time (such as silica coatings that alter the reactive surface area),
- (3) the uncertainty from utilizing a limited number of samples to define the correction for silica precipitation,
- (4) the confidence in the upper limit of corrosion rates resulting from the limited sample size, and
- (5) the uncertainty from alternative statistical representations of the population of empirical general corrosion rates.

The technical basis for sources of uncertainty will be established upon completion of existing agreement items CLST 1.4, 1.5, 1.6, and 1.7. DOE will then propagate significant sources of uncertainty into projections of waste package and drip shield performance included in future performance assessments. This technical basis will be documented in a future revision of the General and Localized Corrosion of Waste Package Outer Barrier AMR (ANL-EBS-MD-000003) expected to be available consistent with the scope and schedules for the specified CLST agreements. The results of the AMR analyses will be propagated into future TSPA analyses for any potential license application.

TSPA1.3.04 Provide the technical basis that the representation of the variation of general corrosion rates (if a significant portion is "lack of knowledge" uncertainty) does not result in risk dilution of projected dose responses (ENG1.3.3). DOE will provide the technical basis that the representation of the variation of general corrosion rates results in reasonably conservative projected dose rates. The technical basis will be documented in an update to the WAPDEG Analysis of Waste Package and Drip Shield Degradation AMR (ANL-EBS-PA-000001). This AMR is expected to be available to NRC in FY 2003. These results will be incorporated into future TSPA documentation for any potential license application.

TSPA1.3.05 Provide the technical basis for the representation of uncertainty/variability in the general corrosion rates in revised documentation. This technical basis should provide a detailed discussion and analyses to allow independent reviewers the ability to interpret the representations of 100% uncertainty, 100% variability, and any intermediate representations in the DOE model (ENG1.3.6). DOE will provide the technical basis for the representation of uncertainty/variability in the

## CLST Documents and Agreements Status

general corrosion rates. This technical basis will include the results of 100% uncertainty, 100% variability, and selected intermediate representations used in the DOE model. These results will be documented in an update to the WAPDEG Analysis of Waste Package and Drip Shield Degradation AMR (ANL-EBS-PA-000001) or other document. This AMR is expected to be available to NRC in FY 2003.

### Listed documents:

General and Localized Corrosion of Waste Package Outer Barrier AMR: ANL-EBS-MD-000003  
- on DOE Website

WAPDEG Analysis of Waste Package and Drip Shield Degradation AMR: ANL-EBS-PA-000001  
- on DOE Website

## CLST Documents and Agreements Status

### Appendix O: Critical and Corrosion Potentials for Alloy 22

- CLST.1.10 Provide the documentation for Alloy 22 and titanium for the path forward items listed on slide 21 and 22. [
- measure corrosion potentials in the LTCTF to determine any shift of potential with time toward the critical potentials for LC;
  - determine critical potentials on welded and welded and aged coupons of Alloy 22 vs those for base metal - particularly important if precipitation or severe segregation of alloying elements occurs in the welds;
  - separate effects of ionic mix of specimens in YM waters on critical potentials - damaging species from potentially beneficial species;
  - determine critical potentials in environments containing heavy metal concentrations]
- DOE will provide the documentation in a revision to AMRs (ANL-EBS-MD-000003 and ANL-EBS-MD-000004) prior to LA.
- CLST.1.11 Provide the technical basis for the selection of the critical potentials as bounding parameters for localized corrosion, taking into account MIC. DOE will provide the documentation in a revision to AMRs (ANL-EBS-MD-000003 and ANL-EBS-MD-000004) prior to LA.

### Listed Documents:

General and Localized Corrosion of Waste Package Outer Barrier: ANL-EBS-MD-000003  
- on DOE Website

General and Localized Corrosion of the Drip Shield: ANL-EBS-MD-000004  
- not on DOE Website

## CLST Documents and Agreements Status

### Appendix R: Continued Testing in Long Term Corrosion Test Facility

CLST.1.04 Provide the documentation for Alloy 22 and titanium for the path forward items listed on slide 14. [

- continue testing in the LTCTF;
- add new bounding water test environments to LTCTF (SSW & BSW);
- install thinner coupons in LTCTF with larger surface area/volume ratios;
- install high sensitivity probes of Alloy 22 in some of the LTCTF vessels;
- materials testing continues during performance confirmation]

DOE will provide the documentation in a revision to AMR "ANL-EBS-MD-000003 and ANL-EBS-MD-000004" by LA.

### Listed Documents:

General and Localized Corrosion of Waste Package Outer Barrier: ANL-EBS-MD-000003  
- on DOE website

General and Localized Corrosion of the Drip Shield: ANL-EBS-MD  
- not on DOE website

**From:** John Starmer <jstarmer@TerranearPMC.com>  
**To:** <Timothy.Gunter@ymp.gov>, "Gregory Hatchett" <GXH@nrc.gov>  
**Date:** 7/21/04 6:07PM  
**Subject:** Re: RESPONSE:Request Documents for TBD 6, CLST 1.14 and 1.15

Tim,  
I will check on e-availability in the morning.  
John

At 04:46 PM 7/21/2004, Timothy.Gunter@ymp.gov wrote:

>Greg,  
>  
>Copies have been made and are going out by FedEx this afternoon. They will  
>arrive in the Licensing Support Office Thursday morning. (There was  
>apparently some issue with the availability of electronic files of the  
>record copies, so we were not able to e-mail them).  
>  
>John S. - if you are able to access them on the computer system, it is okay  
>for NRC staff to view these until hard copies arrive.  
>  
>Regards,  
>Tim  
>  
>  
>  
>To: <Timothy\_Gunter@Notes.YMP.GOV>  
>cc: "Dennis Galvin" <DJG3@nrc.gov>, <jstarmer@pmctechnologies.com>  
>Subject: RESPONSE:Request Documents for TBD 6, CLST 1.14 and 1.15  
>  
> User Filed as: Excl/AdminMgmt-14-4/QA:N/A  
>  
>  
>Tim,  
>  
>There are documents we need to examine various aspects of the supporting  
>basis for Appendix C, D, F, H, and K to complete our examination of CLST  
>1.14 and 1.15. In addition, we believe the results directly feed into CLST  
>2.08 which has a higher significance. As a result, we are requesting the  
>following documents be provided if not tomorrow in the satellite office by  
>Thursday:  
>  
>Bechtel SAIC Company, LLC. Drip Shield Structural Response to Rock Fall.  
>000-00C-TED0-00500-000-00A. Las Vegas, Nevada: Bechtel SAIC Company, LLC.  
>2003a.  
>  
>Bechtel SAIC Company, LLC. Drip Shield Statically Loaded by Backfill and  
>Loose Rock Mass. 000-00C-TED0-00300-000-00A. Las Vegas, Nevada: Bechtel  
>SAIC Company, LLC. 2003b.  
>  
>Bechtel SAIC Company, LLC. Stress Corrosion Cracking of the Drip Shield,  
>the Waste Package Outer Barrier, and the Stainless Steel Structural  
>Material. ANL-EBS-MD-000005 REV 01 ICN 00. Las Vegas, Nevada: Bechtel SAIC  
>Company, LLC. 2003c.



>  
>Bechtel SAIC Company, LLC. Seismic Consequence Abstraction.  
>MDL-WIS-PA-000003 REV 00. Las Vegas, Nevada: Bechtel SAIC Company, LLC.  
>2003d.  
>  
>Bechtel SAIC Company, LLC. Repository/PA IED Interlocking Drip Shield and  
>Emplacement Pallet. 800-IEDWIS0-00401-000-00Ba. Las Vegas, Nevada: Bechtel  
>SAIC Company, LLC. 2003e.  
>  
>Bechtel SAIC Company, LLC. Aging and Phase Stability of Waste Package Outer  
>Barrier. ANL-EBS-MD-000002 REV 01 ICN 0. Las Vegas, Nevada: Bechtel SAIC  
>Company. 2003a  
>  
>LL021105312251.023. Stress Corrosion Cracking Growth and Initiation  
>Measurements for C-22 and Ti-7, General Electric Global Research Center  
>(GEGRC) 121202. Submittal date: 01/08/2003.  
>  
>Please let me know the availability of these documents as soon as  
>possible. Additionally, I need to get an update of the documents in the  
>satellite office. Norm provided this in excel format via e-mail. If the  
>folks in the satellite office could provide by COB today of first thing  
>tomorrow it would be appreciated. Thanks in advance,

>  
>  
>  
>Gregory P. Hatchett  
>Senior Project Manager  
>Office of Nuclear Material Safety & Safeguards  
>U.S. Nuclear Regulatory Commission  
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**CC:** <Timothy\_Gunter@Notes.YMP.GOV>, "Dennis Galvin" <DJG3@nrc.gov>, <jstarmer@pmctechnologies.com>, <Mark\_Wisenburg@ymp.gov>, <Norman.Henderson@rw.doe.gov>