

Engineering Change Request Form

Change Request No.: 1303-00513	Date: 10/17/2011	WBS: 1.3.3.7.25 1.3.3.7.34
Control Account Name: 1.3.3.7 - Vehicle Development	Configuration Manager: Wickman, Diana	Control Account Manager: Parks, Steve

SECTION TO BE COMPLETED BY PERSON REQUESTING CHANGE:

Requestor: Steve Parks **Telephone Number:** 508 289 3986

Request Name (Include document number and revision level):

AUV Salinity Operating Range Waiver

Description of Change (Include all related systems):

This ECR requests waivers for the CGSN AUV procured from Hydroid of the L2 Science Requirements Module, L3 CG System Requirements Module, and L4 CG AUV Requirements Module requirements for the water salinity operating environment.

- L2-SR-RQ-3497 Water column properties shall be measured in water salinities of 0 to 40 PSU.
- L3-CG-RQ-862 CGSN infrastructure and sensors shall enable water column measurements in water salinities of 0 to 40 PSU.
- L4-CG-AUV-RQ-171 AUVs shall be capable of operating in a water salinity range from 0 to 40 psu (practical salinity units).

This waiver accepts an operating range from 20 to 40 PSU for Hydroid AUVs selected for the Pioneer Array.

Note: this waiver is only good for the Hydroid AUV selected by the current procurement. When a future replacement AUV is procured, the original requirements will be applicable.

This ECR is a Waiver Request submitted in accordance with the Procedure for Obtaining Waivers which resides in the Systems Engineering Process Library in Al Fresco. A waiver is a specific written authorization to accept a product which departs from specified requirements, but nevertheless is considered suitable for use "as is" or after modification by an approved method. A waiver states that a requirement does not need to be satisfied in order to pass a test of the related product. Waivers are associated with particular products and do not modify the requirement(s) in question. The procurement Source Selection and Evaluation Boards (SSEB) are authorized to procure products which deviate from the approved requirements in order to achieve the best value for the program. This scope of this ECR is whether the item is acceptable and the Waiver should be granted; it does not include the SSEB process.

Reason for Change:

Operating the AUV over the full salinity range of 0-40 PSU would require the addition of a hull section for buoyancy followed by the addition of internal ballast weight to meet requirement L4-CG-AUV-RQ-080 for Middle Atlantic Bight Pioneer Array environmental conditions (RQ-080: "AUVs shall be designed such that vehicle weight and buoyancy may be adjusted manually, outside of the AUV pressure case, in order to obtain desired vehicle trim"). The hull section and ballast add cost and result in increased vehicle length and weight detrimental to handling and mission performance, while providing no benefit. In contrast, a subrange of 20-40 PSU can be accommodated, and RQ-080 satisfied, without an additional hull section or internal ballast weight.

If the Pioneer Array were to be deployed in a substantially different environment in the future (e.g. fresh water) it would be possible to re-tune the AUV to another 20 PSU subrange (e.g. 0-20 PSU) between 0 and 40 PSU. As noted, this would require addition of a modular hull section at additional cost and with some performance compromises. The goal of this waiver is to optimize the present design for typical continental shelf conditions (20-40 PSU) while retaining the potential for re-tuning to a different salinity subrange if and when the future need arises.

Benefit to OOI:

A shorter, lighter vehicle improves handling, improves vehicle stability, reduces the "lever arm" of the vehicle when docked and reduces power consumption during missions. Lower power consumption provides additional reserve energy for mission execution and docking, lowering deployment risk. The supplier estimates a cost avoidance of \$12,000 by using less titanium.

Requestor Assessment of Impact to Control Account:

Scope:

There is no impact to the AUV development scope. The design development effort required by vendor to develop updates to the hull sections is unchanged. Only one of the hull section lengths is reduced.

Schedule:

There is no impact to the AUV development work plan, and no impact to the overall AUV schedule. The hull

development is not on the critical path.

Cost:

By granting this waiver a cost of \$12,000 per vehicle (for hull materials) is avoided.

SECTION TO BE COMPLETED BY IO/SL CCB CHAIRPERSON:

Assessment of Impact to IO Project:

Master Schedule:

CG CCB: Concur with requestor's assessment.
SL CCB: Concur with CG CCB.

Project Cost:

CG CCB: Concur with requestor's assessment. For 6 AUVs the procurement savings is \$72,000.
SL CCB: This waiver allows for a cost avoidance of \$72,000.

Deliverables:

CG CCB: No impact.
SL CCB: Concur with CG CCB.

Potential Impact to Science and Design / As-built Capability: CG CCB: Evaluation of available environmental data indicates that salinities at the Pioneer Array site are always > 20 PSU. Thus, there will be no negative impact to science from this change. The reduced drag and power consumption for a shorter hull will have a positive impact.
SL CCB: Concur with CG CCB. This waiver has a positive impact on AUV range and endurance.

Percent Impact on WBS elements(s) selected: 0%

Percent Impact on OOI: 0%

Contingency \$0

Contingency Schedule (weeks): 0

Signature of CG CCB Chairperson:

Sheri White (swhite@whoi.edu)

Date:

10/19/2011 1:30:00 PM

Board Determination:

Approved with Liens

Signature of System CCB Chairperson:

Ed Chapman (echapman@oceanleadership.org)

Date:

3/15/2012 11:00:00 AM

Board Determination:

Approved

CERTIFICATION OF TECHNICAL DATA PACKAGE AND CONTROL SYSTEM UPDATE

Signature of Configuration Manager:

Diana Wickman (dwickman@whoi.edu)

Date:

4/17/2012 12:46:06 PM

Systems and

Documentation Updated:

Confirmed Complete

Attach supporting technical documentation and or additional comments as needed.

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ECR Comments

#	Reviewer	Date Added	General Comment	Requestor Response	CCB Decision	Lien
1	Kevin J. Mackie	10/18/2011	Shouldn't the Released Deviation/Waiver Request form (3101-0007) and process be used in this instance? ECRs are to revise documents and none are being revised by this waiver of requirements.	Reject		
2	Sheri White	10/18/2011	Recommend approval. It is not worth the NRE cost and reduced vehicle performance to require operations below 20 PSU when those salinity conditions will not be experienced in the Pioneer Array.			
3	Paul Matthias	10/18/2011	Strongly recommend approval.			
4	Ed Dever	10/18/2011	The Pioneer array is designed to be relocatable. If Pioneer is relocated to an area such as the Gulf of Mexico where strong river plumes exist, then AUV's will be required to operate in water near 0 PSS. It's also possible that the Pioneer array could be relocated to the Great Lakes region. I think the waiver could still be upheld because the AUV can be ballasted to some subset of the 0-40 PSS range. However, the waiver should be written carefully to reflect this - not to simply say that the AUV is no longer required to operate in low salinity water.	Accept	Accept	Yes
5	Breeze Simmons	10/19/2011	There are no safety concerns with this modification. CGSN Safety Officer recommends approval.			
6	Al Plueddemann	3/8/2012	Recommend approval.			
7	David Ayers	3/8/2012	docuemnt reviewed - no comments			
8	Ed Chapman	3/9/2012	I recommend approval.			
9	Pete Barletto	3/13/2012	Recommend approval			
10	Alan Chave	3/13/2012	Reviewed--recommend approval			
11	Susan Banahan	3/13/2012	Recommend approval.			
12	Bill Pritchett	3/14/2012	Recommend approval			
13	Michael Zernick	3/14/2012	I recommend approval.			
14	Greg Settle	3/15/2012	Recommend approval			

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ECR Vote (Highest Level Board: System)

Title	Member Name	Delegate Name	Vote	Comment
Senior Project Scientist	Steve Ackleson		Approve	
Project Manager	Matthew Arrott		Approve	
EHS Manager	David Ayers		Approve	
Associate Program Director	Susan Banahan		Approve	
Project Manager	Pete Barletto		Approve	
COTR - Associate Project Manager CG	Mark Bittenbender		Approve	
Chief Systems Engineer	Ed Chapman		Approve	
Former teammate	Alan Chave		Approve	
OOI Program Director/PI	Tim Cowles		Approve	
Project Manager	Mike Crowley		Approve	
Program Director/PI	John Delaney		Approve	
Senior Project Manager, Advisor	Anthony Ferlaino		(Did Not Vote)	
Principal Investigator	Scott Glenn	Mike Crowley	Approve	
COTR - Associate Project Manager RSN	Paul Hagstrom		Approve	
Project Scientist	Deb Kelley	Pete Barletto	Approve	
Program Manager and Chief Engineer	Paul Matthias		Approve	
COTR - Associate Project Manager EPE	Andrea McCurdy		Approve	
Senior Systems Engineer	Chuck McGuire		Approve	
Principal Investigator for CI	John Orcutt		Approve	
Project Scientist	Al Plueddemann		Approve	
COTR - Associate Project Manager CI	Bill Pritchett	Mark Bittenbender	Approve	
CGSN and EA COTR	Greg Settle		Approve	
EV Consultant	Steve Stratton		Approve	
Co-Principal Investigator	John Trowbridge		Approve	
Deputy Principal Investigator	Frank Vernon		Approve	
Program Director/PI	Bob Weller	John Trowbridge	Approve	

Lead System Engineer	Sheri White		Approve	
System Engineer	Joe Wieclawek		Approve	
Quality & Safety Manager	Michael Zernick		Approve	

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ECR Liens/Action Items			
Lien	Due Date	Complete	Completion Date
Adjust change description/text of ECR for clarity on salinity range.	10/26/2011	Yes	10/20/2011

Action Item	Due Date	Complete	Cancel	Completion Date
Mark the Verification Status for the L2 requirements as "Waived" in DOORS.	4/9/2012	No	Yes	
Mark the Verification Status for the L3 requirements as "Waived" in DOORS.	4/9/2012	No	Yes	
Mark the Verification Status for the L4 requirements as "Waived" in DOORS.	4/9/2012	Yes	No	4/2/2012
Update "Approved Waiver-CM" attribute for affected L2 requirement (s) in DOORS with the ECR number of the approved Waiver and a description of the affected product.	4/9/2012	Yes	No	4/2/2012
Update "Approved Waiver-CM" attribute for affected L3 requirement (s) in DOORS with the ECR number of the approved Waiver and a description of the affected product.	4/9/2012	Yes	No	4/2/2012
Update "Approved Waiver-CM" attribute for affected L4 requirement (s) in DOORS with the ECR number of the approved Waiver and a description of the affected product.	4/9/2012	Yes	No	4/2/2012
Baseline L2 Science Requirements module	4/25/2012	Yes	No	4/13/2012
Baseline L3 CG System Requirements module	4/25/2012	No	Yes	
Baseline L4 CG Instrument Package module	4/25/2012	No	Yes	
Export updated L2 Science Requirements spreadsheet and post in Alfresco	4/25/2012	Yes	No	4/13/2012
Export updated L3 CG System Requirements spreadsheet and post in Alfresco	4/25/2012	No	Yes	
Export updated L4 CG Instrument Package spreadsheet and post in Alfresco	4/25/2012	No	Yes	
Update L2 Science Requirements module	4/25/2012	Yes	No	4/11/2012
Update L3 CG System Requirements module	4/25/2012	Yes	No	4/11/2012
Update L4 CG Instrument Package module	4/25/2012	Yes	No	4/11/2012

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ECR Meeting Results and Notes

Board Level	Meeting Date	Meeting Name	Meeting Result	Meeting Notes
CG	10/19/2011	20111019 CG CCB	Approved with Liens	
System	3/15/2012	2012-03-15 System Level CCB	Approved	