Verification Procedure & Results

Test Procedure Document No.:	Test Procedure Rev.:
3166-50101	1-00

Test Case Name:	Test Plan Document #	Test Plan Rev.:	Test End Date:
Inspection and Analysis of Design Drawings	3166-50000	1-03	

Test Conductor (Print Name)	Signature	Design Engineer (Print Name)	Approval Signature	Date
		N/A		
Test Director (Print Name)	Signature	**System Engineer** (Print Name)	Approval Signature	Date
		Sheri N. White		2015-03-30
Witnessed by (Print name)	Signature	**QA/QC Engineer** (Print Name)	Approval Signature	Date
		Gary Cook		2/26/2015
DOORS Verification Procedure ID	**DOORS Verification Event ID**	**Test Results Reviewed**	**QA:**	Date
Ver-CG-81	CG-VE-3018		**Test Dir.**	Date

Test Description

This Test Case will include inspection of the mooring or mooring assembly drawings to see that instruments called out in the reruirements are included in the mooring. The rest of the mooring assembly will be inspected to verify mooring line shot lengths, anchor weights/geometry, instrument cages, and other features are present per the mooring drawing.

Requirements Addressed

L3-CG-RQ-1031: CGSN infrastructure shall include safety design features that support prevention of injury to humans.
L3-CG-RQ-243: Surface Moorings shall include a long-range bi-directional communications capability.
L3-CG-RQ-186: Surface moorings shall include a short-range line-of-sight Ethernet based telemetry link.
L3-CG-RQ-187: Surface Moorings shall include a short-range (line-of-sight) RF-based bi-directional communications capability.
L3-CG-RQ-180: Surface moorings shall provide the capability to include an underwater bi-directional acoustic communications capability for interfacing with assets not electrically connected to the mooring.
L3-CG-RQ-181: Surface moorings shall provide the capability to include an inductive modem telemetry link for transmission of data, commands, and status to subsea resources not electrically connected to the mooring.
L3-CG-RQ-557: Surface Moorings shall include GPS receivers.
L3-CG-RQ-174: Surface mooring Meteorology measurements shall include Wind Velocity.
L3-CG-RQ-509: Surface moorings Meteorology measurements shall include Ambient Air Temperature.
L3-CG-RQ-510: Surface mooring Meteorology measurements shall include Relative Humidity.
L3-CG-RQ-511: Surface mooring Meteorology measurements shall include Barometric Pressure.
L3-CG-RQ-512: Surface mooring Meteorology measurements shall include Downwelling Shortwave Irradiance.
L3-CG-RQ-513: Surface mooring Meteorology measurements shall include Downwelling Longwave Irradiance.
L3-CG-RQ-514: Surface mooring Meteorology measurements shall include Precipitation.
L3-CG-RQ-516: Surface mooring Meteorology measurements shall include Temperature of surface water.
L3-CG-RQ-517: Surface mooring Meteorology measurements shall include Conductivity of surface water.
L3-CG-RQ-515: Surface mooring Flux measurements shall include Turbulent Wind.
L3-CG-RQ-951: Surface mooring Flux measurements shall include Turbulent Air Temperature.
L3-CG-RQ-952: Surface mooring Flux measurements shall include Relative Humidity.
L3-CG-RQ-954: Surface mooring Flux measurements shall include Barometric Pressure.
L3-CG-RQ-955: Surface mooring Flux measurements shall include Turbulent Humidity Fluctuations.
L3-CG-RQ-956: Surface mooring Flux measurements shall include Platform Motion.
L3-CG-RQ-175: Surface moorings shall measure the Partial Pressure of Carbon Dioxide (pCO2) in air.
L3-CG-RQ-519: Surface moorings shall measure the Partial Pressure of Carbon Dioxide (pCO2) of surface water.
L3-CG-RQ-177: Surface moorings shall support the capability to measure the Sea-Surface wave spectrum (period and amplitude).

L3-CG-RQ-1050 Global surface moorings shall measure dissolved oxygen in surface water.
L3-CG-RQ-1051 Global surface moorings shall measure Chlorophyll a Fluorescence, and Optical Backscatter in surface water.
L3-CG-RQ-1052 Global surface moorings shall measure optical attenuation and absorption in surface water.
L3-CG-RQ-1053 Global surface moorings shall measure nitrate in surface water.
L3-CG-RQ-930: Surface Moorings shall support the capability to measure single point water velocity at the surface.
L3-CG-RQ-178: Surface moorings shall provide the capability to include an ADCP to measure a profile of water velocity structure, from the near surface downward through the water column.
L3-CG-RQ-520: Surface moorings shall support the capability to measure optical backscatter, chlorophyll a, and Colored Dissolved Organic Material (CDOM) fluorescence of near surface water.
L3-CG-RQ-943: Surface moorings shall support the capability to measure single point water velocity of near surface water.
L3-CG-RQ-252: Surface moorings shall support the capability to measure pH of near surface water.
L3-CG-RQ-254: Surface moorings shall support the capability to measure Dissolved Oxygen (DO) content of the near surface water.
L3-CG-RQ-255: Surface moorings shall support the capability to measure Optical attenuation and absorption in near surface water.
L3-CG-RQ-256: Surface moorings shall support the capability to measure Spectral irradiance in near surface water.
L3-CG-RQ-257: Surface moorings shall support the capability to measure Nitrate in near surface water.
L3-CG-RQ-259: Surface moorings shall support the capability to measure CTD of near surface water.

L3-CG-RQ-179: Global surface moorings shall measure conductivity, temperature and depth (CTD) at depths of 15m, 20m, 40m, 60m, 80m, 130m, 180m, 250m, 350m, 500m, 750m, 1000m, 1500m.
L3-CG-RQ-521: Global surface moorings shall measure pH at depths of 20 m and 100 m.
L3-CG-RQ-1054 Global surface moorings shall measure disolved oxygen at 40m, 80m, and 130 m.
L3-CG-RQ-1055 Global surface moorings shall measure Chlorophyll a Fluorescence, and Optical Backscatter at 40 m, 80 m, and 130 m.
L3-CG-RQ-1056 Global surface moorings shall measure the partial pressure of carbon dioxide (pCO2) at 40 m, 80 m, and 130 m.
L3-CG-RQ-558: Coastal Surface Moorings shall transmit a Pulse Per Second (PPS) signal to its MFN on the seabed.
L3-CG-RQ-897: MFNs shall be capable of utilizing power from the surface buoy or from a primary battery power system.
L3-CG-RQ-1034: MFNs shall be capable of supporting a wet-mateable connector to connect to seafloor instrumentation.
L3-CG-RQ-260: MFNs shall support the capability to measure Dissolved Oxygen (DO).
L3-CG-RQ-262: MFNs shall support the capability to measure conductivity, temperature, and depth (CTD).
L3-CG-RQ-576: MFNs shall support the capability to measure the Partial Pressure of Carbon Dioxide (pCO2) of near seafloor water.
L3-CG-RQ-264: MFNs shall support the measurement of pH.
L3-CG-RQ-266: MFNs shall support the measurement of single point water velocity.
L3-CG-RQ-267: MFNs shall support the measurement of Optical attenuation and absorption.
L3-CG-RQ-578: MFNs shall support the capability to measure near bottom acoustic backscatter.
L3-CG-RQ-411: MFNs shall support the capability to measure three axis point water velocity.
L3-CG-RQ-419: MFNs shall support the capability to include a digital camera with strobe.
L3-CG-RQ-795: MFNs, located on the seafloor, shall support the capability to measure Seafloor Pressure.
L3-CG-RQ-415: MFNs shall support the capability to include an ADCP to measure a profile of water velocity structure, from the seafloor upward through the water column.
L3-CG-RQ-583: MFNs shall be capable of supporting an AUV docking system.

L4-CG-MO-RQ-76: Mooring riser assemblies shall have backup recovery buoyancy sufficient to float all mooring components to the surface.
L4-CG-MO-RQ-230: Mooring riser loads shall conform to the details specified in 3307-00003.
L4-CG-MO-RQ-229: Mooring risers shall not go slack under design conditions.
L4-CG-MO-RQ-215: Coastal moorings riser assemblies shall incorporate stretch hose components for elastic compliance.
L4-CG-MO-RQ-79: Mooring riser assemblies shall be designed to sustain anchor launch transient loads.
L4-CG-MO-RQ-275: Mooring riser components shall be designed to interface with inductive telemetry systems.
L4-CG-SB-RQ-153: Surface buoy towers shall provide and locate the exit of the combustion gas exhaust, for fuel-based power systems, on the nominal downwind side of the buoy.
L4-CG-SB-RQ-160: Global Surface buoy gross air weight shall not exceed 4000 kg.
L4-CG-SB-RQ-174: Coastal Surface buoy Gross Air Weight shall not exceed 3000 kg.
L4-CG-SB-RQ-306: The Surface Buoy shall have a positive righting moment in both pitch and roll up to at least 70° from vertical.
L4-CG-SB-RQ-164: Global Surface Buoy tower nominal instrument mounting plane height shall be not less than 4.5 meters above the static buoy waterline.
L4-CG-SB-RQ-178: Coastal Surface Buoy tower nominal instrument mounting plane height shall be not less than 2.7 meters above the static buoy waterline.
L4-CG-SB-RQ-184: Coastal Surface buoys with High Power Systems shall provide and support tankage and plumbing to safely store not less than 500 liters of fuel cell fuel.
L4-CG-SB-RQ-145: Lift points shall conform to the details specified in 3307-00003.
L4-CG-SB-RQ-276 : Surface buoys shall be capable of being deployed and retrieved using standard UNOLS vessel deck equipment that includes use of A-frames, winches, and cranes.
L4-CG-SB-RQ-161: Global Surface buoy net buoyancy shall be not less than 5000 kg.
L4-CG-SB-RQ-175: Coastal Surface buoy Net Buoyancy shall be not less than 3000 kg.

Test Setup

Test Artifacts

Test Procedure 3166-50101 Rev 1-00				Test Results		
Step#	**Instructions**	**Expected Results**	**Requirement ID**	**Observed Results**	**Pass/Fail**	**Notes**
1	Inspect Coastal Surface Mooring and confirm the presence of a High Voltage Interlock Jumper		L3-CG-RQ-1031			
2	Inspect Coastal and Global Surface Mooring and confirm the presence of non-skid which allows secure footing on the buoy.		L3-CG-RQ-1031			
3	Inspect Coastal and Global Surface Mooring and confirm the presence of Iridium and Fleet Broadband telemetry		L3-CG-RQ-243			
4	Inspect Coastal and Global Surface Mooring and confirm the presence of WiFi telemetry		L3-CG-RQ-186			
5	Inspect Coastal and Global Surface Mooring and confirm the presence of RF Modem		L3-CG-RQ-187			
6	Inspect CP03ISSM Coastal Surface Mooring and confirm the presence of Acoustic modem on NSIF		L3-CG-RQ-180			

Test Procedure 3166-50101 Rev 1-00				Test Results		
Step#	**Instructions**	**Expected Results**	**Requirement ID**	**Observed Results**	**Pass/Fail**	**Notes**
7	Inspect Global Surface Mooring and confirm the presence of inductive modem and instruments		L3-CG-RQ-181 L4-CG-MO-RQ-275			
8	Inspect Coastal and Global Surface Mooring and confirm the presence of GPS receiver		L3-CG-RQ-557			
9	Inspect Coastal and Global Surface Mooring metrologic sensors and confirm the presence METBK sensor suite		L3-CG-RQ-174, 509, 510, 511, 512, 513, 514, 516, 517			
10	Inspect Coastal and Global Surface Buoy and confirm the presence of the FDCHP sensor	Not on Argentine Basin	L3-CG-RQ-515, 951, 952, 954, 955, 956			
11	Inspect Coastal and Global Surface Buoy and confirm the presence of the PCO2A sensor		L3-CG-RQ-175 & 519			
12	Inspect Coastal and Global Surface Buoy and confirm the presence of the WAVSS sensor		L3-CG-RQ-177			
13	Inspect Coastal and Global Surface Buoy and confirm the presence of the VELPT sensor	Only on Endurance Buoys	L3-CG-RQ-930			
14	Inspect Global Surface Buoy and confirm the presence of the DOSTA sensor		L3-CG-RQ-1050			
15	Inspect Global Surface Buoy and confirm the presence of the FLORT sensor		L3-CG-RQ-1051			
16	Inspect Global Surface Buoy and confirm the presence of the OPTAA sensor		L3-CG-RQ-1052			
17	Inspect Global Surface Buoy and confirm the presence of the NUTNR sensor		L3-CG-RQ-1053			
18	Inspect Coastal and Global Surface Mooring and confirm the presence of an ADCP sensor	On Global Riser, and Endurance NSIF	L3-CG-RQ-178			
19	Inspect Coastal and Global Surface Mooring and confirm the presence of a FLORT sensor in the NSIF		L3-CG-RQ-520			
20	Inspect Coastal and Global Surface Mooring and confirm the presence of a VELPT sensor in the NSIF		L3-CG-RQ-943			
21	Inspect Coastal Surface Mooring and confirm the presence of a PHSEN sensor in the NSIF		L3-CG-RQ-252			
22	Inspect Coastal and Global Surface Mooring and confirm the presence of a DOSTA sensor in the NSIF		L3-CG-RQ-254			
23	Inspect Coastal and Global Surface Mooring and confirm the presence of a OPTAA sensor in the NSIF		L3-CG-RQ-255			
24	Inspect Coastal and Global Surface Mooring and confirm the presence of a SPKIR sensor in the NSIF		L3-CG-RQ-256			
25	Inspect Coastal and Global Surface Mooring and confirm the presence of a NUTNR sensor in the NSIF		L3-CG-RQ-257			
26	Inspect Coastal and Global Surface Mooring and confirm the presence of a CTD sensor in the NSIF		L3-CG-RQ-259			
27	Inspect Global Surface Mooring deck drawings and confirm the presence of CTD sensors at the specified depths along the riser		L3-CG-RQ-179			
28	Inspect Global Surface Mooring dech drawings and confirm the presence of PHSEN sensors at the specified depths along the riser		L3-CG-RQ-521			
29	Inspect Global Surface Mooring dech drawings and confirm the presence of DOSTA sensors at the specified depths along the riser		L3-CG-RQ-1054			
30	Inspect Global Surface Mooring dech drawings and confirm the presence of FLORD sensors at the specified depths along the riser		L3-CG-RQ-1055			
31	Inspect Global Surface Mooring dech drawings and confirm the presence of PCO2W sensors at the specified depths along the riser		L3-CG-RQ-1056			
32	Inspect Coastal Surface Mooring log files and confirm the presence of a PPS signal at the MFN		L3-CG-RQ-558			
33	Inspect Coastal Surface Mooring and confirm MFN is supploed from the Buoy Inspect the EA ISSM mooring and confirm MFN power is supplied by Primary Batteries		L3-CG-RQ-897			
34	MFN support for a wet-mateable connector will be verified once the AUV connection is implemented	to be verified on a 'dock ready' MFN	L3-CG-RQ-1034			
35	Inspect Coastal Surface Mooring and confirm the presence of a DOSTA sensor in the MFN		L3-CG-RQ-260			

Test Procedure 3166-50101 Rev 1-00				Test Results		
Step#	**Instructions**	**Expected Results**	**Requirement ID**	**Observed Results**	**Pass/Fail**	**Notes**
36	Inspect Coastal Surface Mooring and confirm the presence of a CTDBP sensor in the MFN		L3-CG-RQ-262			
37	Inspect Coastal Surface Mooring and confirm the presence of a PCO2W sensor in the MFN		L3-CG-RQ-576			
38	Inspect Coastal Surface Mooring and confirm the presence of a PHSEN sensor in the MFN		L3-CG-RQ-264			
39	Inspect Coastal Surface Mooring and confirm the presence of a VELPT sensor in the MFN	Pioneer Only	L3-CG-RQ-266			
40	Inspect Coastal Surface Mooring and confirm the presence of a OPTAA sensor in the MFN		L3-CG-RQ-267			
41	Inspect Coastal Surface Mooring and confirm the presence of a ADCP sensor in the MFN		L3-CG-RQ-578			
42	Inspect Coastal Surface Mooring and confirm the presence of a VEL3D sensor in the MFN	Endurance Only	L3-CG-RQ-411			
43	Inspect EA Coastal Surface Mooring CE07SHSM and confirm the presence of a CAMDS sensor in the MFN		L3-CG-RQ-419			
44	Inspect Coastal Surface Mooring and confirm the presence of a PRESF sensor in the MFN		L3-CG-RQ-795			
45	Inspect Coastal Surface Mooring and confirm the presence of a ADCP sensor in the MFN		L3-CG-RQ-415			
46	Inspect Coastal Surface Mooring and confirm the presence of a AUV Dock connection in the MFN	to be verified on a 'dock ready' MFN	L3-CG-RQ-583			
47	Inspect Mooring Design Spreadsheets to confirm risers have backup recovery buoyancy sufficient to float all mooring components to the surface		L4-CG-MO-RQ-76			
48	Inspect Mooring Design Spreadsheets to confirm Mooring risers will not go slack under design conditions.		L4-CG-MO-RQ-229			
49	Inspect Coastal Surface Mooring and confirm the presence of a Stretch Hose		L4-CG-MO-RQ-215			
50	Inspect mooring analysis and confirm launch transient is less than 8,000 lbs		L4-CG-MO-RQ-79			
51	Inspect Coastal Fuel Cell equiped mooring and confirm exhust gases exit on the down-wind side of the buoy		L4-CG-SB-RQ-153			
52	Inspect Global Surface Buoy and confirm it weighs less than 4,000kg		L4-CG-SB-RQ-160			
53	Inspect Coastal Surface Buoy and confirm it weighs less than 3,000kg		L4-CG-SB-RQ-174			
54	Inspect the Surface Buoy Design analysis and confirm its righting moment		L4-CG-SB-RQ-306			
55	Inspect the Global Surface Mooring and confirm the upper halo is at least 4.5m above the water line		L4-CG-SB-RQ-164			
56	Inspect the Coastal Surface Mooring and confirm the upper halo is at least 2.7m above the water line		L4-CG-SB-RQ-178			
57	Inspect Coastal Fuel Cell equiped mooring and confirm the ability to carry at least 500 liters of fuel		L4-CG-SB-RQ-184			
58	Inspect Surface Buoy and confirm the lift points conform to 3307-00003		L4-CG-SB-RQ-145			
59	Confirm that Surface Buoys have been deployed and retrieved by UNOLS ships		L4-CG-SB-RQ-276			
60	Inspect Mooring Design Spreadsheets to confirm Global Surface Buoys have a net buoyance of at least 5,000kg		L4-CG-SB-RQ-161			
61	Inspect Mooring Design Spreadsheets to confirm Coastal Surface Buoys have a net buoyance of at least 3,000kg		L4-CG-SB-RQ-175			