# Verification Procedure & Results

| Test Procedure Document No.: | Test Procedure Rev.: |
|---|---|
| 3166-90106 | 1-00 |

**Test Case Name:** TC-001 CSPP Inspection and Analysis (Instruments)

| Test Plan Document # | Test Plan Rev.: | Test End Date: |
|---|---|---|
| 3161-90000 | A | |

| Test Conductor (Print Name) | Signature | Design Engineer (Print Name) | Approval Signature | Date |
|---|---|---|---|---|
| | | John Koegler | John Koegler | 01/06/2014 |
| **Test Director** (Print Name) | Signature | **System Engineer** (Print Name) | Approval Signature | Date |
| | | Jonathan Fram | Jonathan Fram | |
| **Witnessed by** (Print name) | Signature | **QA/QC Engineer** (Print Name) | Approval Signature | Date |
| | | | | |

| DOORS Verification Procedure ID | DOORS Verification Event ID | Test Results Reviewed | QA: | Date |
|---|---|---|---|---|
| Ver-CG-279 | CG-VE-3091 | | Test Dir. | Date |

**Test Description**

This test case consists of inspection and analysis of product data sheets, vendor documentation and historical data for instruments that will be deployed on the Coastal Surface-Piercing Profiler, WETLabs AMP.

Instrument makes, models, and First Article SNs include:

CTDPF – SeaBird Electronics SBE49 S/N 4974683-0308

DOFST-J – Aanderaa Optode 4831 S/N 209

FLORT-J – ECO BBFLB / Triplet S/N:BBFL2W-1084

PARAD-J – WETLabs PARS S/N:PARS-365

SPKIR-J-Satlantic OCR507 ICSW S/N: 237 Bio shutter S/N: 183

NUTNR-J-Satlantic SUNA v2 S/N:337

VEL3D-J – Aquadopp II Profiler 400m Head ID: AQS-6032 Hardware ID: AQD11259

OPTAA-J-WETLabs AC-S S/N: ACS-137

**Requirements Addressed**

CTDPF-J:L4-CG-IP-RQ-159, L4-CG-IP-RQ-162, L4-CG-IP-RQ-594, L4-CG-IP-RQ-440, L4-CG-IP-RQ-163, L4-CG-IP-RQ-592, L4-CG-IP-RQ-167, L4-CG-IP-RQ-171, L4-CG-IP-RQ-176, L4-CG-IP-RQ-177 L4-CG-IP-RQ-180, L4-CG-IP-RQ-342, L4-CG-IP-RQ-343, L4-CG-IP-RQ-344, L4-CG-IP-RQ-346

DOFST-J: L4-CG-IP-RQ-182, L4-CG-IP-RQ-183, L4-CG-IP-RQ-187, L4-CG-IP-RQ-348, L4-CG-IP-RQ-561

FLORT-J: L4-CG-IP-RQ-213, L4-CG-IP-RQ-214, L4-CG-IP-RQ-217, L4-CG-IP-RQ-219, L4-CG-IP-RQ-397, L4-CG-IP-RQ-395, L4-CG-IP-RQ-393 L4-CG-IP-RQ-223, L4-CG-IP-RQ-551, L4-CG-IP-RQ-659

PARAD-J: L4-CG-IP-RQ-387, L4-CG-IP-RQ-388, L4-CG-IP-RQ-389, L4-CG-IP-RQ-390, L4-CG-IP-RQ-391

SPKIR-J: L4-CG-IP-RQ-374, L4-CG-IP-RQ-527, L4-CG-IP-RQ-206, L4-CG-IP-RQ-373, L4-CG-IP-RQ-207, L4-CG-IP-RQ-377

NUTNR-J: L4-CG-IP-RQ-233, L4-CG-IP-RQ-403, L4-CG-IP-RQ-558, L4-CG-IP-RQ-234, L4-CG-IP-RQ-404, L4-CG-IP-RQ-239

VEL3D-J: L4-CG-IP-RQ-260, L4-CG-IP-RQ-261, L4-CG-IP-RQ-264, L4-CG-IP-RQ-265, L4-CG-IP-RQ-266, L4-CG-IP-RQ-385, L4-CG-IP-RQ-606, L4-CG-IP-RQ-596, L4-CG-IP-RQ-597, L4-CG-IP-RQ-598 L4-CG-IP-RQ-267, L4-CG-IP-RQ-607

OPTAA-J: L4-CG-IP-RQ-226, L4-CG-IP-RQ-514, L4-CG-IP-RQ-516, L4-CG-IP-RQ-518, L4-CG-IP-RQ-519, L4-CG-IP-RQ-228, L4-CG-IP-RQ-399, L4-CG-IP-RQ-520, L4-CG-IP-RQ-522 L4-CG-IP-RQ-525, L4-CG-IP-RQ-401

**Test Setup**

Compile vendor provided documentation (specs, calibration and test reports, data, etc.) and previous OOI verifications of instruments

**Test Artifacts**

Vendor provided test results/reports:

CSPP_SN_<<pending>>_COCs_Calibration_documents_yyyy-mm-dd.pdf

CSPP_SN_<<pending>>_FAT.pdf

CTDPF-J CTDPF-J_SBE49manualMar11.pdf

CTDPF-J: CTDPF-J_SBE49brochureMar11.pdf

DOFST-J_DOSTA_TD269_Oxygen_Optode_4330_4835_4831_Manual.pdf

DOFST-J_DOSTA_D403_Oxygen_Optode_4831_4831F_Datasheet.pdf

FLORT-J: FLORT_ECO-triplet_Users-Guide.pdf

FLORT-J: FLORT_Manual_tripletwd.pdf

PARAD-J_ECO-PAR -6Feb08_0.pdf

PARAD-J_WETLabs_parc_manual.pdf
SPKIR-J: SPKIR_Bioshutter_Operation_Manual_SAT-DN-00089_revH.pdf
SPKIR-J: SPKIR_OCR-507_Operation_Manual_SAT-DN-0027revE.pdf
SPKIR-J: SPKIR_OCR-500_brochure.pdf
NUTNR-J: NUTNR_SUNA-V2.0-Manual SAT-DN-00596revE.pdf
NUTNR-J: NUTNR_Brochure_SUNA_V2_July10-2013.pdf
VEL3D-J_Aquadopp_II_Profiler_Brochure.pdf
VEL3D-J:VEL3D-J_NQG_HR_2013-01-09.pdf
OPTAA-J: OPTAA_Manual_acsj.pdf
OPTAA-J: OPTAA_Manual_acsj.pdf

| Test Procedure 3166-90106 Rev 1-00 | | | | Test Results | | |
|---|---|---|---|---|---|---|
| Step# | Instructions | Expected Results | Requirement ID | Observed Results | Pass/Fail | Notes |
| **CTDPF-J** | | | | | | |
| CTD1 | Review the Purchase Specification for Part No. RXA-ZX0063. Review instrument vendor documentation. | The instrument has a temperature measurement resolution of 0.0001°C. | L4-CG-IP-RQ-159 | | | |
| CTD2 | Review the Purchase Specification for Part No. RXA-ZX0063. Review instrument vendor documentation. | The instrument is capable of sampling at a frequency of 1 Hz. | L4-CG-IP-RQ-162<br>L4-CG-IP-RQ-594<br>L4-CG-IP-RQ-440 | | | |
| CTD3 | Review the Purchase Specification for Part No. RXA-ZX0063. Review instrument vendor documentation. | The instrument has a temperature range of 2 to +35 degrees C. | L4-CG-IP-RQ-163 | | | |
| CTD4 | Review the Purchase Specification for Part No. RXA-ZX0063. Review instrument vendor documentation. | The instrument has a conductivity accuracy (inside and outside cal. range) of at least ±0.001 S/m. | L4-CG-IP-RQ-592 | | | |
| | Review the Purchase Specification for Part No. RXA-ZX0063. Review instrument vendor documentation. | The instrument has a conductivity accuracy in the laboratory of at least ±0.0003 S/m. | L4-CG-IP-RQ-166 | Initial accuracy is .0003 S/m | Pass | |
| CTD5 | Review the Purchase Specification for Part No. RXA-ZX0063. Review instrument vendor documentation. | The instrument has a conductivity measurement resolution of 0.00001 S/m. | L4-CG-IP-RQ-167 | | | |
| CTD6 | Review the Purchase Specification for Part No. RXA-ZX0063. Review instrument vendor documentation. | The instrument has a conductivity measurement range of 0 to 7 S/m. | L4-CG-IP-RQ-171 | | | |
| CTD7 | Review the Purchase Specification for Part No. RXA-ZX0063. Review instrument vendor documentation. | The pressure sensor has an accuracy within ±0.1% of the full scale range. | L4-CG-IP-RQ-176 | | | |
| CTD8 | Review the Purchase Specification for Part No. RXA-ZX0063. Review instrument vendor documentation. | The pressure sensor has a resolution of 0.002% of the full scale range. | L4-CG-IP-RQ-177 | | | |
| CTD9 | Review the Purchase Specification for Part No. RXA-ZX0063. Review instrument vendor documentation. | The pressure sensor options include options that are consistent with the operational range of the vehicle (200m). | L4-CG-IP-RQ-180 | | | |
| CTD10 | Review the Purchase Specification for Part No. RXA-ZX0063. Review instrument vendor documentation. | The temperature accuracy is ±0.002, | L4-CG-IP-RQ-342 | | | |
| CTD11 | Review the Purchase Specification for Part No. RXA-ZX0063. Review instrument vendor documentation. | The instrument has an annual drift of no more than 0.01°C per year. | L4-CG-IP-RQ-343 | | | |
| CTD12 | Review the Purchase Specification for Part No. RXA-ZX0063. Review instrument vendor documentation. | The instrument has an annual drift of no more than 0.001 S/m. | L4-CG-IP-RQ-344 | | | |
| CTD13 | Review the Purchase Specification for Part No. RXA-ZX0063. Review instrument vendor documentation. | The instrument has an annual drift of no more than 0.05% of the maximum value of its operational depth range. | L4-CG-IP-RQ-346 | | | |
| **DOFST-J** | | | | The instrument (Aanderaa 4331 optode) used is the same as the DOSTA series A-D and L-N. Verification was documented in 3161-11001-00001.xls. | | |
| DO1 | Review the Purchase Specification for Part. No RXA-ZX0113. Review instrument vendor documentation. | The instrument has an accuracy of ± 2% (with the value defined as that provided by a Winkler titration of a corresponding water sample). | L4-CG-IP-RQ-182 | | | Waived per ECR 1300-00290 |

| Test Procedure 3166-90106 Rev 1-00 | | | | Test Results | | |
|---|---|---|---|---|---|---|
| Step# | Instructions | Expected Results | Requirement ID | Observed Results | Pass/Fail | Notes |
| DO2 | Review the Purchase Specification for Part. No RXA-ZX0113. Review instrument vendor documentation. | The DO instrument can measure dissolved $O_2$ concentrations with a resolution of at least 1.0 µmol/kg. | L4-CG-IP-RQ-183 | | | |
| DO4 | Review the Purchase Specification for Part. No RXA-ZX0113. Review instrument vendor documentation. | The DO instrument is able to measure dissolved $O_2$ concentrations within the range of 0-500 µmol/kg. | L4-CG-IP-RQ-187 | | | |
| DO5 | Review the Purchase Specification for Part. No RXA-ZX0113. Review instrument vendor documentation. | The DO instrument can measure dissolved $O_2$ concentrations with an annual drift of less than 10 µmol/kg. | L4-CG-IP-RQ-348 | | | Waived per ECR 1300-00290 |
| DO6 | Review the Purchase Specification for Part. No RXA-ZX0113. Review instrument vendor documentation. | The DO instrument has a response time of 10 seconds or less for the measured DO to be ±63% of the change in value. | L4-CG-IP-RQ-561 | | | |
| **FLORT-J** | | | | The instrument (Wetlabs ECO triplet) used is the same as the FLORT (all assigned series). Verification was documented in 3161-11101-00001.xls | | |
| FLOR1 | Review the Purchase Specification for Part. No. FAS-015253 and instrument vendor documentation. | The instrument measures Chlorophyll-a Fluorescence between 675 and 700 nm by excitation between 245 and 490 nm. | L4-CG-IP-RQ-213 | | | |
| FLOR2 | Review the Purchase Specification for Part. No. FAS-015253 and instrument vendor documentation. | The instrument measures CDOM fluorescence between 425and 480 nm by excitation between 345 and 380 nm. | L4-CG-IP-RQ-214 | | | |
| FLOR5 | Review the Purchase Specification for Part. No. FAS-015253 and instrument vendor documentation. | Chlorophyll-a fluorescence is measured over a range of 0.03 to 50 µg/L. | L4-CG-IP-RQ-217 | | | |
| FLOR7 | Review the Purchase Specification for Part. No. FAS-015253 and instrument vendor documentation. | CDOM fluorescence has a range of 0.09 – 500 ppb relative to a quinine sulfate standard. | L4-CG-IP-RQ-219 | | | |
| FLOR8 | Review the Purchase Specification for Part. No. FAS-015253 and instrument vendor documentation. | CDOM fluorescence measurements may be sampled at 1 Hz. | L4-CG-IP-RQ-397 | | | |
| FLOR9 | Review the Purchase Specification for Part. No. FAS-015253 and instrument vendor documentation. | Chlorophyll-a fluorescence measurements may be sampled at 1 Hz. | L4-CG-IP-RQ-395 | | | |
| FLOR10 | Review the Purchase Specification for Part. No. FAS-015253 and instrument vendor documentation. | Optical backscatter instruments have a range of 0.001 bb(λ) /m to 0.2 bb(λ) /m. | L4-CG-IP-RQ-393 | | | |
| FLOR11 | Review the Purchase Specification for Part. No. FAS-015253 and instrument vendor documentation. | Optical backscatter measurements may be sampled at 1 Hz | L4-CG-IP-RQ-223 | | | |
| FLOR12 | Review the Purchase Specification for Part. No. FAS-015253 and instrument vendor documentation. | Optical backscatter instruments excite and measure the 700 nm band in the visible spectrum. | L4-CG-IP-RQ-551 | | | |
| FLOR13 | Review the Purchase Specification for Part. No. FAS-015253 and instrument vendor documentation. | Optical backscatter is reported by the measurement band. | L4-CG-IP-RQ-659 | | | |
| **PARAD-J** | | | | | | |
| PAR1 | Review the Purchase Specification for Part. No. FAS-016001. Review instrument vendor documentation. | The PAR instrument has a wavelength range of 400 nm to 700 nm. | L4-CG-IP-RQ-387 | | | |
| PAR2 | Review the Purchase Specification for Part. No. FAS-016001. Review instrument vendor documentation. | The PAR instrument has an accuracy of ±5%. | L4-CG-IP-RQ-388 | | | |
| PAR3 | Review the Purchase Specification for Part. No. FAS-016001. Review instrument vendor documentation. | The PAR instrument has a resolution of 0.01 µmol photons $m^{-2}$ $s^{-1}$. | L4-CG-IP-RQ-389 | | | |
| PAR4 | Review the Purchase Specification for Part. No. FAS-016001. Review instrument vendor documentation. | The PAR instrument has a range of 0.1 to 2000 µmol photons $m^{-2}$ $s^{-1}$. | L4-CG-IP-RQ-390 | | | |
| PAR5 | Review the Purchase Specification for Part. No. FAS-016001. Review instrument vendor documentation. | The PAR instrument is capable of sampling at frequencies of no less than 1Hz. | L4-CG-IP-RQ-391 | | | |

| Test Procedure 3166-90106 Rev 1-00 | | | | Test Results | | |
|---|---|---|---|---|---|---|
| Step# | Instructions | Expected Results | Requirement ID | Observed Results | Pass/Fail | Notes |
| **SPKIR-J** | | | | Results for -J application per 3161-80101-00001.xls (the -J is the same instrument as the -B). QCT results 3305-00114-00003.doc and data file 3305-00114-00003-A.txt | | |
| SPK1 | Review the Purchase Specification for Part. No. RXA-ZX0109 . Review instrument vendor documentation. | Accuracy of ±5% | L4-CG-IP-RQ-374 | | | |
| SPK2 | Review the Purchase Specification for Part. No. RXA-ZX0109 . Review instrument vendor documentation. | Precision of 0.01 micro mol photons m-2 s-1 | L4-CG-IP-RQ-527 | | | |
| SPK3 | Review the Purchase Specification for Part. No. RXA-ZX0109 . Review instrument vendor documentation. | Wavelength range of 380 nm to 720 nm | L4-CG-IP-RQ-206 | | | |
| SPK4 | Review the Purchase Specification for Part. No. RXA-ZX0109 . Review instrument vendor documentation. | At least 7 measurement bands over the stated wavelength range | L4-CG-IP-RQ-373 | | | |
| SPK5 | Review the Purchase Specification for Part. No. RXA-ZX0109 . Review instrument vendor documentation. | Spectral bands of no more than 20 nm width | L4-CG-IP-RQ-207 | | | |
| SPK6 | Review the Purchase Specification for Part. No. RXA-ZX0109 . Review instrument vendor documentation. | Measurement range of 0.1 to 2000 micro mol photons m-2 s-1 | L4-CG-IP-RQ-377 | | | |
| **NUTNR-J** | | | | Results for NUTNR-J application per 3161-11501-00002.xls (the -J is the same instrument as the -A, but includes the wiper). Common RQs verified for the SUNA in 3161 11501-00002.xls . | | |
| NUT1 | Review the Purchase Specification for Part. No. RXA-ZX0108 . Review instrument vendor documentation. | Accuracy of ± 2 µM for nitrate concentrations below 20 µM. | L4-CG-IP-RQ-233 | | | |
| NUT2 | Review the Purchase Specification for Part. No. RXA-ZX0108 . Review instrument vendor documentation. | Accuracy of ± 10% for nitrate concentrations at or above 20 µM. | L4-CG-IP-RQ-403 | | | |
| NUT3 | Review the Purchase Specification for Part. No. RXA-ZX0108 . Review instrument vendor documentation. | Precision of ± 2%. | L4-CG-IP-RQ-558 | | | |
| NUT4 | Review the Purchase Specification for Part. No. RXA-ZX0108 . Review instrument vendor documentation. | Range of 0.5 to 50 µM. | L4-CG-IP-RQ-234 | | | |
| NUT5 | Review the Purchase Specification for Part. No. RXA-ZX0108 . Review instrument vendor documentation. | Drift of no greater than 4 µM over a deployment of seven months. | L4-CG-IP-RQ-404 | | | |
| NUT6 | Review the Purchase Specification for Part. No. RXA-ZX0108 . Review instrument vendor documentation. | Capable of sampling intervals of no less than one time per second. | L4-CG-IP-RQ-239 | | | |
| **VEL3D-J** | | | | Results for VEL3D application per 3161-80101-00001.xls (the -J is the same instrument as the -K). Common RQs verified for the Aquadopp in 3161-10301-00001.xls (as VELPT, but same basic instrument) | | |
| VEL1 | Review the Purchase Specification for Part. No. RXA-ZX0112 . Review instrument vendor documentation. | Measures three axes of current speed with an accuracy of +/- 1 cm s-1. | L4-CG-IP-RQ-260 | | | |
| VEL2 | Review the Purchase Specification for Part. No. RXA-ZX0112 . Review instrument vendor documentation. | Measures three axes of current speed with a resolution of 0.001 m s-1. | L4-CG-IP-RQ-261 | | | |
| VEL3 | Review the Purchase Specification for Part. No. RXA-ZX0112 . Review instrument vendor documentation. | Samples at frequencies of no less than 10 Hz. | L4-CG-IP-RQ-264 | | | |
| VEL4 | Review the Purchase Specification for Part. No. RXA-ZX0112 . Review instrument vendor documentation. | Has a range of 0 to 4.8 m s-1. | L4-CG-IP-RQ-265 | | | |

| Test Procedure 3166-90106 Rev 1-00 | | | | Test Results | | |
|---|---|---|---|---|---|---|
| Step# | Instructions | Expected Results | Requirement ID | Observed Results | Pass/Fail | Notes |
| VEL5 | Review the Purchase Specification for Part. No. RXA-ZX0112 . Review instrument vendor documentation. | Has a direction accuracy of +/- 2 degrees. | L4-CG-IP-RQ-266 | | | |
| VEL6 | Review the Purchase Specification for Part. No. RXA-ZX0112 . Review instrument vendor documentation. | Has a direction resolution of 0.1 degrees. | L4-CG-IP-RQ-385 | | | |
| VEL7 | Review the Purchase Specification for Part. No. RXA-ZX0112 . Review instrument vendor documentation. | Has a direction range of 0 to 360 degrees. | L4-CG-IP-RQ-606 | | | |
| VEL8 | Review the Purchase Specification for Part. No. RXA-ZX0112 . Review instrument vendor documentation. | Measures temperature over a range of -2° C to 30° C. | L4-CG-IP-RQ-596 | | | |
| VEL9 | Review the Purchase Specification for Part. No. RXA-ZX0112 . Review instrument vendor documentation. | Measures temperature with an accuracy of ±0.1°C. | L4-CG-IP-RQ-597 | | | |
| VEL10 | Review the Purchase Specification for Part. No. RXA-ZX0112 . Review instrument vendor documentation. | Measures temperature with a resolution of 0.01°C. | L4-CG-IP-RQ-598 | | | |
| VEL11 | Review the Purchase Specification for Part. No. RXA-ZX0112 . Review instrument vendor documentation. | Is capable of data compression. | L4-CG-IP-RQ-267 | | | |
| VEL19 | Review the Purchase Specification for Part. No. RXA-ZX0112 . Review instrument vendor documentation. | Is capable of burst sampling. | L4-CG-IP-RQ-607 | | | |
| **OPTAA-J** | | | | Results (per 3161-11701-00001, the -J is the same instrument as the -D) | | |
| OPT1 | Review the Purchase Specification for Part. No. FAS-000308 . Review instrument vendor documentation. | Absorption accuracy of ±0.01 a(λ) m-1 | L4-CG-IP-RQ-226 | | | |
| OPT2 | Review the Purchase Specification for Part. No. FAS-000308 . Review instrument vendor documentation. | Absorption precision of 0.005 a(λ) m-1 | L4-CG-IP-RQ-514 | | | |
| OPT3 | Review the Purchase Specification for Part. No. FAS-000308 . Review instrument vendor documentation. | Absorption wavelength range of 400 nm to 720 nm | L4-CG-IP-RQ-516 | | | |
| OPT4 | Review the Purchase Specification for Part. No. FAS-000308 . Review instrument vendor documentation. | At least 7 absorption measurement bands over the stated wavelength range | L4-CG-IP-RQ-518 | | | |
| OPT5 | Review the Purchase Specification for Part. No. FAS-000308 . Review instrument vendor documentation. | Absorption spectral bands of no more than 20 nm width | L4-CG-IP-RQ-519 | | | |
| OPT6 | Review the Purchase Specification for Part. No. FAS-000308 . Review instrument vendor documentation. | Absorption measurement range of 0.05 a(λ) m-1 to 8 a(λ) m-1 | L4-CG-IP-RQ-228 | | | |
| OPT8 | Review the Purchase Specification for Part. No. FAS-000308 . Review instrument vendor documentation. | Attenuation accuracy of ±0.01 c(λ) / m | L4-CG-IP-RQ-399 | | | |
| OPT9 | Review the Purchase Specification for Part. No. FAS-000308 . Review instrument vendor documentation. | Attenuation precision of 0.005 c(λ) m-1 | L4-CG-IP-RQ-520 | | | |
| OPT10 | Review the Purchase Specification for Part. No. FAS-000308 . Review instrument vendor documentation. | Attenuation wavelength range of 400 nm to 720 nm | L4-CG-IP-RQ-522 | | | |
| OPT11 | Review the Purchase Specification for Part. No. FAS-000308 . Review instrument vendor documentation. | At least 7 attenuation measurement bands over the stated wavelength range | L4-CG-IP-RQ-524 | | | |

| Test Procedure 3166-90106 Rev 1-00 | | | | Test Results | | |
|---|---|---|---|---|---|---|
| Step# | Instructions | Expected Results | Requirement ID | Observed Results | Pass/Fail | Notes |
| OPT12 | Review the Purchase Specification for Part. No. FAS-000308 . Review instrument vendor documentation. | Attenuation spectral bands of no more than 20 nm width | L4-CG-IP-RQ-525 | | | |
| OPT13 | Review the Purchase Specification for Part. No. FAS-000308 . Review instrument vendor documentation. | Attenuation measurement range of 0.05 c(λ) m-1 to 15 c(λ) m-1 | L4-CG-IP-RQ-401 | | | Waived by ECR 1300-00287 |