Standard Operating Procedure

Procedure Number: SOP-06-001

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Procedure Title: Upgrading an Existing Water Level Station or Installing a New Water Level Station

System: Xpert, Xpert Dark, and 9210 Data Collection Platforms

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On March 27, 2006 the MSCB approved a new SOP for the testing and installing of a new water level station which include Sutron Xpert series of DCPs. This original SOP was updated and re-approved by MSCB on August 22, 2007, for distribution.

This procedure shall be used for all new stations and when a station is being upgraded. This SOP is applicable until the Electronic Site Report becomes operational, and it will be modified as needed in the future. This SOP covers a number of issues related to various Steps (3 through 7) as outlined in Center for Operational Oceanographic Products and Services' (CO-OPS) Reliable Operating System (ROS).

Tester is defined as a person or organization that assembles the whole system and performs testing. At the present time, Testers are, the RDD instrument lab (east coast), FOD instrument lab (west coast), and instrument lab contract support (presently RDSI).

Installer is defined as a person or a team - both government and contractors - who performs annual maintenance, emergency maintenance, DCP upgrade, or installation of a new water level station.

Project Lead is defined as the project manager or lead person who has the delegated authority from CO-OPS' Senior Management Team (SMT) for the planning, execution, control and monitoring of the project.

Task Manager is defined as the person who has the delegated authority from the Contracting Officer's Representative (COR) who is the technical representative of the contracting officer for a specific contract.

Contractor is a person or organization who has been awarded a specific task order(s) under government contract(s) for the specific project.

(1) For a new station, Project Lead/Task Manager shall request a new station number from CO-OPS Requirements and Development Division's (RDD) Operational Engineering Team (OET) by providing the position information - latitude and longitude - of the new station to OET. OET will assign the new station number and inform the Project Lead/Task Manager. The Project Lead/Task Manager shall notify the Chesapeake Instrument Lab of the planned station configuration and planned installation date. This request for station hardware shall be made at least 60 days before the planned installation date if the equipment will be from the existing inventory, or 180 days if the equipment purchase is required.

(2) The Tester shall request assignment of transmissions parameters - platform-id, channel, and transmit time - from OET, at least two weeks before the beginning of the test. OET will assign the transmission parameters and provide the information to the requester.

(3) The Tester(s) shall prepare the approved preliminary Xpert Site Report by completing the following fields:

(a) the station name, station ID number;

(b) the transmission parameters (correct assigned plat-id, channel, and transmit time);

(c) the serial numbers of all boards and equipment as listed on the approved Site Report for the DCPs that will be installed/upgraded in the field;

(d) the correct number, type, and serial numbers of the sensors that will be installed on each DCP;

(e) the sensor offset for the acoustic sensor.

(4) The Tester shall provide an e-mail and the approved preliminary Xpert Site Report to OET at least three business days prior to the beginning of the test, and within three business days the station information will be configured by OET in CO-OPS Database Management System (DMS). Tester shall provide the testing information in an e-mail such as test platform id, test channel number, test transmit time, test station id, and information about all the sensors that will be used during the system throughput testing for one or more DCP.

Here are a couple of suggested formats for this e-mail message: first one is for a new station installation and second one is for an existing station upgrade.

(a) The following is available for DPAS testing for the installation of USCG Mobile, AL.

USCG Sector Mobile, AL (8736897), latitude 30^0/38'/54' N, longitude 88^0 03' 30" W

GOES Transmission parameters are as follows: Platform id 336A14AE, Channel 150W, Transmit Time 00:03:06 (6 second window every 6 minutes), Transmitting as test station id 99999831.

SNS -0.1048 DAT 10.000

The following sensors are tested:
A1 Aquatrak (Xpert)
L1 Battery (Xpert)
D1 Air Temp (Xpert)
E1 Water Temp (Xpert)
C1 Wind Sensor (Xpert)
F1 Barometer (Xpert)

B1 Druck Pressure Sensor (Xpert Dark)
C1 Redundant Wind Sensor (Xpert Dark)
L2 Battery (Xpert Dark)

(b) Kewaunee is broadcasting GOES messages, and is now up for testing:

9087068 Kewaunee, WI, latitude 44^0 27' 50" N, longitude 087^0 30' 04" W
Transmissions are on RDSI 6 Min Test 3.

GOES Transmission parameters are as follows: Platform ID 335EE760, Channel 147E, Transmit Time 00:01:25 (5 second window every 6 minutes), Transmitting as test station id 99999231.

SNS 0 DAT 178.484

The GOES parameters for deployment are:
Platform ID 336B23CE, Channel 150W, Transmit Time 00:04:48 (6 second window every 6 minutes)

The following sensors are tested:
V1 BEI Encoder (Xpert)

V1 BEI Encoder (Xpert Dark)
B1 KPSI 735T (Xpert Dark)

(5) OET shall configure the test station in DMS and will inform the Tester that the station is ready to be tested. Once a station is configured, Tester will have up to three weeks to complete the test. In most cases, it will only require a few days, but for new installations, Tester may need additional time.

(6) During the testing phase, Tester shall use the exact equipment that will be installed in the field, so that any problems can be identified and rectified prior to the installation. Instead of using the actual station id, the tester shall use the test station id and the assigned transmissions parameters for the testing purposes. OET has provided the test station numbers to the Testers and Installers.

(7) Once the data is transmitted properly, OET will check the data from the system under test in the DMS, and OET will inform the Tester that the test is complete and equipment is ready to be shipped to the field for the upgrade/installation. Tester shall also access the CO-OPS website to check the status of the transmissions and sensor data. Tester and OET shall provide a copy of the test results (data plots, e-mails) to be included in the station folder.

(8) Tester shall change the test station number to the correct station number in the DCP before the equipment is shipped to the Installer.

(9) Tester shall update the preliminary site report if any of the information has been changed during the testing phase and provide the preliminary Site Report and the data results from the end to end test to the Project Lead, Task Manager, Installer, OET, and to distribution, as necessary. OET will make the necessary configuration changes in DMS within 3 business days of the receipt of the site report.

(10) For contract installations, after receipt of equipment from the Tester, Contractor shall perform a pre-deployment bench test of fully assembled and configured system, using Contractor assigned test station ids by CO-OPS, to verify the operation of appropriate systems and sensors prior to the deployment in the field. CO-OPS shall make available to the Contractor the decoder software to decode the raw satellite messages as an additional resource. Contractor needs to have access to DOMSAT or permission to login to NESDIS for downloading raw data during this phase. Contractor needs to use the assigned test station id for testing but needs to ascertain that the test station id is changed to the correct station id before deployment.

Contractor shall ensure that all equipment is functioning properly prior to the transportation to the field. Contractor shall document and communicate the results of pre-deployment testing to the Task Manager and OET, as appropriate.

(11) Project Lead/Task Manager/Installer, as appropriate, shall provide a schedule for the upgrade/installation to OET at least a month prior to the upgrade/installation.

For a station that is listed on the Hydro Hot List (HHL) and is used as a control station for a hydrographic survey but is planned to be upgraded, then Project Lead/Task Manager/Installer shall discuss the schedule with OET and Hydro Planning Team (HPT), and postpone the upgrade of the control station till the survey is completed, if and when possible. This should be considered case by case basis.

The Hydro Hot List is available at http://tidesandcurrents.noaa.gov/hydro.shtml to determine if the affected water level station is listed as operational on the HHL.

(12) For stations that are designated as Remote Stations by CO-OPS, there are additional requirements that need to be considered and Project Lead/Task Manager/Installer shall consult CO-OPS Engineering Design Review Board (EDRB). As additional requirements and SOP are developed in this area, this SOP will be updated in the future.

(13) For upgrades, Installer shall inform the CORMS, a few hours prior to the beginning of the upgrade, so that CORMS can notify appropriate personnel and stop the dissemination of data over the web, as appropriate.

(14) Installer shall perform the specific sequence as defined below for upgrading a water level station.

(a) Installer shall remove the older model primary DCP (Sutron 9000 or other) being sure to download the data prior to removal of the DCP. The downloading of all the available data shall be done for both primary and backup DCP and in some cases may involve downloading to various electronics media such as PCMCIA cards, flash cards, hard disks, etc. The intent is to download or copy data in electronic format.

(b) Generally the bolt holes for the Sutron Xpert DCP box will match that for the older DCP box. But, if it is necessary to facilitate the installation of the new Xpert system, the 8200 DCP can be un-mounted from the wall and carefully placed on a table top, box, or even floor and shall be left running, if possible, while the primary DCP and sensor are being upgraded i.e. when primary sensor data is not available. Installer shall ascertain that connecting cables are not kinked, broken, or pulled out.

If Installer finds that the 8200 DCP cable lengths are not adequate for placing the DCP on the table or floor, where it can be left running, or for non-working 8200 DCP or sensor situations, then Installer shall contact OET and discuss the situation and obtain the waiver from this requirement.

This situation may develop for a station that was not on the HHL during the planning step as described in Section 11 above, but was placed on the HHL thereafter. In that case, OET shall check the Hydro Hot List (HHL) to determine if the station is required for hydrographic or photogrammetric surveys, as appropriate, and the hydro/photo survey parties shall be notified by POC of the situation, and possibility of unavailability of data for the few hours for the control station during the upgrade, as appropriate.

(c) Installer shall install the Sutron Xpert DCP, and upgrade only the primary sensor (acoustic A1, or Pressure N1/NT on the coastal side, and Shaft Angle Encoder V1 in the Great Lakes).

(d) Installer shall enable the satellite communications for the primary sensor through the primary DCP (Sutron Xpert).

(e) Installer shall contact OET to ascertain that the primary sensor is transmitting good valid data before disconnecting existing Sutron 8200 DCP and the backup pressure sensor. Once OET confirms that upgraded primary DCP and primary sensor are collecting and transmitting valid preliminary data, then Installer shall download the available data from the Sutron 8200 DCP, accounting for the time period when the primary sensor was not collecting data. Then Installer shall remove the older model Sutron 8200 DCP and the backup pressure sensor.

(f) Installer shall install the redundant DCP (Sutron Xpert Dark) and the redundant pressure sensor (Druck or equivalent).

(g) Installer shall enable the communications of the primary DCP (Sutron Xpert) and the redundant DCP (Sutron Xpert Dark).

(h) Installer shall install and enable the communications of the ancillary sensors, as appropriate, such as wind, barometer, water temperature, air temperature, etc., with the primary or redundant DCP, as appropriate. The installed DCP and the corresponding sensors shall match the project plan.

(i) Installer shall ascertain that all other communications methods such as phone lines, modems, IP modems, etc., are working properly.

(j) Installer shall ascertain that all system power related equipment such as batteries, solar panels, external AC chargers, etc., are working properly.

(k) Installer shall perform level runs and other required tasks as outlined in the appropriate project instructions, task orders, as necessary.

(l) Installer shall ascertain that upgraded water level station and all of the installed sensors are collecting good and valid preliminary data, and has received confirmation from OET that all DCP and sensors are collecting good and valid data before departing the water level station. See additional communications requirements below in Section 14.

(15) When in the field, Installer shall communicate with OET via a telephone call (and a follow-up e-mail to document the conversations, actions and results):

(a) If the tested equipment can not be used because it was damaged during shipping or a spare sensor/equipment will be used for a valid reason, then new serial number of the equipment and sensor offset shall be provided to OET.

(b) When the old Sutron 9000 DCP is taken down and when the Sutron Xpert is installed as described above.

(c) When the old Sutron 8200 backup DCP is taken down and when the Sutron Xpert Dark DCP is installed with corresponding appropriate sensors, as described above.

(d) Installer confirms Sensor Offset (SNS or C1) and Datum Offset (DAT or C2) for acoustic primary sensors, or Accepted Orifice Offset for single/dual orifice primary ParoScientific sensors, or Accepted Datum Offset for the Great Lakes stations, and provides the leveling abstract after the completion of leveling run.

(e) OET will check the data transmissions from the primary and redundant DCPs and installed sensors in DMS with the predicted data, if available, and shall inform the Installer if there are any problems/issues, etc.

(f) Installer shall resolve the problems/issues as discussed with OET, and then OET will inform the Installer that all the data is good. If some problems can not be resolved, OET will advise the installer the course of actions needed for the resolution.

(g) Installer must not leave the station till OET informs the Installer that all DCPs and sensors

are collecting good, valid, and continuous data. In addition, Installers shall check with the Task Manager, Project Lead, or supervisors, as appropriate, to get permission to leave a site. Installer shall also notify CORMS about the completion of the maintenance before departing the tide station.

(16) OET shall designate station as "Installed/Upgraded" and the data are considered "Developmental" for both - new and upgraded stations. OET shall inform appropriate personnel and organizations including CORMS about the installation or upgrade.

(17) After proper notification, CORMS shall resume the dissemination of the data over the web.

(18) In the case of a tsunami station, POC informs NWS HQ that a station is installed or upgraded, and POC also informs ATWC and PTWC that a station is installed or upgraded. This notification or subsequent notification to NWS HQ and to ATWC/PTWC may include declaration of a tsunami tide station as "Provisionally Operational" ("Tsunami-Capable" status), as appropriate. For existing stations, the notification will be quicker, because the accepted datums, predictions, etc will be available. For new stations, when all the proper and required data quality checks are performed after a month of data collection, then data will be declared as "Fully Operational". The declaration of "Fully Operational" status of the data is covered in SOP under ROS Step 7.

(19) Installer shall provide all the required deliverables – all documentation and downloaded data - in a timely fashion as listed in the contract documents, or the Standing Project Instructions, as appropriate.

(20) New installations and upgrades are encouraged to be done on the weekdays and are generally not recommended for weekends. But if an upgrade or a new installation needs to be done on the weekend, then OET shall configure most of the information prior to the weekend, and Installer shall call CORMS to make the switch during the weekend. In that case, the first business day after the weekend/holiday, OET will check the station, complete the configuration of datum offset, communicate with the Installer, and then designate the station as operational. Stations where acoustic sensors are switched to ParoScientific pressure sensors or vice a versa, or complex installation shall not be done on the weekends as the CORMS weekend switch procedure can not handle these types of upgrades/installations on the weekends and OET intervention is necessary for these types.

Installer shall provide the appropriate and necessary information to the CORMS operator in case the upgrade/installation is done over the weekend. Installer shall provide (a) the station name and number (b) the assigned transmissions parameters - platform id, channel, and transmit time (c) Parameter value (as defined below) to the CORMS in the case of a weekend upgrade/installation. The sensor offset value (-0.xxx in meters) is the Parameter value required for a primary acoustic sensor. The Accepted Datum Offset value (xx.xxx in meters) is the Parameter value required for a Great Lakes station. The Accepted Orifice Offset(s) for N1 sensor (+/-xx.xxx in meters) is the Parameter value required for a single orifice station. The Accepted Orifice Offsets for N1 and T1 (+/- xx.xxx in meters) are the Parameter values required for a dual orifice station.

This completes the upgrade/installation of a new tide/ water level station.

Acronyms:
ATWC – NOAA/NWS Alaska Tsunami Warning Center
CO-OPS – Center for Operational Oceanographic Products and Services
COR – Contracting Officer's Representative
CORMS – CO-OPS Continuous Operational Real-Time Monitoring System
COTR – Contracting Officer's Technical Representative
DCP – Data Collection Platform
DMS – Database Management System
EDRB – Engineering Design Review Board
FOD – CO-OPS Field Operations Division
GOES – Geostationary Operational Environmental Satellite
HQ – Headquarters
MSCB – CO-OPS Measurement Systems Configuration Board
NOAA – National Oceanic and Atmospheric Administration
NOS – NOAA National Ocean Service
NWS – NOAA National Weather Service
OET - CO-OPS/RDD Operational Engineering Team
POC – Point of Contact
PTWC – NOAA/NWS Pacific Tsunami Warning Center
RDD – CO-OPS Requirements and Development Division
RDSI – Research and Development Solutions, Inc.
ROS – CO-OPS Reliable Operating System
SMT– CO-OPS Senior Management Team
SOP – Standard Operating Procedures
TM – Task Manager