

NAVAL FACILITIES ENGINEERING COMMAND
SOUTHWEST
COASTAL IPT UTILITIES

STANDARD OPERATING PROCEDURE

TITLE

SHIP TO SHORE ELECTRICAL SERVICE

PROCEDURE NUMBER

WRUP6-018

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TITLE: SHIP TO SHORE ELECTRICAL SERVICE

REFERENCE: (a) Naval Ship's Technical Manual Chapter 320
(b) OPNAVINST 11310.3B Operation and Maintenance Policy for Shore To Ship Power
(c) Unified Criteria Guide 3-560-01 Electrical Safety for Operations and Maintenance

ENCLOSURES: (1) NAVFAC SW WRUP62-018.1 Ship to Shore Cable Insulation Resistance Record
(2) NAVFAC SW WRUP62-018.2 11310/40 Ship to Shore Connection Checklist

1. PURPOSE. Defines the Utilities requirement for providing Ship To Shore Electrical service to ships and contractor equipment on the piers in Metro San Diego.

2. SCOPE. This SOP applies to all NAVFAC SW Coastal IPT Utilities Code WRUP6C HV Electrical and WRUP6D Ship To Shore personnel.

3. ACTION. All Utilities Ship To Shore and HV Electrical personnel. The complete process must be repeated each time a ship connects to or disconnects from shore power for any reason.

4. GENERAL. It is Utilities policy to conduct ship to shore electrical service safely and in full accordance with references (a), (b) and (c). It is also our policy that only qualified employees may direct the berth preparation/teardown, connect and disconnect shore power cables, and open or close the breakers supporting the ship.

5. DEFINITIONS.

Qualified Person. An employee trained in the proper procedures required to perform a specific job and trained to recognize and avoid the hazards associated with the job. Specifically an employee, who by virtue of their training and experience, is permitted to work on or near exposed energized parts of systems or equipment.

Energized Work. Any time an individual intentionally handles, assembles, disassembles, adjusts, loosens, tightens, maintains, touches, or encroaches on the minimum approach distance of a live or energized component or conductor. This definition includes measuring voltage.

Deenergized/Electrically Safe Condition. The circuit, or equipment has been locked and tagged out of service, tested, shorted and grounded. For work in any LV (600 v and below) panel board, where there is no allowance or space for attaching temporary grounds, Electrically Safe Condition is defined as when the circuit has been locked, tagged, discharged and tested and all potential sources are under the complete control the maintenance person.

Personal Protective Equipment (PPE). Arc Flash rated PPE is required during the performance of this work. Refer to Chapter 4 of reference (e) when determining the Arc Flash PPE requirement.

Ship's Representative. The supported ship's Electrical Officer, Electrical Leading Chief Petty Officer, Electrical Leading Petty Officer, or Electrical Petty Officer who will represent the ship during the shore power connect/disconnect procedure.

Live Line Tool. Insulated tool that electrically insulates the worker from the energized conductor and provides physical separation from the device being operated.

High Voltage (HV). System voltages above 600vac.

Low Voltage (LV). System voltages 600vac and lower.

6. TRAINING. All Employees shall be trained in and familiar with the safety related work practices, safety procedures, and other safety requirements which pertain to their respective job assignments. Employees shall also be trained in and familiar with related emergency procedures (such as pole top and manhole rescue).

- a. At least annually, management shall determine that each employee is complying with the safety work practices and uses these practices in conducting work.
- b. Employees will receive additional training under the following conditions:
 - 1. If management determines that the employee is not complying with established safe work practices.
 - 2. When new technology, equipment, or procedures are introduced into the workplace.
 - 3. The employee is required to perform tasks which are not normally performed as part of their regular duties.

7. QUALIFIED PERSON REQUIREMENTS. Qualified Persons must be trained and competent in:

- a. The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.
- b. The skills and techniques necessary to determine the nominal voltage of exposed live parts.
- c. The minimum approach distances specified in reference (a), which correspond to the voltages to which the employee may be exposed.
- d. The proper use of precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools used for working on or near exposed energized parts of electric systems or equipment.

8. DOCUMENTATION. A listing of those personnel qualified to perform work on, or near, energized High Voltage systems or equipment must be maintained within the Electrical Product Line.

9. PROCEDURES.

a. **480 Volt Shore Power (Metro San Diego)**

- 1. Berth Preparation.
 - a. All Ship's arrival information will be received from the NAVFAC SW Utilities Duty Desk.
 - b. Once notification has been received of a ship's arrival and berth assignment, Code WRUP6D will dispatch a crew to that pier berth. Each berth will be evaluated in order to achieve optimum shore power service to the ship. The equal length cables necessary to support the class of arriving ship will be laid out consistent with their arrival announcement (bow in/out, starboard/port side to the pier).
 - c. If during Berth Preparation, a refrigerated or dental van occupy receptacles on a mound which will prevent providing the requested number of cables, contact Port Operations to coordinate moving those cables to available receptacles on the other side of the mound. Reefers and Dental vans will remain on until disconnect confirmation received from Port Ops. If a contractor power panel occupies a receptacle which will prevent providing the requested number of cables, the power panel will be de-energized and disconnected immediately. If the necessary receptacles for relocation are not available, contact Port Ops for resolution.
 - d. Notify Port Operations immediately of any potential conflict regarding the inability to provide any requested service. This includes significant delays caused by security, other ship, government, or contractor equipment obstructing access to the Viking receptacles, or planned cable lay down areas.
- 2. Shore Power Cable and Plug Assembly Testing.
 - a. All Shore Distribution System and Cable testing will be conducted IAW References (a), (b), and (c).
 - b. Conduct Pre-job brief; ensure all personnel are outfitted in required PPE; confirm communications are established with all crew members. **Refer to reference (e), Chapter 4 when determining PPE**

- c. Select and inspect tools and devices used for the voltage and insulation measurement. Ensure that all are rated and set for the voltage to be tested.
 - d. Inspect Class 00 insulated rubber gloves and leather protectors.
 - e. The following tests must be conducted prior to connecting to an energized power source (prior to each use).
 - 1. The cable outer jacket, insulating boot and insulated conductors, cable lugs, splice connectors and plug assembly (Viking, Joy or Single Pole), shall be visually examined for signs of physical damage, excessive wear or overheating. Cables and Plugs not passing this visual examination will be removed from service immediately and repaired, reutilized, or recycled.
 - 2. The insulation resistance of each cable will be tested Phase to Phase, with a 500 Volt Megger. Minimum permissible insulation resistance is two (2) meg-ohms. Cables which test lower than 2 Meg-ohms will be removed from service immediately and a replacement cable installed. The failed cable must then be repaired, reutilized or recycled. Enter the insulation resistance reading in the blocks in enclosure (1). **Verification Signature Required. Once the berth is prepared and the cables are tested satisfactory, WRUP6D sign Step 1 of enclosure (2).**
3. Shore Power Connects and Disconnects.
- a. Upon arrival at the pier, the Code WRUP6D Electrician will contact the arriving ship to confirm their power requirements, the number of cables provided, the insulation resistance of those cables, and to issue any special instructions or precautions to the ship (which must be documented on enclosure (1)). **Verification Signature Required. WRUP6D and Ship's representative sign enclosure (1), and step 2 of enclosure (2), before proceeding to the next step.**
 - b. WRUP6D Electrician enter the Unit Substation which will feed power to the ship and check all breakers to ensure they are open. Lock the station access doors when leaving.
 - c. If the ship carries only the Viking Plug assembly, the ship will receive all necessary shore power cable from the pier. Ship's Force will perform all lug to lug splicing on the ship.
 - d. If the ship carries the Viking Plug Assembly and shore power cable, the lug end of their ship's cables will be passed to the pier for splicing and connection by Code WRUP6D. Ship's Force will perform all lug to lug splicing on the ship.

Note: Cables serving submarines will have a MIL-C-24368/5 outboard connection permanently attached to the shipboard end. Lug to Lug Splices are not permitted on the shipboard end of the shore power cables serving submarines.

- e. NAVFAC SW electricians will perform all lug to lug splicing on the Pier, using the following hardware:
 - Bolts (1/2" x 1 1/4" LG Hex Grade 8 Zinc Coated Steel, 13 TPI)
 - Plain Hex Nuts (1/2" x 13 (UNC STL Cap Surface),
 - Flat Washers (1/2" Bolt Size, 17/32 ID X 1 1/16 OD, Steel Cadmium & Chromium Surface).
 The lug/splice assembly must be torqued to 60 pound feet. All splices will be encapsulated with two complete layers of cambric tape (overlapping the exposed conductors by two inches on both ends of the splice), followed by two layers of electrician's Tape (overlapping the cambric by two inches on both ends of the splice). All taped splices must be placed in non-conductive, protective spreaders.
- f. When cable splicing is complete, Code WRUP6D and ships representative meet to confirm that all splice connections have been made and that shore power is ready to be connected. **Verification Signature Required. WRUP6D and ship's representative sign Step 3 of enclosure (2) before proceeding to the next step.**

- g. Code WRUP6D direct the ships electrician to plug in their Viking Plug Assemblies on the ship.
 - h. Code WRUP6D open the covers on all Viking receptacles which will supply the ship. Confirm correct multimeter operation by testing on a known source. Check for voltage on all phases (A-B, B-C, C-A) using a multimeter. If no voltage is present, proceed to step 9.a.3.i. **PPE Arc Flash 2* using Voltage Rated Gloves and Tools.**
 - i. Code WRUP6D check voltage on all cables at the individual splices using a Tic-Tracer. If no voltage is found, proceed to step 9.a.3.j.
 - j. Code WRUP6D personnel connect all shore power cable Viking Plug Assemblies to the pier mound.
 - k. Connections on the ship and the pier are complete. **Verification Signature Required. WRUP6D and ship's representative sign Step 4 of enclosure (2) before proceeding to the next step.**
 - l. Code WRUP6D personnel energize and de-energize the cables one at a time in order for the ship to test each cable individually for proper phase rotation.
 - m. Correct phase rotation has been confirmed by the ship. If the correct phase rotation is not found, all breakers must be opened, all splices tested for voltage, and all plugs removed from the receptacles before beginning troubleshooting. Once the problem has been found and corrected, repeat steps 9.a.3.f through 9.a.3.l. Enclosure (2) must be signed which authorizes shore power to be fully energized. **Verification Signature Required. WRUP6D and ship's representative sign Steps 5 and 6 of enclosure (2) before proceeding to the next step.**
 - n. WRUP6D close all assigned shore power breakers and notify ships electrician of the availability of shore power. **Verification Signature Required. WRUP6D and ship's representative sign Step 7 of enclosure (2) before proceeding to the next step.**
 - o. WRUP6D apply two full wraps of white fabric tape on each of the cables, near where the cable enters the back side of the receptacle. Use a permanent marker to write the name of the ship on each of the assigned plugs. **Verification Signature Required. WRUP6D sign Step 8 of enclosure (2) before proceeding to the next step.**
 - p. For SSN/SSGN/SSBN WRUP6D enable the Shunt Trip Group for the breakers assigned to that submarine. Refer to paragraph a.6.a through a.6.c for additional details. **Verification Signature Required. WRUP6D and ship's representative sign Step 9 of enclosure (2) before proceeding to the next step.**
 - q. Once notified by the ships electrician that the ship is stabilized on shore power, Code WRUP6D Electrician will notify the Utilities Duty Desk which shore breakers are providing power to that ship.
 - r. Place enclosures (1) and (2) in the Pier Unit Substation at that berth where they will remain until the ship departs the berth.
4. Providing power to the outboard ship at a nested berth.
- a. All cables for the outboard ship will prepared and tested in accordance with Paragraphs 9.a.1. and 9.a.2.
 - b. If while being rigged, the outboard ship's cables will come in close proximity to, or in contact with, the energized cables supplying the inboard ship, the inboard side ship must go onto ship's power and their shore power cables deenergized, tested and the plugs removed from the shore an dship's receptacles during the cable rigging process. If the shore Viking plugs are disconnected, correct phase rotation must be tested and confirmed once those cables are reconnected and prior to the inboard ship returning to continuous shore power (Repeat Steps 3.e. through 3.j. and document).

- c. The connection, and disconnection, of the outboard ship's shore power will be performed in accordance with 9.a.3. and 9.a.5.
5. Securing 480v Shore Power.
- a. At ship's request, or at least 1 hour prior to scheduled departure if the activity has not called, a qualified Code WRUP6D Electrical crew will be dispatched to the berth.
 - b. Upon arrival at the berth, the Code WRUP6D Electricians will retrieve enclosures (1) and (2) from the Pier Unit Substation at the berth, notify ship's duty representative of their arrival. Ship's representative will confirm that the ship is on ship's power and that all their shore power breakers are open. **Verification Signature Required. Ship's representative sign Step 10 of enclosure (2) prior to opening the breakers.**
 - c. For SSN/SSGN/SSBN, WRUP6D disable the Shunt Trip Group for the breakers assigned to that submarine. Refer to paragraph a.7.a and a.7.b for additional details. **Verification Signature Required. WRUP6D sign Step 11 of enclosure (2) before proceeding to the next step.**
 - d. At the splice, WRUP6D will use a clamp-on ammeter to check each cable for a no-current condition, and voltage tester (Tic Tracer) for a no-voltage condition. In no case will the pier shore power breakers be opened when ship's shore power bus and cables are energized.
 - e. WRUP6D open the pier shore power breaker(s). WRUP6D Electricians will use a Voltage Tester (Tic Tracer) to test at each splice to confirm each cable is de-energized.
 - f. If a no voltage condition is confirmed, WRUP6D unplug the Viking Plug Assemblies from the Shore Power Mound, place the cover over the plug end and lower to the pier deck, replace and latch each the receptacle door cover, and notify the ship's electricians to unplug the ship's Viking Plug Assemblies from their shore power connection point. **Verification Signature Required. WRUP6D sign Step 12 of enclosure (2) prior to opening the breakers.**
- Note: Do not leave the plug hanging on the hook or bail with the receptacle cover open.**
- g. Ship's representative and WRUP6D confirm that all cables are unplugged and are laying on the pier deck. **Verification Signature Required. WRUP6D and ship's representative sign Step 13 of enclosure (2).**
 - h. Once confirmation is received that the ship's Viking Plug Assemblies have been disconnected, WRUP6D will disassemble the pier splices and return cables to the ship (when applicable). Ship's electricians will concurrently disassemble all shipboard splices and deliver cable to pier (when applicable).
 - i. Once the disconnect evolution is complete, WRUP6D will remove the white fabric tape from each plug and stage the shore power cables neatly at the berth or schedule for transport.
 - j. The Ship To Shore copy of enclosures (1) and (2) will be turned in to the WRUP6D Supervisor at the end of the shift. All copies will be maintained for a period of one year.
6. Special Instructions for Activating Shunt Trip (Submarines Only). This section will be performed in addition to all other 480v shore power connection steps at SUBASE.
- a. At SUBASE San Diego, prior to connecting the shore power cables to the shore power mound, open the door on the Shunt Trip Control Panel inside the mound and ensure the control switch for the group of plugs being connected is in the "OFF" position.

- b. Check the 86 Lockout Relay to determine if it has tripped for any reason. Notify the WRUP6C Supervisor if the 86 device is tripped. Do not attempt to activate Shunt Trip for that breaker group if the 86 device for that group is tripped.
 - c. Once the submarine has shifted the electrical load to shore power, open the door on the Shunt Trip Control Panel inside the mound and turn the control switch to the "ON" position. Shunt Trip is now armed for that breaker group.
7. Special Instructions for De-activating Shunt Trip (Submarines Only). This section will be performed in addition to all other 480v shore power disconnect steps at SUBASE.
- a. Once the submarine has shifted the electrical load from shore to ship's power, open the door on the Shunt Trip Control Panel inside the mound and turn the control switch to the "OFF" position. Shunt Trip is now disarmed for that breaker group.
 - b. Check the 86 Lockout Relay to determine if it has tripped for any reason. Notify the WRUP6C Supervisor if the 86 device is tripped.
- b. **4,160 V SHORE POWER (Metro San Diego).**
- 1. Berth Status.
 - a. Naval Base Coronado (NBC), Berths Juliet (Station E), Kilo (Station D), and Lima (Station C). When the individual berths are vacant and no ships are scheduled to receive shore power, the normal breaker and berth status will be as follows: all cables will be removed and stored, receptacle covers, with Kirk Locks engaged, are in place, feeder breakers are racked in and closed, and the main breakers are closed. The intent is to keep the underground cable energized and dry, subsequently improving the insulation resistance.
 - b. Naval Base San Diego (NBSD) Berth 1306. When the berth is vacant and no ships are scheduled to receive shore power, the normal breaker and berth status will be as follows: all cables will be removed and stored, receptacle covers, with Kirk Locks engaged, are in place, feeder breakers are racked out, locked and tagged, and the main breaker is closed.
 - 2. Berth Preparation.
 - a. All Ship's arrival information will be received from the NAVFAC SW Utilities Duty Desk. 72 hours prior to ship arrival, Code WRUP6D Electricians will lay out all cables and remote trip devices (if applicable) on pier.
 - b. Conduct Pre-job brief; ensure all personnel are outfitted in required PPE; confirm communications are established with all crew members. **Refer to reference (e), Chapter 4 when determining PPE.**
 - c. Select and inspect tools and devices used for voltage measurement. Ensure that all are rated and set for the voltage to be tested.
 - d. Inspect Class 2 insulated rubber gloves and leather protectors.
 - e. WRUP6C open main breakers. **Refer to reference (e), Chapter 4 when determining PPE for this step.**
 - f. WRUP6C Open, rackout, lockout and tagout all feeder breakers. The Feeder Breakers will remain open, racked out, locked out and tagged until step b.4.o. of this process is attained. **Refer to reference (e), Chapter 4 when determining PPE for this step.**
 - g. Using the Kirk Key, remove the receptacle cover. **PPE Arc Flash 4 using Voltage Rated Gloves and Tools.**

- h. Test the Touch meter against a known energized source, or a test medium. Confirm the meter is operational and displaying correctly. **PPE Arc Flash 4 using Voltage Rated Gloves and Tools.**
 - i. Apply the tip of the touch meter to the receptacle conductors. Check for no voltage on all phases. **PPE Arc Flash 4 using Voltage Rated Gloves and Tools.**
 - j. Plug in all cables to their assigned receptacles and remove Kirk Key. **PPE Arc Flash 2.**
 - k. Rope off and post the 4,160 volt cable lay down area with Danger High Voltage signs.
 - l. **Verification Signature Required. WRUP6C sign enclosure (1) and Step 1 of enclosure (3).**
3. Shore Power Cable and Plug Assembly Testing.
- a. All Shore Distribution System and Cable testing will be conducted IAW References (a), (b), and (c).
 - b. The following tests must be conducted prior to connecting to an energized power source (prior to each use).
 - 1. Prior to each use, the cable outer jacket, insulating boot and insulated conductors, lugs and Plug assembly, shall be visually examined for signs of physical damage, excessive wear or overheating. Cables and Viking plugs not passing this visual examination will be removed from service immediately and repaired, reutilized, or recycled.
 - 2. Insulation Resistance Checks. The insulation resistance of each Cable and Plug Assembly, will be tested, Phase to Phase, using a 5000 Volt Megger, with all the "A" Phase lug ends bolted together, all "B" Phase lug ends bolted together and all "C" Phase lug ends bolted together. Minimum permissible insulation resistance is ten (10) meg-ohms phase to ground and five (5) meg-ohms phase to phase. Cables which do not meet the minimum insulation requirements will be removed from service immediately and a replacement cable installed. The failed cable must then be repaired, reutilized or recycled. Enter the insulation resistance reading in the blocks in enclosure (1).
 - c. Conduct Insulation Test 72 hours prior to the ship's arrival. Verification Signature Required. WRUO6C/D document the results of the Insulation Test on enclosure (1). **Verification Signature Required. WRUP6C/D sign Step 2 of enclosure (3).**
4. Connect/Energize Shore Power.
- a. One hour prior to ship arrival stage four (4) additional danger signs for ships' use and plug in the remote trip device(s).
 - b. Conduct Pre-job brief; ensure all personnel are outfitted in required PPE; confirm communications are established with all crew members. **Refer to reference (e), Chapter 4 when determining PPE.**
 - c. Select and inspect tools and devices used for voltage measurement. Ensure that all are rated and set for the voltage to be tested.
 - d. Inspect Class 2 insulated rubber gloves and leather protectors.
 - e. Test the Touch meter against a known energized source, or a test medium. Confirm the meter is operational and displaying correctly. **PPE Arc Flash 4 using Voltage Rated Gloves and Tools.**
 - f. Apply the tip of the touch meter to the lug ends of all shore power cables to check for voltage. Check for no voltage on all phases. **PPE Arc Flash 4 using Voltage Rated Gloves and Tools.**

- g. Upon ship arrival contact the ship's representative to confirm their power requirements, the number of cables provided, the insulation resistance of those cables, and to issue any special instructions or precautions to the ship (which must be documented on enclosure (1)). The ship's representative will witness the final Megger test. Perform Megger test as described in step 2.h.2. and document the results on enclosure (1). **Verification Signature Required. Ship's representative sign enclosure (1); and Ship's Representative and WRUP6C sign Step 3 of enclosure (3) before proceeding to the next step in the process.**
- h. Ship's Representatives will lock and tag out all 4,160 feeder breakers IAW their ship's tag out procedures. Locks, which are provided by WRUP6C, must be attached to the crew hasp. The key to the locks provided to the ship will remain in the possession of the ship's representative until the ship's tag and locks are removed. The spare key is maintained by the Electrical PLTL at NBSD. **Verification Signature Required. WRUP6C and ship's representative sign Step 4 of enclosure (3) before proceeding to the next step in the process.**
- i. Ship will rig and connect lugged cables to their shore power connection points and will notify WRUP6C once the ship has connected the shore power cables on the ship. **Verification Signature Required. Ship's representative sign Step 5 of enclosure (3) before proceeding to the next step in the process.**
- j. The ship's representative will remove the ship's locks and tags from the feeder breakers.
- k. Code WRUP6C will remove their locks and tags, rack in all feeder breakers, close the main breakers and notify the ship's representative that shore power is ready for phase testing. **Refer to reference (e), Chapter 4 when determining PPE for this step. Verification Signature Required. WRUP6C and ship's representative sign Step 6 of enclosure (3) before proceeding to the next step in the process.**
- l. While coordinating with the ship's representative, Code WRUP6C personnel will energize, and deenergize, the cables in order, to allow for the ship to test for proper phase rotation. **PPE Arc Flash 2. Verification Signature Required. WRUP6C sign Step 7 of enclosure (3) before proceeding to the next step in the process.**
- m. Phase rotation is confirmed correct. If the correct phase rotation is not found, all breakers must be opened, racked out locked and tagged, and all cables disconnected from the ship before beginning troubleshooting. Once the problem has been found and corrected, repeat steps 9.b.4.i through 9.b.4.l. **Verification Signature Required. WRUP6C and ship's representative sign Step 8 of enclosure (3) before proceeding to the next step in the process.**
- n. **Optional.** The ship may decide to test the remote shore power trip system. If so, the ship will ask the WRUP6C crew to close all eight feeder breakers in order to test the Remote Trip. The four breakers on each bus are controlled independently, consequently when the forward device is depressed, the breakers supporting that portion of the ship will trip, and when the after device is depressed, the four breakers supporting that other portion of the ship will trip. **If the ship decides not to test the remote trip system, WRUP6C sign Step 9 and enter "Ship Declined" next to their signature. If the Remote Trip test is performed a Verification Signature is Required. WRUP6C and ship's representative sign Step 9 of enclosure (3) before proceeding to the next step in the process.**
- o. At the conclusion of either phase rotation or remote trip testing, WRUP6C crews reset and re-close all feeder breakers. **PPE Arc Flash Category 0.**
- p. When all preparatory steps are complete, the ship's representative will indicate that they are ready to receive continuous shore power. **Verification Signature Required. WRUP6C and ship's representative sign Step 10 of enclosure (3).**
- q. Place enclosures (1) and (2) in the Substation at that berth where they will remain until the ship departs the berth.

5. De-energize/Disconnect Shore Power

- a. At the ship's requested disconnect time, a qualified Code WRUP6C Electrical crew will meet the ship's representative at the berth.
- b. The WRUP6C will confirm with the ship's representative that the ship is on ship's power, and their shore power breakers are open. Check installed meters in substation for "no current" condition. **Verification Signature Required. Ship's representative sign Step 11 of enclosure (3).**

Note: In no case will the pier shore power breakers be opened when the ship's shore power breakers are closed.

- c. WRUP6C open feeder breakers. **Refer to reference (e), Chapter 4 when determining Arc Flash PPE level.**
 - d. WRUP6C open the Main Breaker(s). **Refer to reference (e), Chapter 4 when determining Arc Flash PPE level.**
 - e. WRUP6C rack out, lockout and tagout the pier shore power breaker(s) and, once complete, notify ship's representative that shore power has been locked and tagged out of service. **Refer to reference (e), Chapter 4 when determining Arc Flash PPE level.**
 - f. Ship's Electricians will lock and tag out all 4,160 feeder breakers IAW their ship's tag out procedures. Locks, which are provided by WRUP6C, must be attached to the crew hasp. The key to the locks provided to the ship, will remain in the possession of the ship's representative until the ship's tag and locks are removed. The spare key is maintained by the Electrical PLTL at NBSD. **Verification Signature Required. WRUP6C and ship's representative sign Step 12 of enclosure (3) before proceeding to the next step in the process.**
 - g. Ship will disconnect all cables and return to the pier or cable float. **Verification Signature Required. Ship's representative sign Step 13 of enclosure (3) before proceeding to the next step in the process.**
 - h. The ship's representative will remove the ship's locks and tags from the crew hasps on the breakers. **WRUP6C and ship's representative sign Step 14 of enclosure (3).**
 - i. If the berth will be occupied within two weeks, proceed to step b.5.k. If the berth will remain vacant longer than two weeks, proceed to step b.6.a. for NBC berths or b.7.a for NBSD Berth 1306.
 - j. WRUP6C close the Main Breaker(s). Feeder breakers will remain racked out, locked and tagged, and the cables, with protective covers on the lugs, will remain on the Pier. **Refer to reference (e), Chapter 4 when determining Arc Flash PPE level.**
 - k. The Ship to Shore copies of enclosures (1) and (2) will be kept on file at in the Ship to Shore shop at NBC. A copy will be sent by fax to the WRUP6D office and be filed for one year.
6. Berth Status (NBC).
- a. If the berth will remain vacant for two weeks or less, the cables will remain rigged, with protective covers on the lugs, the feeder breakers will remain racked out, locked and tagged, and the Main Breakers will be closed.
 - b. If the berth will remain vacant longer than two weeks, perform the following:
 - 1. Conduct Pre-job brief; ensure all personnel are outfitted in required PPE; confirm communications are established with all crew members.

2. Select and inspect tools and devices used for voltage measurement. Ensure that all are rated and set for the voltage to be tested.
 3. Inspect Class 2 insulated rubber gloves and leather protectors.
 4. WRUP6C open, or confirm the Main Breakers are open, and that all feeder breakers are racked out locked and tagged. **Refer to reference (e), Chapter 4 when determining Arc Flash PPE level.**
 5. WRUP6C test the Touch meter against a known energized source, or a test medium. Confirm the meter is operational and displaying correctly. **PPE Arc Flash Category 4 using Voltage Rated Gloves and Tools.**
 6. WRUP6C apply the tip of the touch meter to the lug ends of all shore power cables to check for voltage. Check for no voltage on all phases. **PPE Arc Flash Category 4 using Voltage Rated Gloves and Tools.**
 7. WRUP6C/D use the Kirk Key to remove the shore power plugs from the receptacles. **PPE Arc Flash Category 2.**
 8. WRUP6C/D replace the protective caps on shore power mound receptacles on the pier and restore the Kirk Key position. **PPE Arc Flash Category 2.**
 9. WRUP6C will remove all locks and tags, and rack in all feeder breakers. **PPE Arc Flash Category 2.**
 10. WRUP6C close the main breakers.
 11. WRUP6C close the feeder breakers.
 12. WRUP6D palletize and transport the shore power cables to the storage area.
7. Berth Status (NBSD Berth 1306).
- a. If the berth will remain vacant for two weeks or less, the cables will remain rigged, with protective covers on the lugs, the feeder breakers will remain racked out, locked and tagged, and the Main Breakers will be closed.
 - c. If the berth will remain vacant longer than two weeks, perform the following:
 1. Conduct Pre-job brief; ensure all personnel are outfitted in required PPE; confirm communications are established with all crew members.
 2. Select and inspect tools and devices used for voltage measurement. Ensure that all are rated and set for the voltage to be tested.
 3. Inspect Class 2 insulated rubber gloves and leather protectors.
 4. WRUP6C open, or confirm the Main Breakers are open, and that all feeder breakers are racked out, locked and tagged. **Refer to reference (e), Chapter 4 when determining Arc Flash PPE level.**
 5. Test the Touch meter against a known energized source, or a test medium. Confirm the meter is operational and displaying correctly. **PPE Arc Flash Category 4 using Voltage Rated Gloves and Tools.**

6. Apply the tip of the touch meter to the lug ends of all shore power cables to check for voltage. Check for no voltage on all phases. **PPE Arc Flash Category 4 using Voltage Rated Gloves and Tools.**
7. WRUP6C/D use the Kirk Key to remove the shore power plugs from the receptacles. **PPE Arc Flash Category 0.**
8. WRUP6C/D replace the protective caps on shore power mound receptacles on the pier and restore the Kirk Key position. **PPE Arc Flash Category 2.**
9. WRUP6C close the main breakers. **PPE Arc Flash Category 2.**
10. WRUP6D palletize and transport the shore power cables to the storage area.

Ship To Shore Power Cable Insulation Record

Ref: OPNAVINST 11310.3

Ship: _____ Berth: _____ Date: _____

1. Visually inspect cable and the terminations for damage and corrosion. Use 5000v Megger on 4,160v cables, and 500v Megger on 480v cables to measure insulation resistance. Document Insulation Resistance readings below.

		Ship To Shore Cable			Receptacle to Breaker					
Cable #	Plug #	A-B	B-C	C-A	A-Gnd	B-Gnd	C-Gnd	Date	Time	Signature

2. Inform ship’s representative of any Special Conditions or Restrictions (i.e., load current limitations, closing ship’s bus ties, cables conditions, etc.)

3. SSN/SSGN/SSBN Cables: Inspect the Single Pole Connectors. Clean cable plugs. Inspect each plug conducting surface for pitting, corrosion, and evidence of overheating. Inspect cable connectors for pitting, corrosion, and evidence of overheating. Apply a light coat of approved lubricant to cable connectors.

SPECIAL INSTRUCTIONS: Paralleling transformers. If a ship is supplied by two transformers, the ship is not permitted to parallel these transformers through the ships bus tie. If shore transformers are paralleled though the ship's bus, circulating currents may overheat and destroy cables, transformers and switchgear on board ship, or on shore.

Emergency Trip buttons on the shore substations are for Emergency Use Only.

For 24/7 Utility Assistance, call the Utilities Duty Desk at (619) 556-7349.

Ship’s Representative _____ Date: _____

NAVFAC SW WRUP6C/D _____ Date: _____

**NAVFAC SW
480v Ship To Shore Power Connection Checklist (Metro San Diego)**

Ship Name:		Berth:		Date:	
SPM Work Order:					
Steps	Task Description	WRUP6C/D Signature	Ship Representative Signature	Date	Time
1	Berth Prepared for the arriving class ship				
2	Arrival or Reconnect Date 24 hour Megger Test Satisfactory				
3	Ship/NAVFAC SW confirm all splice connections are complete.				
4	Ship/NAVFAC SW confirm all cables are plugged into the receptacles and ship is ready to begin confirming correct phase rotation.				
5	Ship/NAVFAC Confirm phase rotation is satisfactory.				
6	Ship confirm it is ready to receive shore power.				
7	NAVFAC SW Close breakers.				
8	NAVFAC SW Apply one full wrap of white fabric tape to each plug. Use Permanent Marker to write the ship's name on each of the ship's assigned plugs.				
9	Enable Shunt Trip (SSN/SSGN/SSBN only)				
10	Disconnect Date Ship confirms all ship's shore power breakers are open and ship is ready to deenergize shore power				
11	Disable Shunt Trip (SSN/SSGN/SSBN only)				
12	NAVFAC SW open all breakers providing power to the ship, test for voltage and disconnect all plugs.				
13	Ship/NAVFAC SW confirm all cables are unplugged from the receptacles.				

Notes: A 500v Megger must be used to perform insulation resistance testing on 480v cable/systems.
This procedure must followed each time a ship connects or disconnects shore power.
All Connection Sheets must be maintained in the Ship To Shore Office for one year.

SOP WRUP62-018

Enclosure (2)

NAVFAC SW
4160v Ship To Shore Power Connection Checklist (Metro San Diego)

Ship Name:		Berth:		Date:	
SPM Work Order:					
Steps	Task Description	WRUP6C/D Signature	Ship Representative Signature	Date	Time
1	Berth is Prepared				
2	72 Hour Megger Test satisfactory				
3	Connect Date (CVN/LHD) Final Megger Test Satisfactory				
4	Ship/NAVFAC SW confirm all shore breakers are open/racked out/ locked and tagged.				
5	Ship Confirm all ship connections are complete, and the ship is ready to clear locks and tags, and rack in breakers.				
6	Ship/NAVFAC SW confirm all shore breakers are racked in and ship is ready to begin confirming correct phase rotation.				
7	NAVFAC SW Close and open each breaker, while communicating with the ship's representative, to confirm correct phase rotation.				
8	Phase rotation satisfactory				
9	Remote trip unit test satisfactory				
10	Ship is ready to receive shore power; NAVFAC SW close shore breakers.				
11	Disconnect Date Ship confirms all ship's shore power breakers are open and ship is ready to deenergize shore power				
12	Ship/NAVFAC SW confirm all shore breakers are open/racked out/ locked and tagged.				
13	Ship confirm all ship disconnections are complete, and the ship is ready to clear locks and tags.				
14	Ship/NAVFAC SW confirm all locks and tags are removed. All shore feeder breakers will remain racked out.				

Notes: A 5000v Megger must be used to perform insulation resistance testing on 4160v Shore Power Cable/Systems.
 For 4,160v ships at NBC, if the ship declines the Remote Unit Test, sign and enter "Ship Declined" in the appropriate boxes.
 All Connection Sheets must be maintained in the Ship To Shore Office for one year.