**Operations Manual**

**For**

**“NOAA R/V XXXXX”**

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**SECTION 1. SMALL BOAT’S GENERAL DESCRIPTION**

**AND NATURE OF OPERATIONS**

*1.01 Small Boat Classification (A, I, II, III, or SRV).*

 NOAA launch R/V XXXXX is categorized as a Class II vessel falling into the 26-40 ft. length overall specifications.

*1.02 Mission*

The mission of R/V XXXXX is to conduct basic hydrographic surveys and to conduct emergency response operations in the event of a maritime or coastal climate emergency (i.e. tsunamis, hurricanes, etc.). This vessel is used as well for special projects vessel of opportunity, instrument testing, and other non-hydrographic scientific missions.

*1.03 Operating Area*

The operating of R/V XXXXX is varied over many coastal water body types. Operations are conducted in coastal bays, estuaries, and river bodies. A special request or local topography can bring operations into open water but are limited to 20 miles offshore. The two primary geographical operating areas are the Great Lakes and the Western Gulf Coast. Great Lakes operations are constricted to the warmer seasons of the year. Operations on the Gulf Coast can take place all year round. The tides are minimal in the Great Lakes, so tidal fluctuations are not a mooring or navigational hazard.

*1.04 Small Boat Capabilities*

R/V XXXXX is equipped with MBES, SSS, and DGPS for conducting basic and emergency hydrographic surveys. The vessel is capable as serving as a vessel of opportunity for other scientific studies by internal and external parties, as long as personnel and gear does not exceed capacity loads. The capacity is limited to 2 crew and 4 additional persons. The weight calculation is determined by using industry standard: 1 person=185 lbs. 185 lbs. of gear can be substituted for in lieu of 1 person. R/V XXXXX is allowed to conduct dive operations limited to 3 divers and 2 crew. Divers are assumed to have ~80 lbs. of gear per diver, which accounts for 1 less person allowed on the boat. R/V XXXXX can be used strictly for personnel or equipment transport, adhering to capacity weight limits.

**SECTION 2. SMALL BOAT CHARACTERISTICS**

*2.01 Manufacturer.*

 The vessel was built by SeaArk Marine, Inc. located in Monticello, Arkansas.

*2.02 Official Numbers: NOAA No., Documentation No., and Hull ID No.*

 The vessel’s NOAA No. is R/V XXXXX. Hull ID No. is SAMA1284J101

*2.03 Visual Identification and Painting Scheme: Logos, Name and ID Numbers Locations, Flag(s), Plaques.*

 R/V XXXXX is blazoned with NOAA logo decals on both sides of the cabin. Vessel ID is in 6” block letters at the fore of the cabin exterior on both sides. The life ring buoy is also labeled in block letters. A NOAA flag is not flown on R/V XXXXX, but a national flag is displayed at all times of operation. The cabin up is painted white. The gunwale down is painted a dark grey. Boot top is black.

*2.04 Year Built.*

 NOAA R/V XXXXX was built in 2002.

*2.05 Displacement.*

 Total displacement is 9,640 lbs. as measured with no crew and a half full tank.

*2.06 Hull and Cabin Material.*

 The hull and cabin are made of aluminum. Manufacturer states that the series used is Al 5086.

*2.07 Length Overall, Beam and Draft*.

 The vessel’s length overall is 9.82m (32ft. 3in.). The vessel’s beam is 2.6m (8.5ft.). The draft of the vessel as currently configured at time of report which was a physical measurement taken from the waterline to the bottom of the MBES transducer housing is .61m(2ft.).

*2.08 Speed and Endurance.*

NOAA R/V XXXXX is equipped with twin 200HP Honda 4-stroke fuel injected outboards. Throttles are independent. It is capable of 30 knots in smooth waters. Since no endurance statistics are available for this vessel, using the industry standard of gallons per hour = 10% of combined horsepower (400), it is approximated that the average range of this vessel with 95 gallons of fuel at 30kts would be 70NM. This will vary greatly depending upon loading, sea state and cruising speeds.

*2.09 Hull, Machinery, Electrical and Scientific Equipment*

**SECTION 3. OPERATIONAL PROCEDURES AND LIMITATIONS**

*3.01 Annual Risk Assessment*

See Appendix 1 for the current version of this document. It should be updated on a regional basis.

*3.02 General Policies and Procedures.*

Entire vessel shall be rinsed with freshwater after every use.

All sluice valves shall be in the closed position.

When in doubt, check with the Captain.

*3.03 Material Condition.*

R/V XXXXX is in sound material condition. Deck-to-hull junctions are solid as well. Upon recent inspection the interior hull plating is in excellent condition. Problem areas in the recent past(2011-2012) have been fully addressed. Repairs were conducted in the IMU bilge and the port aft generator bilge(now accessible for inspection) as well as the hull plating . The IMU bilge now has a waterproof access hatch in the deck to waterproof the IMU bilge, as well as the bottom threshold of the dive door relocated to divert water ingress Hatch gaskets, then caulk seal on fuel plate should be inspected first in case of detected water ingress. Other bilge spaces shall be monitored as normal for signs of recurring water ingress. All modifications and welding were completed by a certified shipyard and welders.

*3.04 Weather and Sea-State Limitations and Monitoring.*

Weather forecasts shall be monitored by all available means. A check of the next day’s weather shall be conducted at the end of day previous to the desired survey day and confirmed the following morning before departing to the survey site. With the modern capability of mobile internet it is highly recommended to monitor local and regional weather real-time on the vessel, when a cellular data signal allows. Due to the ability to more closely monitor the weather and potential deteriorating conditions, the crew shall not press weather boundaries. In all cases involving underway mission, the responsible person or operator(s) of R/V XXXXX shall determine whether or not an operation will be delayed, cancelled, or aborted due to weather events/conditions. Special considerations shall be given to high winds, fog, and thunderstorms populated with lightning.

 In regards to sea state, special consideration shall be made to subsiding seas which contained significant wave heights that could be potentially persisting in certain operational areas. Also, certain considerations shall be made to operational areas prone to unexpected, gusty winds which could rapidly deteriorate the sea state. R/V XXXXX is capable of handling relatively rough seas with experienced operation. It is not recommended to operate in wave heights >6 feet, which would only be for finding safe harbor caught out on the water in deteriorating conditions or removing the vessel from an unprotected mooring basin to prevent imminent damage.

 Special weather concerns in the Gulf of Mexico are tropical storms, including hurricanes. The Atlantic hurricane season runs officially from June 1 to November 30. In the event of an approaching storm it should be determined based on tracking and predicted landfall whether to moor the boat in a protected basin/slip or to trailer the vessel to high ground and secure it at a predetermined location. If moored, special line configurations will be necessary to accommodate safe haven from the storm surge preceding the storm. Deciding to keep the vessel in the water shall be based upon consultation with the VOC.

 Following are links for tides and weather information:

 <http://tidesandcurrents.noaa.gov/>

 <http://www.saltwatertides.com/>

 <http://www.wunderground.com/>

 <http://www.nhc.noaa.gov/>

 <http://www.nws.noaa.gov/om/marine/home.htm>

*3.05 Stability and Load Limitations.*

There is no capacity plaque provided from the manufacturer, but limits have been placed at 6 persons@ 185 lbs (84 kg). The total for additional gear and crew from current configuration is 1,110 lbs (503 kg).

The J-arm shall not be for towing instruments in the excess of 200 lbs. It shall also not be used for hoisting equipment other than deploying and retrieving the towed equipment survey instruments.

*3.06 Distance from Shore Restrictions.*

No operations shall take place more than XX miles from shore without prior approval.

All operations conducted by R/V XXXXX shall be within reasonable range of USCG emergency assistance. Any operations conducted outside that range shall be accompanied by a larger support vehicle and requires endorsed permission by the VOC. Any operations conducted further than the range limit will have the Iridium satellite phone onboard.

*3.07 Night and Overnight Operations.*

Night operations, while not regularly practiced, are authorized with prior approval. There are special cautions to take into account in regards to weather, local vessel traffic, and crew experience. A dedicated lookout shall be posted when the vessel is operating above survey speed (~5kts.). It is advisable to use the red interior lighting to preserve night vision when possible to maximize visual acuity. Also, the cabin mounted searchlight shall be in working order to permit conducting night operations.

*3.08 Position Reporting Requirements.*

There are no specific position reporting requirements set forth for operation of R/V XXXXX. Filing and closing a float plan is sufficient notice for regular operations.

A time when position reporting might be requested is during a response. This is for HQ and other vessels to have more detailed progress information of the team’s work and coverage and the frequency and format will be determined by the VOC. Assets are monitored more closely in the response environment.

*3.09 Procedure Lists: Departure and Arrival.*

 There are a number start up and shutdown procedures which must be followed to ensure crew and equipment safety when operating the vessel. Below are some basic check off lists that will detail the proper sequence. These do not detail the procedures involved in

R/V XXXXX Underway Procedures

Prior to Departure:

* + Open float plan
	+ Adequate number of PFDs, Mustang suits, or float coats aboard.
	+ Inspect/test EPIRBs, CO monitor, Gas Fume Detector, AED, and HW bilge alarm for proper operation (monthly).
	+ Check fuel levels.
	+ Check generator oil.
	+ Port main engine power. (2 on switch)power.
	+ Starboard main engine power (1 on switch and supplies panel power).
	+ Energize DC panel
	+ Run bilge fans for 4 minutes before starting engines.
	+ Generator power switch and start.
	+ Trim main engines down.
	+ Start main engines.
	+ Check for cooling water discharges on both engines and genset.
	+ Check oil pressures.
	+ Take in or unplug shore power cable(if equipped).
	+ Energize GPS, VHF radio, and secondary SBES on DC panel
	+ Turn on and check all wheelhouse electronics for proper operation.
	+ Test steering lock-to-lock.
	+ Cast off lines with permission from OIC.

After Arrival:

* + Make mooring lines fast
	+ Secure all electronics and electrical loads in the proper order
	+ Secure main engines and trim up
	+ Secure generator
	+ Close float plan
	+ RINSE THE BOAT
	+ Disembark and go home

*3.10 Float Plan/Trip Report.*

Each day of planned survey operations shall be opened and closed by a Float Plan. The most recent acceptable formatted form should be available on the XXXX, or it can be obtained from the Google Docs “XXXXXXX”. See current form for required fields of information to be filled. The float plan shall be sent before the vessel leaves the dock. Send a closing follow-up email stating that the vessel and all team members have returned to dock safely only after the vessel has been secured. The only exception to just opening and closing a float plan is when the original anticipated time of return will be exceeded by 60 minutes and could raise alarms when the float plan is not closed out as anticipated. The crewmember responsible shall just submit an amended float plan. Include in the email body that it is submission of an amended float plan. Open and close the float plan by attaching the form to an email addressed to XXXXXX@noaa.gov, which forwards a message to the VOC, currently XXXXXXXX. A digital file of each day’s float plan shall be kept on storage for record keeping.

*3.11 Embarked Personnel: Crew, Scientists and Passengers.*

NOAA Administrative Order 217-106 contains policy regarding transportation of non-NOAA personnel aboard government vessels. The specific detail of the policy can be viewed at <http://www.corporateservices.noaa.gov/ames/administrative_orders/chapter_217/217-106.html>. At no time shall anyone other than a qualified NOAA small boat operator be in command of the vessel.

*3.12 Diving from Small Boats: NOAA Diving Regulations Apply, Oxygen Kit Required Aboard.*

When conducting dive operations from a small boat, the boat shall be continuously

manned by a qualified Small Boat Operator. All dive operations shall adhere to the NOAA Diving Regulations. [http://www.ndc.noaa.gov/dr.html](http://www.ndc.noaa.gov/dr.html#noaa) R/V XXXXX does not have an O2 kit onsite and it must be provided by the diving constituent. Pre-approval for conducting diving operations aboard R/V XXXXX must also be approved by the VOC, CDR Todd Haupt.

*3.13 Use of Permanent and Temporary (Science) Installed Equipment.*

 There are a number of scientific instruments which involve deployment and retrieval during regular survey operations that require safety precautions during to use minimize risk to the crew and damage to the equipment.

 The Side Scan Sonar towfish is either stored on the deck on the starboard gunwale bracket or over the lazarette in cradles and is connected via a tow and safety cable to a pivoting J-arm which is secured in place by a pin at the rotation point. The cable is wound on a winch drum which is operated from the cabin or the deck by a wired remote. It is advised to have two people launch the towfish, but an experienced surveyor who knows the operation well can launch it solo. The hazards associated with deploying the towfish are mostly from the J-arm swinging out or in when it is unpinned and the towfish is being swung out or in. This poses a head high hazard and attention must be paid by all on deck to the behavior of the J-arm during the deployment/retrieval operation. The winch shall be used for actual lifting and setting of the towfish and the operator must only steady the fish from swinging while maintaining control of the J-arm. This operation is potentially hazardous the greater the seas are and the increased swinging of the fish and unintentional pivoting of the J-arm. Use loud, verbal commands to the winch controller for instructing start and stop of winching the towfish in and out. Keeping the bow into the seas drastically reduces the risk associated with listing. Also, if you must be abeam of the seas the starboard side shall be the lee side to minimize water action at the deployment site. The towfish weight affects the vessel minimally, but with the J-arm out and two additional crew concentrating their weight on the starboard side, a list is introduced and can be magnified by heavier seas, especially if abeam. The boat operator must be aware of all crewmembers while the operation is taking place, so that engines can be disengaged very quickly if a strike or man overboard takes place.

 There is an Odom sound speed profiler mounted on the transom between the outboard engines in a PVC tube. It is secured in place by a sailing line cleat which clamps on the lined cable to hold it at the height in the tube chosen. It is stored in the up position for transit, at dock, and trailering. It is lowered down before beginning multi-beam surveys extend just beyond the tube end. This requires personnel to stand on the transom platform to unclamp device, lower, and re-clamp in place. The boat shall stay oriented with the bow into the seas during deployment and retrieval to limit water from washing over the transom. This shall especially be honored in any seas above a light chop. With a small risk of man overboard, it is advised that the engine propellers be disengaged while the deployment/retrieval is occurring. Also, the person operating the Odom shall pay special care to the engine cables underfoot as the bulky wire looms can pose a tripping hazard.

 There is a SeaBird CTD which is deployed a couple of times during a normal survey day. It is hooked by the cabin on the port side in the recessed deck. A shackle attaches a rope, which is coiled in an adjacent bucket. The other end of that line is clipped into the handle on the dive door to maintain attachment of instrument to the boat. A hazard that exists in deployment of the instrument would be deploying it too fast or letting it free fall which could cause rope burn if handled without work gloves. Also, it is best to coil the rope into the bucket as you retrieve the instrument to avoid entanglement on deck.

 Any temporary equipment being used for missions aboard R/V XXXXX require that all hazards to use be identified to all crewmembers and consulted with the OIC to approve safe use under current vessel and weather conditions. So that it does not impact an operations day these disclosures and analyses should be conducted before going out on the water.

 On a side maintenance note, all equipment shall be washed down with freshwater immediately after use if deployed in salt or brackish water. Freshwater is less critical, but rinsing should still be a regular protocol.

**SECTION 4. REPAIR AND PREVENTATIVE**

**MAINTENANCE REQUIREMENTS**

*4.01 ABYC, NFPA and USCG Regulations Apply.*

All repairs, modifications, upgrades, and safety equipment must adhere to the American Boat and Yacht Council (ABYC), the National Fire Protection Association (NFPA), and United States Coast Guard (USCG) codes and regulations.

 <http://www.abycinc.org>

 <http://www.nfpa.org/index.asp>

 <http://www.uscgboating.org/regulations/federal_regulations.aspx>

*4.02 Critical vs. Non-Critical Repairs.*

There are some distinctions between critical repairs that must be understood to correctly prioritize repairs and adhere to NOAA Small Boat Program policies. Issues needing repairs are usually discovered one of two ways: during regular operations of the boat or through the annual inspection process.

 Deficiencies discovered during the annual inspection process will be grouped into Category 1, 2, or 3. A Category 1 deficiency requires repair of the afflicted system before the vessel can be operated again. In this case the assignment of Cat 1comes from the definition that a “Deficiency exists in operational essential equipment and causes a loss of a boat’s primary operation.” Both the VOC and the Small Boat Program shall sign off on the repair as bringing the vessel back to an operational status. If there are severe or multiple Cat 1 deficiencies found a “Do Not Operate” order may be issued, requiring immediate addressing of the issue. Category 2 deficiencies are issues that will be assigned a specific amount of time in which to be repaired. What category found deficiencies are placed in will be determined by the Small Boat Program.

 According to the categorical requirements of the SBP Manual Cat 1 is a critical repair, whereas, Cat 2 and 3 are non-critical.

*4.03 Preventative Maintenance Schedule (daily, weekly, monthly, quarterly, semi-annually, annually, based on hours of operation)*

Daily:

* Check generator oil level
* Check and clean sea strainer daily if operating in high vegetation/flotsam area.

Monthly:

* EPIRB test (2)
* CO2 monitor test
* HW Bilge alarm test
* Gas Fume Detector test
* Check sat phone
* Check outboard engine oil level
* Check sea strainer monthly if operating in debris clear waters
* Check onboard AED using internal diagnostic program (logged)
* Inspect sensor and test gas fume detector
* Grease zerk fittings on engine, steering, trim/tilt system (saltwater)
* Check hydraulic steering level at helm

Quarterly:

* Inspect and apply silicone to all watertight hatch gaskets. Clean sealing surface ensure seal and avoid gasket abrasion.
* Check condition of **aluminum**  bar anodes on outboards and hull

-lower unit

-bottom of transom bracket

-hull stern

* Check condition of internal generator **zinc** pencil anode

\*\*\* replace anodes when 50% deteriorated\*\*\*

Semi-annual:

* Grease zerk fittings on engine, steering, trim/tilt system (freshwater)

Annual:

* Winterize if non-operational over the winter (recommended to be done by a qualified facility)
* Inspect all power cables, fuel lines, and hydraulic steering hoses connected to outboards and generator for signs of wear and chafing

Hour-based:

* Outboards- 100 hours:
* change engine oil
* change gear case oil
* check/adjust throttle linkage
* check /adjust idle speed
* Generator-100 hours

 (Consult manufacturers owners manual and insert here)

A recommended best practice is to time the inspections using the Annual Small Boat Evaluation as the starting date for the calendar year basis of performing maintenance tasks. It is a task that gives a consistent benchmark for calculating the following year’s maintenance schedule.

*4.04 Maintenance Logs (Hardcopy and Database).*

Maintenance logs for the vessel are kept mostly in digital form on the team’s network drives in an Excel spreadsheet. They can be located at the network destination *Z:\Admin\Boat*. Hardcopies of older records and invoices/receipts are located on file in the team office trailer. Any newly acquired/installed equipment shall be documented in the maintenance log and a manual, if available, shall be kept on board in the boat manual and/or in electronic form on the team’s network drives.

*4.05 Monitoring Systems: LO Analysis, Vibration, Gages, Alarms.*

 R/V XXXXX is equipped with safety warning systems which must be tested monthly. The systems are wired to constant 12VDC power.

The first system is an in cabin Carbon Monoxide (CO) monitor which detects unacceptable CO levels inside the enclosed crew cabin. It is equipped with a visual LED notification system of both power on (left green) and alarm/diagnostic (right red) indicators. A lit green indicates the power is connected. There are annotations on the unit itself to determine the status indicated by different sequences of illumination on the red LED. A highly audible alarm will also sound if there are any harmful amounts of CO accumulation in the cabin. This shall be tested monthly, which is completed by pushing, appropriately enough, the test button. Depress for five seconds until the red LED flashes and an audible alarm is heard. The current model installed is a Fireboy Xintex CO Sentinel. <http://www.fireboy-xintex.com/co-detectors.html>

The second system is a bilge high water alarm. The sensor is mounted in the lazarette bilge and will sound a highly audible alarm if water has filled the compartment to a certain point, determined by the height of the mounted sensor. The purpose of this system is to monitor either a water condition where ingress has occurred and the bilge is filling with water either because the bilge pump is inoperable or cannot keep up with water ingress. The sensor is designed to sound an alarm and illuminate an LED at the helm station, to notify crew of the condition. The sensor acts by requiring 8 seconds of contact with conductor, water in this case. The sensor is to be mounted low enough that a problem will be made aware to the crew in enough advanced time to prevent an unstable situation. If ingress is substantial enough to cause concern the vessel shall be immediately taken back to dock. If necessary, follow standard radio protocols in notifying the appropriate authorities. This system shall be tested monthly and can be done by pouring water over the sensor for 8 seconds or by touching the sensor with your hand. Sensor must be kept clean for proper operation. The current model installed is a LevelGuard SensaLevel High-Water Bilge Alarm. <http://www.levelguardproducts.com/marine-rv/marine-high-water-bilge-alarm.php>

The third system is a gasoline fume detector. This sensor is mounted in the lazarette to allow detection of gasoline vapors in the enclosed generator compartment. This system is designed to alarm the crew that 16-20% fume concentration has been reached within the compartment. This alarm should prompt the crew to turn the blowers on and to shut down electric systems and the generator to allow for inspection after the blowers have run for sufficient time. This system shall be tested monthly. Care shall be taken to inspect sensor and keep it free of any oil residue from the bilge. The current model installed is a Fireboy-Xintex M-1-R. <http://www.fireboy-xintex.com/M1.html>.

The fourth system is a discharge indicator for the fixed fire extinguisher system. This is a link to the fixed fire bottle in the generator compartment. It alerts the helm with an audible and visual signal. This allows the crew to detect a fire hazard in the generator compartment and take appropriate action.

*4.06 Crew and Shore/Depot Level Repair and Maintenance.*

Repairs and maintenance carried out by crew underway and at the shore facility shall be undertaken only if persons are capable and experienced in the type of repair to be conducted. Anything going beyond simple maintenance/parts replacement shall consult the advice of necessary parties such as the VOC, small boat engineers, and vendors. Caution shall be taken that the repair does not hamper survey operations, especially if lack of an instant repair does not impact safe and functional operation of the vessel. Always use appropriate PPE for the task being undertaken.

**SECTION 5. SAFETY SYSTEMS**

*5.01 Required Safety/Firefighting/Life Saving Equipment for Class II Vessels*

Class II NOAA small boats must have the following on board at all times. Requirements taken from NOAA SBP Manual v.3, Appendix D, Minimum Small Boat Safety Equipment.

* 1 Anchor
* 2 Type B-1 Portable fire extinguishers
* Ring buoy attached to lifeline
* 1 Type I PFD for all persons embarked\*\*
* 3 red flares of any type
* 1 orange distress flag or three orange smoke signals
* 1 Current first aid kit
* 1 Horn or other signal device

\*\*Immersion suits may be substituted for Type I PFD’s but Type I’s cannot be substituted for immersion suits, for obvious reasons. Immersion suits are required at 1:1 ratio for coldwater operations.

*5.02 Testing/Examination of Safety/Firefighting/Life Saving Equipment.*

All fire extinguishers aboard shall be inspected annually by a qualified fire equipment inspection service and recharged/replaced as needed. EPIRB, CO monitor, gasoline fume detector, and HW bilge alarm shall be tested monthly. Inspect life-ring line and life vests quarterly for wear and sun damage and replace as needed. Mustang Type IV CO2 vests and waist units must be inspected and re-armed as necessary. Be sure to note model as re-arming kits are model specific. The Automatic Electronic Defibrillator (AED) shall be tested monthly using the internal diagnostic test on the unit. Consult individual units for testing protocols. The first aid kit, stored under the captain’s seat, shall be inspected annually and expired components shall be replaced as necessary.

*5.03 Required Navigation and Communication Equipment*

The following requirements the minimum and any redundancy or additional communication navigation equipment are encouraged and may be necessary for certain weather conditions or operational areas. An example of additional equipment beyond minimums would be a NMEA enabled RADAR. The requirements for navigation and communication equipment aboard a NOAA Class II vessel are as follows:

* + - 2 Fixed mount VHF radios
		- 1 GPS
		- 2 EPIRB’s
		- 1 Depth sounder
		- 1 Cellular or satellite phone
		- 1 Waterproof chart or chartlet covering the operations area

**SECTION 6. EMERGENCY PROCEDURES**

*6.01 Proximity and Probability of Emergency Assistance.*

All operations conducted by R/V XXXXX shall be within reasonable range of USCG emergency assistance. The vessel should not operate beyond the range of USCG air rescue without special planning and approvals. Further offshore operations are permitted with prior approval from the VOC and a larger support vessel in the vicinity for emergencies.

*6.02 Drills: Fire, Flooding, Collision, Man Overboard, Oil Spill, etc.*

Man overboard, fire, and abandon ship drills shall be conducted underway annually. Crew are expected to review emergency procedures as needed to remain familiar with the actions taken in these various scenarios.

 It is recommended to conduct all three drills as well as a fire drill that rolls into an abandon ship drill, in the event of an uncontained fire onboard. A debriefing shall be conducted to review errors made and corrective actions necessary proper procedures. If significant errors are discovered, it is recommended to run the drill again.

 Care should be taken that radio communications are conducted according to the appropriate USCG emergency protocols. A laminated safety card is posted at the vessel’s VHF.

# *6.03 Emergency Check-Off Lists (46 CFR 26.03-2).*

# These are guidelines and check-off lists for the appropriate functions and procedures in dealing with various emergencies. They are taken directly from Emergency Instructions, 46 CFR 26.03-2:

*“(a) The operator or master of each uninspected passenger vessel must ensure that an emergency check-off list is posted in a prominent and accessible place to notify the passengers and remind the crew of precautionary measures that may be necessary if an emergency situation occurs.*

*(b) Except where any part of the emergency instructions are deemed unnecessary by the Officer in Charge, Marine Inspection, the emergency check-off list must contain not less than the applicable portions of the sample emergency check-off list which follows:*

*Measures to be considered in the event of:*

*(a) Rough weather at sea or crossing hazardous bars.*

*□ All weathertight and watertight doors, hatches and airports closed to prevent taking water aboard.*

*□ Bilges kept dry to prevent loss of stability.*

*□ Passengers seated and evenly distributed.*

*□ All passengers wearing life preservers in conditions of very rough seas or if about to cross a bar under hazardous conditions.*

*□ An international distress call and a call to the Coast Guard over radiotelephone made if assistance is needed (if radiotelephone equipped).*

*(b) Man overboard.*

*□ Ring buoy thrown overboard as close to the victim as possible.*

*□ Lookout posted to keep the victim in sight.*

*□ Crewmember, wearing a life preserver and lifeline, standing by ready to jump into the water to assist the victim back aboard.*

*□ Coast Guard and all vessels in the vicinity notified by radiotelephone (if radiotelephone equipped).*

*□ Search continued until after radiotelephone consultation with the Coast Guard, if at all possible.*

*(c) Fire at Sea.*

*□ Air supply to the fire cut off by closing hatches, ports, doors, and ventilators, etc.*

*□ Portable extinguishers discharged at the base of the flames of flammable liquid or grease fires or water applied to fires in combustible solids.*

*□ If fire is in machinery spaces, fuel supply and ventilation shut off and any installed fixed firefighting system discharged.*

*□ Vessel maneuvered to minimize the effect of wind on the fire.*

*□ Coast Guard and all vessels in the vicinity notified by radiotelephone of the fire and vessel location (if radiotelephone equipped).*

*□ Passengers moved away from fire and wearing life preservers.”*

**SECTION 7. OPERATOR QUALIFICATIONS**

**AND STAFFING LEVELS**

*7.01 Certification and License Requirements as Applicable to Small Boat Class.*

Requirements listed below in this section are taken explicitly from section 4.03.a of the NOAA SBP manual v.3.

“Class A, I and II training:

*1. The USCG Auxiliary BS&S (Boating Skills and Seamanship) or equivalent. An equivalent course must cover all of the significant topics of the USCG Auxiliary’s BS&S curriculum and must be, at minimum, of equivalent duration (approximately 24 hours dependent on location). The topics are available at:*

[*http://www.cgaux.org/boatinged/classes/sailing\_skills\_and\_seamanship.html*](http://www.cgaux.org/boatinged/classes/sailing_skills_and_seamanship.html)*. Approved equivalent courses are listed at the Small Boat Program website, http://www.sbp.noaa.gov.*

*(a) For cases where a prospective Small Boat Operator has prior training*

*(for example: prior USCG license, prior uniformed service), the Small*

*Boat Safety Board may consider this as fulfilling the USCG Auxiliary*

*BS&S or equivalent requirement on a case-by-case basis.*

*(b) Operators of only non-motorized craft may use the following*

*procedure in lieu of the USCG Auxiliary BS&S or equivalent training:*

*Complete a risk assessment for their operations with their VOC. The VOC shall determine the need for a formalized swift water or similar class. If no class is deemed necessary from the risk assessment then the VOC shall develop and review the proper PQS with the operator and certify them as a non-motorized vessel user only. If the VOC is not able to make this decision due to lack of own experience or training, they shall designate someone who is properly qualified to*

*make that decision (an industry professional may be included in the discussion if necessary). The VOC shall keep all documentation of such training and skills review and should review them with their respective LOSBO.*

*2. NOAA Component Course. The NOAA Component is developed by the SBSB and updated as policies, procedures and standards change. It consists of 3 sections with accompanying exercises and a test. A NOAA Component Refresher Course is yet to be developed but could be taught by regional instructors or through e-learning when there are significant changes to the NAO or this Manual. The Course may be customized by location. Section topics include:*

*(a) NOAA small-boat policy, procedures and standards*

*(b) Operational Risk Assessment*

*(c) Team Leadership*

*In extreme cases where no Component course is available due to remote geography or lack of timely local instruction, the following guidance provides a temporary exemption: the VOC shall review the major components of the Component class with a focus on risk management (GAR model) and NOAA policy. The VOC shall also perform a detailed PQS with the operator. All other prerequisites shall be adhered to (including but not limited to USCG BS&S or equivalent course, first aid & CPR, adequate experience). This*

*exemption is only good for 6 months and shall only be provided one time per person.*

*3. Personnel Qualification Standards (PQS). These may be developed, on site, by the Programs with direction from the Small Boat Safety Board. These will include:*

*(a) Checklists (see Section 4.04 and Appendix G for minimum requirements Class A-I and Class II)*

*(b) Advanced/Continuing Education*

*(c) Local or program-specific training (examples: surf operations, dive operations, towing nets, trailering, survey launch, ice, marine mammal operations).*”

*7.02 Training: Seamanship, CPR and First Aid.*

All Small Boat Operators shall have current Red Cross or equivalent certification in

cardiopulmonary resuscitation (CPR), including the use of Automated External Defibrillators (AED) instruction when available, and First Aid. Seamanship training requirements can be referenced above in section 7.01. Copies of all training certificates and operator qualification checklists for all Small Boat Operators will be maintained by the Vessel Operations Coordinator for each Line Office Program.

*7.03 Vessel Operations Coordinator.*

Outlined below are the roles and responsibilities as stated by the NOAA SBP Manual v.3., section 2.10:

*“The Vessel Operations Coordinator (i.e., Operations Coordinator, Operations Manager, Marine Operations Coordinator, Navigation Response Team Leader, or marine operations point of contact) for each Program, Laboratory, or Field Party is responsible for implementing all requirements in accordance with this Manual. (Checklist of responsibilities is available on the web site www.sbp.noaa.gov ) The VOC shall also manage and maintain small boat support costs, establish and maintain contact with all users, and manage all small boat operations personnel. The Vessel Operations Coordinator should address any conflicts or other problems arising from the daily operation or maintenance of small boats with the appropriate Program Director as soon as possible. The VOC shall update the NOAA small boat inventory list and operator training list, and report inspections as completed to their LOSBO and the NOAA Small Boat Program.”*

*7.04 Operator and Crew Staffing Levels.*

R/V XXXXX shall have 2 operators onboard during all operations. If only two team members are available for a local transit and it is beneficial to have one stay shore side to, for example, pull the trailer over to a ramp while the other operator brings the boat from slip to ramp, prior approval from the VOC is required. This condition of operation shall be minimized and only used when logistical simplicity or time constraints require it. The vessel shall not be manned by only one operator when other guests are aboard.

**SECTION 8. INSPECTION REQUIREMENTS**

*8.02 Annual Small Boat Evaluation (ASBE) for Class A, I and II.*

 NOAA Class A, I, and II ASBEs shall be performed by the VOC or their designee

(who must also be familiar with NOAA small boat policies) on an annual basis using inspection criteria set forth in the ASBE checklist and outline. The checklist and outline are available at the SBP website link, <http://www.sbp.noaa.gov/resources/inspections/index.html>. It is advisable to have someone is very familiar with USCG regulations as well as current ABYC standards.

 Completed inspection checklists, reports, records of findings, and recommendations shall be signed by the inspector or surveyor and signed and retained by the VOC with a copy forwarded to and signed by the LOSBO. Notification of inspections will be reported to the SBP Coordinator. Reports shall be generated when numerous or significant deficiencies are noted, and then forwarded to the SBP Inspection Coordinator via the SBP Coordinator.

 A copy shall be kept in the Boat Maintenance folder on the team server as well as digitally reported via the Small Boat Program website link above.

*8.03 Small Boat Examination (SBEX) for Class A, I and II.*

SBEX shall be performed by a certified marine surveyor or a person approved by

the Small Boat Safety Board. SBEX frequency shall be as follows: for Class II boats biennially (every 2nd year) and for Class I boats triennially (every 3rd year). Class A boats do not require an SBEX. A list of qualified people to conduct SBEX is available on the SBP website, <http://www.sbp.noaa.gov/resources/inspections/index.html>.

 Completed inspection checklists, reports, records of findings, and recommendations shall be signed by the inspector or surveyor and signed and retained by the VOC with a copy forwarded to and signed by the LOSBO. Notification of inspections will be reported to the SBP Coordinator. Reports shall be generated when numerous or significant deficiencies are noted, and then forwarded to the SBP Inspection Coordinator via the SBP Coordinator.

 A copy shall be kept in the Boat Maintenance folder on the team server as well as digitally reported via the Small Boat Program website link above.

**SECTION 9. CONFIGURATION CONTROL**

*9.01 Boat Alterations, Submittal Procedures, and Record Keeping.*

All proposed significant alterations shall be submitted and reviewed by the VOC to determine the impact on the vessel’s safety and mission. Work proposed and ultimately conducted shall adhere to all applicable marine engineering standards and NOAA policies. Consult with the Small Boat Program Inspection Coordinator and the Small Boat Program Marine Engineer for applicable alteration standards and documentation procedures.

*9.02 Marine Engineering Consultation.*

Significant alterations require field team to seek marine engineering services via the SBP Inspection and Engineering Coordinators, Darel McCormick and Jeff Kingrey and/or a professional marine engineer. Significant alterations are any change to the configuration of the boat with regard to structural, mechanical, or electrical systems. Examples listed in the SBP Manual include the addition of structures or winches, the addition of any weight handling gear (e.g., A-frame, crane, and articulated boom), replacement of inboard propulsion engines, installation of electric generators, lengthening of a vessel, or addition of a bow pulpit. This also goes for removal of large components that are put out of service as these reductions can also affect stability. Often when the above mentioned items are added stock configuration structures and systems are modified to accommodate the alteration. Removal of certain systems must ensure that involved members are returned to stock configuration.

*9.03 Weight and Moment Control.*

Appropriate weight or moment reports shall be produced by marine engineers, internal or external, and maintained on record with the field team in the collection of maintenance and inspection records. If paper copies are received they should be converted to digital and stored on the team’s server. Copies of reports shall also be forwarded to the VOC.

**SECTION 10. DOCUMENTATION, REPORTING AND RECORD KEEPING**

*10.01 Drawing and Diagrams showing:*

*a. Major Systems.*

Schematics of the major systems are located in the grey vessel binder which is

 stored under the port navigator’s seat onboard the vessel.

*b. Location of Emergency and Safety Gear (Damage Control).*

Below is a diagram of the vessel and the physical location of the EPIRB, fire

extinguishers, VHF, and PFD’s. R/V XXXXX does not have any damage control equipment (auxiliary pumps, hull patches, etc.) onboard.



*c. General Arrangements Including Galley, Messing and Berthing.*

See schematic above.

*10.02 Pollution Control and Discharge Plaque.*

The pollution control and discharge plaque is located on the interior surface of the cabin door. It contains all information as required by the USCG.

*10.03 List of Drills and Frequencies*

The requirements for emergency drills for Class II vessels are conducted annually to maintain crew efficiency and safety in the event of an emergency. Class II vessels are required to conduct:

* Man overboard
* Fire
* Abandon-ship
* Emergency communications

Operators, crewmembers, and any other person on board at the time of a drill are required to participate. All parties embarked will be briefed about the drill shore side before departing for operations.

*10.04 Stability Information.*

Specific stability information was not provided with this vessel at delivery. However, a capacity plate with loading restrictions is displayed as referenced in Section 3.05 (Stability and Load Limitations). The maximum capacity shall not be exceeded at any time. The operator is responsible for maintaining vessel stability through load limitations and operating conditions.

*10.05 Material Safety Data Sheet (MSDS).*

Outside of internal engine fluids including standard gasoline fuel, there are no chemicals or substances carried on board R/V XXXXX that require a MSDS on a regular operational basis. Below is the policy regarding hazardous chemicals being used and transported aboard R/V XXXXX as taken from the NOAA SBP Manual, Section 11.02.

*“All hazardous materials/substances required to carry out the objectives of an embarked scientific party, including ancillary tasks, are the direct responsibility of the embarked designated Chief Scientist, whether or not that Chief Scientist is using the materials directly.*

*An inventory of all hazardous materials and a Material Safety Data Sheet (MSDS) shall be available for all hazardous materials carried aboard. Updated MSDS sheets shall be forwarded to the Vessel Operations Coordinator at least two weeks prior to getting underway, if not already on file. Copies of each MSDS will be available when the hazardous materials are loaded aboard.*

*The embarked scientific party, under the supervision of the Chief Scientist, shall explain the spill-response procedures during the pre-departure briefing. This includes providing properly-trained and equipped personnel for response, as well as the necessary neutralizing chemicals and clean-up materials. A spill response will be a collaborative effort between the Chief Scientist and the boat crew.*

*The Chief Scientist or scientific party shall ensure that neutralizing agents, buffers, and/or absorbents in amounts adequate to address spills of a size equal to the amount of chemicals brought aboard. This spill-response material must accompany the chemicals when they come aboard.*

*Upon departure, visiting scientific parties will provide an inventory of hazardous materials to the VOC showing that all hazardous materials brought aboard have been depleted or removed as an unused but usable product. The visiting scientific party is responsible for the off loading a disposal/transportation of all hazardous waste or unused but usable product.*

*Hazardous materials shall be off loaded by visiting scientists in* compliance with DOT regulations for transporting. http://hazmat.dot.gov/.”

*10.06 OEM Technical Manuals for Installed Equipments.*

There are two places where technical manuals are located. Digital copies, whether downloaded or only provided that way, are at network destination *Z:\Library\Boat Equipment Manuals* on the team’s server.There is also a grey vessel binder and technical survey equipment manuals located under the port navigator’s seat on the vessel.

*10.07 NOAA Small Boat Program Website*

The NOAA Small Program website is located at [http://www.sbp.noaa.gov](http://www.sbp.noaa.gov/index.html).

*10.08 Spares Inventory*

Spares for R/V XXXXX and its components are kept either onboard or in the field team’s storage trailer.

 This is a list of the spares kept onboard R/V XXXXX:

* 1 windshield wiper
* Variety of stainless worm-gear hose clamps
* Genset parts including anodes, impeller, fuel filter, oil filter, spark plugs

This is a list of spares kept in the storage trailer:

* 2 Fuel filters for outboard engines
* 2 RACOR water/fuel separators for outboard engines
* Hydraulic steering fluid

*10.09 Accident Reporting and Investigation.*

These are guidelines regarding accident reporting and investigation as taken from the NOAA SBP Manual, Section 10:

 *“.01 Major Incidents*

*Small Boat Program activities shall follow all existing policy regarding the reporting of*

*accidents. The affected Program Director (or designee) shall notify the Line Office Small Boat Officer and Safety and Environmental Compliance Office (SECO) Representative of a small boat accident or incident when it involves any of the following:*

*a. Unintentional grounding for greater than 24 hours;*

*b. Explosions;*

*c. Sinking;*

*d. Fire;*

*e. Collisions involving breach of hull integrity;*

*f. Any incident which results in damage in excess of $10,000 to the small boat,*

 *its systems, or its equipment;*

*g. Incapacitating injury requiring professional medical attention or*

 *hospitalization, or loss of life of any person;*

*h. Unintentional and extensive flooding (self-bailing boats excluded);*

 *i. Discharge of oil or any substance violating local, State, or Federal*

 *Regulations;*

*j. Failure of gear and equipment and any other damage that may affect or impair*

 *a small boat’s seaworthiness; or*

*k. Damage/harm to a protected or endangered natural resource or species.*

*When the cause of the accident is not clearly evident, the Program Director shall initiate*

*an investigation consistent with NOAA's Safety Policy NAO 209-1. Findings and*

*recommendations resulting from the investigation shall be made available to the Program Director, Line Office Small Boat Officer, AA, NOAA Small Boat Program Manager, OMAO Small Boat Engineer(s), and the Director, OMAO.*

*Findings and lessons learned from an accident or accident investigation shall be*

*distributed by the NOAA Small Boat Program Manager to the NOAA small boat-user*

*community. The identity of the small boat, personnel, and program or facility associated*

*with the accident will remain anonymous.*

*.02 Minor Incidents and Close Calls*

*SBSB requests minor incidents of equipment damage or other non-reportable accidents*

*and close calls be reported for the purposes of lessons learned and safety metrics. This is*

*a common procedure at other organizations to enhance safety, reduce mishaps, and*

*identify problems with equipment, procedures and training. Minor incidents and close*

*calls may be reported using the reporting forms available on the SBP web site*

*(www.sbp.noaa.gov).”*

For further detail on accident investigation procedures and protocols, NAO 209-1 can be found at: <http://www.corporateservices.noaa.gov/ames/administrative_orders/chapter_209/209-1.html>.

*10.10 Boat Alteration Records.*

Alteration records for R/V XXXXX shall be stored both at the field team level and will be available upon request to the Small Boat Program.

*10.11 Operator Certifications, Licensing, and Training Records.*

Records of this nature shall be kept by the employee in a place where retrieval for any request or verifications needed is easily obtained. Ideally, the employee should keep copies certificates of completion as well as a personal database indicating types of training, completion dates, and expiration dates. No PIV information should be stored in these records

*10.12 Inspection Records.*

Digital copies of past inspection records are kept on the team’s servers at the network destination:Z:\Admin\Boat\Vessel Inspections.

**SECTION 11. REFERENCES**

46CFR, ABYC and USCG Regulations, Annual Risk Assessment, Supplemental Small Boat

Policy, NOAA Small Boat Standards and Procedures Manual, and NOAA Administrative

Orders as Applicable.

**SECTION 12. CONTACTS**

*12.1 NOAA Programmatic Contacts*

### NOAA Small Boat Program Coordinator/Program Manager

Lieutenant Commander Keith Golden, NOAA
206-553-0258 Phone
206-526-6037 Fax
912-695-9289 Cell
E-mail: sbp.manager@noaa.gov or sbp.coordinator@noaa.gov

*Areas of Responsibility*: Program Administration, Line Office/NOAA Management Liaison, Regulatory Compliance Assessment and Assistance, Operational Risk Assessment Review, Chairman, Small Boat Safety Board.

### Executive Officer

Lieutenant Sarah Duncan, NOAA
206-553-7590 Phone
206-526-6037 Fax
email: sbp.xo@noaa.gov

*Areas of Responsibility*: The officer works directly for the SBP Manager.  The officer is expected to actively build partnerships with various NOAA Line Office activities that operate boats to improve management and safety of the various and myriad research motorboat platforms in NOAA.  The Small Boat Program XO assists the Manager in the oversight of SBP, training development, web page updates, and inventory and compliance.

### NOAA Small Boat Program Inspection Coordinator

Darel McCormick
206-553-7916 Phone
206-526-6037 Fax
E-mail: darel.s.mccormick@noaa.gov

*Areas of Responsibility*: Coordination and scheduling boat inspections, identification of applicable regulation, boat inspection and marine survey.

### NOAA Small Boat Engineering Coordinator

Jeff Kingrey
206-553-2648 Phone
206-526-6037 Fax
E-mail: Jeff.Kingrey@noaa.gov

*Areas of Responsibility*: small boat engineering maintenance program, engineering technical research and assistance, small boat alteration review and inspections.

### NOAA Small Boat Engineer

Lieutenant Andrew Ostapenko, NOAA
757-441-6202 Phone
757-441-3812 Fax
E-mail: sbp.engineer@noaa.gov

*Areas of Responsibility*: Marine Engineering Assistance, Regulatory Compliance Assessment and Assistance

##### [NOAA Small Boat Training Component Instructors List by Region](http://www.sbp.noaa.gov/contacts/index.html)

[Line Office Small Boat Operators and Vessel Operations Coordinator List](https://www.st.nmfs.noaa.gov/confluence/display/FleetWiki/Line%2BOffice%2BSmall%2BBoat%2BOfficers%2Band%2BVessel%2BOperations%2BCoordinators) is available at the Small Boat Program page on the OMAO Fleet Wiki. NOAA email username and password required for login.

*12.2 Local and Emergency Contacts*

Houston Pilots: 713-645-9620

Galveston/Texas City Pilots:

USCG Air Station Houston: 713-578-3000

USCG Station Galveston: 409-766-5633

USCG Group Sabine: 409-971-2195

USCG Group Port Arthur: 409-762-9689

Port Police: 409-766-6173

**Appendix 1**

**Annual Risk Assessment**

**NOAA Survey Vessel R/V XXXXX**

**May 2012**

Part I: Summary of Vessel Characteristics, Mission Definition, and Description of the Operating Area.

The R/V XXXXX is a XX-foot dual outboard monohull working in bay, river, and near coastal waters of commercial ports of the Gulf of Mexico. The vessel’s primary mission is to conduct hydrographic surveys of prescribed project areas to detect hazards to navigation update all facets of nautical navigation charts. The vessel’s secondary mission is to conduct emergency response surveys when requested by constituents. These can consist of natural disaster responses, object detection of derelict cargo and vessels, investigation of shoaling in commercial traffic areas, etc.

The carriage of non-NOAA personnel aboard R/V XXXXX is uncommon and only occurs during public relations events where support is available close by in event of an emergency. All passengers are briefed in safety procedures and safety equipment locations onboard vessels. The vessel is equipped with all prescribed safety equipment sufficient to accommodate all passengers.

While overnight operations are permissible, they are rarely undertaken, and almost all operations are conducted between the hours of local sunrise and sunset, with the boat being moored overnight or retrieved and trailered until launch the following day. No more than 6 people are onboard the underway vessel at one time, which includes two certified NOAA operators. The vessel operates an average of 80 days per year and is always manned by two certified NOAA operators.

Underway operations consist of towing scientific instruments and manual over-the-side operations. Towing operations are conducted using a manual deployment J-arm system with cable pay in/out via electric winch control. Over-the-side operations are conducted using manual pay in/out of instrument with no instruments weighing over 50 pounds. This vessel may serve as a vessel of opportunity by an external group and outfitted for deploying non-traditional equipment. Examples of this would be deploying and retrieving an AUV, which does not have a tether.

Part II: Identification, Characterization, and Quantification of Risks

Each of the following entities is subject to unique hazards:

* personnel
* vessel
* environment
* mission

These are hazards that can compromise the safe, efficient completion of any voyage.

Hazards to Personnel:

* Heat exposure, dehydration, hypothermia in the winter months
* Injuries incurred by animals
* Blunt trauma, lacerations, or muscular injuries consistent with general deck operations
* Incapacitating injuries caused by failure of winching equipment
* Machinery space injuries caused by contact with moving parts, hot components, or toxic chemicals and/or their by-products
* Tripping/ falling on deck

Hazards to the Vessel

* Capsizing
* Towed scientific equipment snag on hull or seafloor
* Compromised stability conditions during severe weather or the transfer of heavy loads
* Machinery, deck equipment, or structural failure
* Fire
* Collision
* Allision
* Flooding as a result of the hazards above

Hazards to the Environment:

* Accidental discharge of fuel or other products capable of producing sheen upon the water
* Unintentional trash deposition as a result of wind or sea conditions
* Physical damage resulting from accidental contact between deployed equipment and the seafloor, including anchoring

Hazards to the Mission

* Loss or destruction of science equipment/instruments
* Loss of time or productivity due to machinery failure
* Elevated sea conditions
* Aborting due to medical emergency of personnel
* Occurrence of any of the hazards listed above

Risk Hierarchy Matrix:

Hazard severity and hazard probability criteria and a risk hierarchy matrix (below) were used to determine relative hazard rankings for small boat operations.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Hazard Probability** |  |  |  |
| **Hazard Severity** |  A | B | C | D |
| I | 10 | 10 | 9 | 8 |
| II | 9 | 9 | 7 | 6 |
| III | 8 | 7 | 4 | 3 |
| IV | 6 | 3 | 2 | 1 |

The Hazard Severity and Hazard Probability categories in the matrix are defined as follows:

Hazard Severity:

**Category I** - The hazard may cause death, complete loss of boat or gear, severe or irreparable damage to the environment, and result in great loss of trust or support from any group of stakeholders.

**Category II** - The hazard may cause severe injury, chronic illness, substantial property or environmental damage, temporary loss of boat use, and result in a loss of trust from any group of stakeholders.

**Category III** - The hazard may cause minor injury or property damage, temporary damage to the environment or a boat, and result in a loss of trust from a group of stakeholders.

**Category IV** - The hazard presents minimal threats to personal safety, property, or health and will result in decreased mission accomplishment or represents inefficient use of Government resources.

Hazard Probability:

**Category A** - Likely to occur in time, or repetitively over time. Expected to occur frequently to a person or item of property, or continuously throughout the small boat user community.

**Category B** - Probably will occur in time. Expected to occur several times to an individual person, item, or frequently to the small boat user community over time.

**Category C** - May occur in time. Can reasonably be expected to occur sometime to an individual person, or item, or several times to the small boat user community over time.

**Category D** - Unlikely to occur to any person, or item over the period of one year. May occur within the small boat user community rarely over time

The rankings within each cell of the matrix are on a scale of 1-10 with 10 being the greatest risk.

**Hazards Specific to NOAA R/V XXXXX Operations**

*Man Overboard (I-C). Risk Rank of X.*

The risk of a person falling overboard during transit is low due to the presence of a recessed work deck and non-skid deck material. When transiting no personnel in the survey party are allowed on the upper deck and the risk is very low for a crewmember falling overboard from the recessed deck. The risk increases during over-the-side deck operations at rest, particularly when personnel are leaned over the gunwale for gear deployment and recovery. While there is a non-skid material it does become more slippery when wet and increases the potential of loss of footing. These risks exist at dock as well during transfer on and off the boat of equipment and personnel transfer, but recovery difficulty is mitigated by a static position. Contingency plans, drills, and pre-operational safety briefings should help to decrease these risks, namely by increasing situational awareness. In addition, all personnel are required to don personal flotation devices (PFD) or work vests and close toed shoes during any of the above operations.

*Mechanical/Systems Failure (II-B): Risk Rank of X.*

The vessel is XX years old with a build year of XXXX. The generator, outboard engines, and electrical system have a rigorous maintenance regime keeping these items in the best working condition possible. Tests are conducted regularly to verify proper function of essential systems and minimize failure. Existing and preventative maintenance procedures should:

a) Reduce the probability of failure

b) Decrease the severity of incident, should failure indeed occur.

*Fire (II-C): Risk rank of X*

The vessel has been outfitted with adequate fire extinguishing capability. The use of combustible materials is limited, and all machinery spaces are maintained free of grease, oil, or dirt as much as possible. The vessel’s engine rooms include fixed extinguishing systems with remote discharge capabilities. There is one fire extinguisher at the helm for managing issues inside the cabin and one on the exterior of the cabin for managing exterior issues. All on-board fire-suppression equipment is inspected and/or exercised regularly to ensure proper operation. All crewmembers are competent in operation of all onboard fire-suppression systems.

*Structural Failure (II-D): Risk rank of X.*

The nature of underway operations, amidst unpredictable wind and sea conditions, presents inherent risk of incident. Weather is a primary basis of operational decisions and often determines whether operations are aborted due to deterioration or even conducted. The vessel has strict operational limitations set in place in respect to the weather and is in line with the capabilities of the vessel and the operators. Structural failures, although rare, are still possible and can be life threatening. The Operator-in-Charge are required to review all planned operations prior to departure, to ensure that planned operations fall within the scope of the vessel’s and the crew’s capabilities, and to ensure that planned operations do not impose any inherent risks to the vessel or crew. Crew are trained in emergency radio and abandon ship procedures. Also, the boat is physically equipped with all necessary survival equipment for the working environment.

*Stability (II-D): Risk rank of X.*

There is no formal stability or trim book for vessel R/V XXXXX. Other than manufacturer sea trials verifying seaworthiness, no formal record has been kept of equipment additions to the vessel. When the vessel is operated with advanced caution and within weather limitations the vessel’s stability should not be in question.

*Progressive Flooding (II-D): Risk Rank of X.*

The vessel has nine watertight bilge spaces and one isolated, but not secured bilge space in the generator compartment, which is also where the bilge pump is located. Four of them are completely inaccessible from other bilge spaces, making them not subjective to progressive flooding, but also make their flooding undetectable. The four major compartments are linked by closable sluice valves and are always kept in a closed position to prevent progressive flooding in the event of breach of one of them. Also, a manual hand pump is kept on board to allow discharge of water from those compartments not equipped with an electric bilge pump. It is vessel policy that before getting underway, the OIC is to check that all watertight doors, internal and external hatches are closed. The accessible vessel’s bilges are kept dry as possible and monitored on a regular basis. Anchor locker is checked regularly for water ingress, which usually occurs from failed or damaged hatch gaskets. The bilge system and bilge alarm panel is checked before getting underway for proper operation and to ensure that valves are exercised regularly. The generator compartment is equipped with a separate high water bilge alarm which provides a visual and audible helm alarm to notify crew of water ingress into generator/battery compartment.

*Collision (II-D). Risk Rank of X.*

Common vessel traffic near shore includes container ships, tankers, supply vessels, sport fishing vessels, and commercial fishing vessels. In confined waters near land, there also are recreational power and sailing vessels as well as personal watercraft to look out for. The navigational products used to navigate are up-to-date and provide the tools for safe passage in crowded port areas and primary navigation channels. The risk of collision is highest closest to land, out to 20nm, due to the larger vessel and boater traffic. We employ visual, electronic charts and positioning, and RADAR as methods to navigate waterways. This vessel is regularly engaged in conducting towed operations which makes its mobility restricted and puts it at increased risk of collision with other vessels. Also, the size of our vessel compared to the puts it at further risk of visibility to other vessels, but prudent monitoring of other vessel actions and behaviors will avoid collision. Our towed gear can be retrieved very quickly (1-2min) if needed to regain full mobility and implement evasive maneuvers to avoid collision. Also, we have a quick detachment system which will release our towed equipment in <30 seconds) in the event of an imminent emergency, which helps mitigate the mobility restrictions.

*Human Systems Failure (III-C): Risk rank of X.*

The current NOAA vessel operators strive to maintain an impeccable safety record and to operate the vessel in a manner consistent with the safety of the crew and vessel as the primary conduct. The Small Boat Operations Manual contains rules for all embarked personnel. Standard operating procedures for particular missions and usage of equipment onboard are practiced. Emergency checklists have been developed assistance in responding to marine emergencies as well as having the crew current in these practices. Despite manning the vessel with a highly skilled staff, cramped quarters, potentially long work hours, heat, and elevated noise levels contribute to crew fatigue and increase potential for accident. Personal Protective Equipment is supplied on the vessel for deck and maintenance operations to mitigate risk of a serious injury.

The vessel is consistently operated by the same crewmembers so all operators are aware of the current state of the vessel. They are also experienced with the handling characteristics in a variety of sea states. Lack of communication between operators is inevitable, but can be reduced by holding operational briefs and maintaining clear communication lines. Also, the size of the vessel lends itself to easy direct communication between parties. All crewmembers shall not work more than 12 hours a day while the vessel is underway. An operator shall not be relieved unless they have determined that their relief is well rested and prepared for taking over. XXX and the R/V XXXXX team lead support any operator’s decision to cease operations whenever safety appears to be compromised.

*Deck Hazards*

There are many potential deck hazards. Crew must be aware of the surroundings and proactive in keeping the deck organized. The deck is kept free from cables and lines which could pose a tripping hazard. Heavy objects are kept secure to avoid uninvited shifting or sliding. Any movement of large items is announced and confirmed by crewmembers in the immediate area. This is true of winching, deployment, and equipment recovery. A non-skid material prevents unnecessary slipping, but it is still more slippery when wet with water or other chemical substance, i.e. fuel. Tools are not left out on the deck and are placed in storage to reduce clutter and underfoot hazards. Proper line handling and docking techniques are used to avoid getting tangled and

*Allision (III-C): Risk rank of X.*

Encounters with floating waste, loose fishing gear, or dunnage are rare in the vessels operating area, however the potential does exist. Given that visual detection and avoidance of such obstructions is very difficult, as much care as possible is taken, including reduced transit speeds and/or a secondary lookout during times of restricted visibility or while transiting through areas subject to higher volumes of debris.

*Grounding (III-D): Risk rank of X.*

The Gulf of Mexico has mainly a sandy or muddy bottom. Shoal areas, foul areas, shipwrecks, fish havens and well heads are all charted. Charts are updated monthly with Notice to Mariner corrections. The vessel is manned with personnel who possess significant local knowledge. Charted obstructions are to be given appropriate berth by vessel operators. The vessel’s draft is .5 meters allowing it to navigate very shallow waters. Also, the speeds at which the boat is operated in shallow waters does not lend itself to hard grounding and extensive hull damage. A majority of the underway operations are conducted at <5 knots, and higher speeds are only used for transiting to the work area. Redundant depth data systems are used at all times of boat operations for constant monitoring of depth under the vessel. Local knowledge is used also for exercising caution in areas where charted depths may deviate from actual bottom topography.

*Damage to the Environment (II-B): Risk rank of X*

There is always a risk when a vessel is underway will that its operations will compromise the environment. This can range from physical, chemical, and ecological forms of stress from operations in a given area. We practice to minimize our impact to the local environment while conducting operations. Deck is kept free of waste material. Special absorbent materials are kept onboard in case of fuel release. Anchoring and towing operations are conducted with special precaution in recognized sensitive areas, and avoided altogether if cultural, geologic, and biological resources will be negatively impacted.

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