Deepwater Program: The Archaeological and Biological Analysis of World War II Shipwrecks in the Gulf of Mexico

Operations Plan

This operation is designed to be a non-disturbance shipwreck investigation. Although biological samples will be collected, every effort will be taken to not cause any physical damage to the shipwreck sites. The ROV should not at any time come in direct physical contact with any of the shipwrecks.

The typical procedure at each site will begin with a site-specific briefing during transit to the site location. After the ROV is deployed, the first task is to conduct a reconnaissance of the main hull structure and place the microbiological experiment platform and current meter. The purpose of the reconnaissance is to assess the current conditions of the wreck site and aid the biologists in deciding where to collect samples and place their experiments and traps. These microbiology platforms can either be lowered in a basket to the seafloor or be taken down with the ROV (possibly attached to the TMS). They will be placed at locations designated by Lori Johnston. Approximately 3 to 5 hours will be used for these combined tasks.

Next we will conduct an area survey (approximately 17 hours) to determine the site boundaries and document the sea life near and away from the wreck site. The survey will be run along predetermined survey lines. The line spacing may be adjusted according to conditions at each site and expanded as needed to cover the entire debris field associated with each shipwreck. We will stop at least two to three times during the survey (near and away from the site) to film passing sea life. At various times the lights may be switched off for short periods while the ROV is stationary. This is because of sea life that may be attracted to the ROV lights and skewing the "fish count."

Next we will conduct a photo mosaic (either profile and/or plan view) of the main hull structure (approximately 5 hours). Plan view mosaic: We will fly a series of level straight video lines over the wreck structure with the camera pointing downward (not straight down, but at a slight angle- not more than 30°). These lines will all be run on the same heading with adequate overlap between lines in order to mosaic the imagery together. Profile Mosaic: A profile mosaic will be conducted if entanglements over the shipwreck or superstructure cause a plan view mosaic to be unpractical or unsafe. To conduct a profile mosaic we will keep the camera perpendicular to the side of the shipwreck and aimed on a constant heading. The ROV will move down the side of the vessel at a constant altitude. We will likely start at the mud line and conduct a series of passes at a slightly higher altitude for each pass with adequate overlap between passes in order to mosaic the imagery together.

Once the mosaics are finished, the equipment basket containing the biology traps and push cores will be lowered to the seafloor. The ROV operation will be temporarily halted so that the ROV crew can operate the wench and A-frame for this task. The basket will be left on the seafloor and the ROV operation will resume by setting the vertebrate and

invertebrate traps (approximately 2 hours). They will be set at locations designated by Dr. Will Paterson and Aaron Baldwin.

After setting the traps, we will take four sediment cores from locations selected during the area survey. The cores will be taken at various distances from the wreck (near to far) (approximately 4 hours). Each time a core is taken it will be returned to the appropriately labeled core holster on the equipment basket and the next core will be taken. This will be repeated until all four cores are successfully completed. We will then spend approximately the next 4 to 8 hours collecting additional biological samples at the discretion of the biology team and the MMS representative (time available for this operation is partially dependent on operational down time). The traps and microbiology experiments will be returned to the equipment basket for recovery.

A check will be made to insure that every operation is completed before recovering the ROV and equipment basket.

The site order is as follows:
1) Virginia - (SP 79)
2) Halo - (GI 114)
3) GulfPenn - (MC 497)
(MMS Crew change at a Noble Energy platform in MC 365A)
4) U-166 - (MC 338)
5) Robert E. Lee - (MC 338)
6) Alcoa Puritan - (MC 386)
7) Anona - (VK 960)

The scientific team will operate 24 hours on a 12-hour shift rotation. There will be approximately six scientists on each shift and at least two will be biologists and two archaeologists. Among the scientists on shift, there will be two designated observers in the ROV control van with the ROV crew. It is important that no more than two observers are in the ROV van at a time because of limited space and in consideration for the ROV crew. The observers will rotate out in four-hour segments within each 12-hour shift rotation. In other words, an individual will be on shift for 12 hours, but will only be an observer for 4 hours of the shift. The observers will be responsible for directing the ROV pilots during the operation and keeping the scientific logs of all biological and archaeological items observed during the operation (Particularly during the area survey). The remainder of each individual scientists' time may be spent conducting their personal analysis and/or documentation for their portion of the project.

Virginia
Location = (SP 79)
Depth = 312 feet

There will not be microbiology platforms set at this site. The remainder of the ROV operation will be the same as previously described.

Hours	
1.0	Deploy ROV
3.0	Reconnaissance Of Main Structure
18.0	Area Survey
	Sit in place (lights off ~30min.)
	2-3 times at different locations
5.0	Photo Mosaic
1.0	Lower Basket to The Seafloor
2.0	Set Traps
4.0	Sediment Cores
4.0	Take Additional Biology Samples
3.0	Retrieve Traps
2.0	Retrieve ROV and Basket
4.0	Down Time
47.0	Approximate Total

Halo
Location = (GI 114)
Depth = 480 feet

There will not be microbiology platforms set at this site. The remainder of the ROV operation will be the same as previously described.

Hours	
1.0	Deploy ROV
3.0	Reconnaissance Of Main Structure & Current Meter
17.0	Area Survey
	Sit in place (lights off ~30min.)
	2-3 times at different locations
5.0	Photo Mosaic
1.0	Lower Basket to The Seafloor
2.0	Set Traps
4.0	Sediment Cores
6.0	Take Additional Biology Samples
4.0	Retrieve Traps
2.0	Retrieve ROV and Basket
4.0	Down Time
49.0	Approximate Total

GulfPenn
Location = (MC 497)
Depth = 1,751 feet

The ROV operation will be the same as previously described.

Hours	
1.5	Deploy ROV
3.0	Reconnaissance Of Main Structure
2.0	Place Micro Biological Platforms (DBI) & Current Meter
17.0	Area Survey
	Sit in place (lights off ~30min.)
	2-3 times at different locations
5.0	Photo Mosaic
1.0	Lower Basket to The Seafloor
2.0	Set Traps
4.0	Sediment Cores
4.0	Take Additional Biology Samples
3.0	Retrieve Traps & DBI Experiments
2.5	Retrieve ROV and Basket
4.0	Down Time
49.0	Approximate Total

U-166
Location = (MC 338)
Depth = 4,820 feet

Minimal survey work will be conducted at this site. The archaeological survey objective will be to find the southern extent of the site. We will take sediment cores, inspect the DBI platforms placed in 2003, and meet the other biological objectives at this site.

Hours	
1.5	Deploy ROV
3.0	Reconnaissance of 2003 DBI Platforms
6.0	Area Survey
	Sit in place (lights off ~30min.)
	2 times at different locations
1.0	Lower Basket to The Seafloor
2.0	Set Traps
4.0	Sediment Cores
2.0	Take Additional Biology Samples
2.0	Retrieve Traps & DBI Experiments
2.5	Retrieve ROV and Basket
24.0	Approximate Total

Robert E. Lee
Location = (MC 338)
Depth = 4,920 feet

The ROV operation will be the same as previously described.
More attention for the archaeological survey should be placed on the debris scatter north of the wreck site, because it is the least investigated area of the site, but survey will be conducted of the entire site to the greatest extent possible.

Hours	
1.5	Deploy ROV
3.0	Reconnaissance Of Main Structure
2.0	Place Micro Biological Platforms (DBI) & Current Meter
17.0	Area Survey
	Sit in place (lights off ~30min.)
	2-3 times at different locations
5.0	Photo Mosaic
1.0	Lower Basket to The Seafloor
2.0	Set Traps
4.0	Sediment Cores
4.0	Take Additional Biology Samples
3.0	Retrieve Traps & DBI Experiments
2.5	Retrieve ROV and Basket
4.0	Down Time
49.0	Approximate Total

Alcoa Puritan
Location = (MC 386)
Depth = 6,450 feet

Scrunch Education Curriculum
Part of the education curriculum is to see the effects pressure has on different types of objects and materials. So we will film the effects of select objects as they descend to the seafloor with the ROV. After reaching the seafloor the objects will be placed into a recovery basket and brought back to the surface, while the ROV continues to work. The Scrunched objects will be filmed and documented by the MSU media team after reaching the surface. Additional material will be lowered to the seafloor using the basket – MSU will take charge of that material. The ROV operation will be halted to conduct this activity during daylight hours if possible. The remainder of the ROV operation will be the same as previously described.

Hours	
2.5	Deploy ROV and Scrunch Material, Deploy and recover Basket
3.0	Reconnaissance Of Main Structure
2.0	Place Micro Biological Platforms (DBI) & Current Meter
17.0	Area Survey
	Sit in place (lights off ~30min.)
	2-3 times at different locations
5.0	Photo Mosaic
1.0	Lower Basket to The Seafloor
2.0	Set Traps
4.0	Sediment Cores
4.0	Take Additional Biology Samples
3.0	Retrieve Traps & DBI Experiments
2.5	Retrieve ROV and Basket
2.0	Additional Scrunch Material
4.0	Down Time
51.0	Approximate Total

Anona
Location = (VK 960)
Depth = 4,160 feet

The ROV operation will be the same as previously described.

Hours	
1.5	Deploy ROV
3.0	Reconnaissance Of Main Structure
2.0	Place Micro Biological Platforms (DBI) & Current Meter
17.0	Area Survey
	Sit in place (lights off ~30min.)
	2-3 times at different locations
5.0	Photo Mosaic
1.0	Lower Basket to The Seafloor
2.0	Set Traps
4.0	Sediment Cores
4.0	Take Additional Biology Samples
3.0	Retrieve Traps & DBI Experiments
2.5	Retrieve ROV and Basket
4.0	Down Time

49.0 Approximate Total