



OTC 18844

## “Special Session: AUVs: Groundtruthing High-Resolution AUV Side Scan Sonar Contacts for Unexploded Ordnance in a Deepwater GeoHazard Assessment”

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### Abstract

Two of the latest directives from the Minerals Management Service indicate a growing concern about Unexploded Ordnance (UXO) located in close proximity to deepwater exploration and development sites within the Gulf of Mexico (NTLs 2006-G12 and 2007-G01)<sup>1, 2</sup>. This paper describes a unique study that yielded project-specific, quantitative avoidance criteria and risk management analysis of UXO, identified during a routine geohazard survey. The ordnance was located with high-resolution Autonomous Underwater Vehicle (AUV) side scan sonar data outside one of seven known dumping zones, in approximately 3,000 feet of water.

Working with high-resolution (410 kHz) AUV side scan sonar data, as well as Remotely Operated Vehicle (ROV) gathered imagery and gradiometer data analysis, a team of global ordnance experts from AMTI (Applied Marine Technology, Inc.) conducted in-depth analytical research, researched historical records, and provided a conclusive analysis of the ordnance. From this, the team identified ordnance types, and assessed and quantified project specific risks. Although industry is increasing exploration and construction within and near to these designated dumpsites, this is the first known instance of such a precise analysis on UXO identified from AUV side scan sonar targets.

The process described in this case study can be applied to geohazard assessments of planned offshore construction sites within and near known ordnance disposal areas in the Gulf of Mexico, as well as globally. These include block studies, well site clearances, right-of-way and lease term pipeline route assessments, and umbilical and communications cable route assessments. The process included an assessment of damage potential to survey and construction equipment by accidental

munitions detonation; thereby providing risk mitigation recommendations.

Field data include high-resolution AUV side-scan sonar, ROV imagery and pipe-tracker results, historical data and background on ordnance. AMTI provided detailed risk mitigation criteria in the event of an accidental detonation and the effect on infrastructure and/or other equipment it may have. The conclusions include a series of recommendations and precautionary measures.

Exploration and development is progressing into areas where the potential to encounter UXO is greater. If used systematically, technology now available – high-resolution side scan sonar, and deepwater ROV photography and gradiometry tools, coupled with the high navigational accuracy of AUVs – could greatly increase the value of a geohazard assessment. Additionally, utilization of Explosive Ordnance Disposal (EOD) experts during geohazard survey operations where unexploded ordnance is or could potentially be involved can reduce the timeline in which the survey and assessment is conducted.

### Introduction

After WWII, and without regulations to adhere to, the world's oceans were the perfect dumping grounds for unused, unsafe and excess ordnance. From 1946 through 1970, military ordnance was dumped in the Gulf of Mexico by the U.S. armed forces, and it was the primary disposal site for the excess munitions originating from a number of large ordnance houses in the southeastern United States. That ordnance included, but was not limited to, projectiles, bombs, and chemical ordnance.

As industry continues to progress into deeper and deeper water, it will continue to encounter the world's munitions dumping grounds, charted and uncharted. Because records were poorly kept and navigation was not as precise as it is today, ordnance has and will be encountered outside known munitions dumping grounds. Many of these munitions may be either armed or in such an unstable condition that a minor influence could detonate them.

The MMS (Minerals Management Service), charged with the task to manage ocean energy resources, requires that all exploration and production activities be conducted in a safe,