



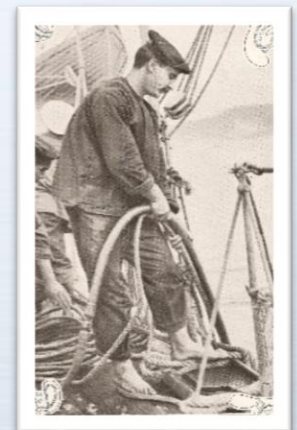
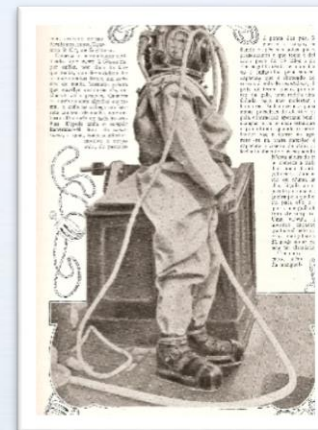
W O R K S H O P

# TECNOLOGIAS MARINHAS 2019

**MINE WARFARE & DEEP DIVING UNIT**  
1TEN VIOLANTE DA LUZ

04DEZ19

**The first notice of the employment of combat divers by Portugal occurred in 1580, during the Portuguese Succession War. In that occasion, Portuguese combat divers attacked the Spanish ships that were in the Tagus river, in order to damage their hulls.**





## Residual MCM Capability - Divers

## DMS-MW



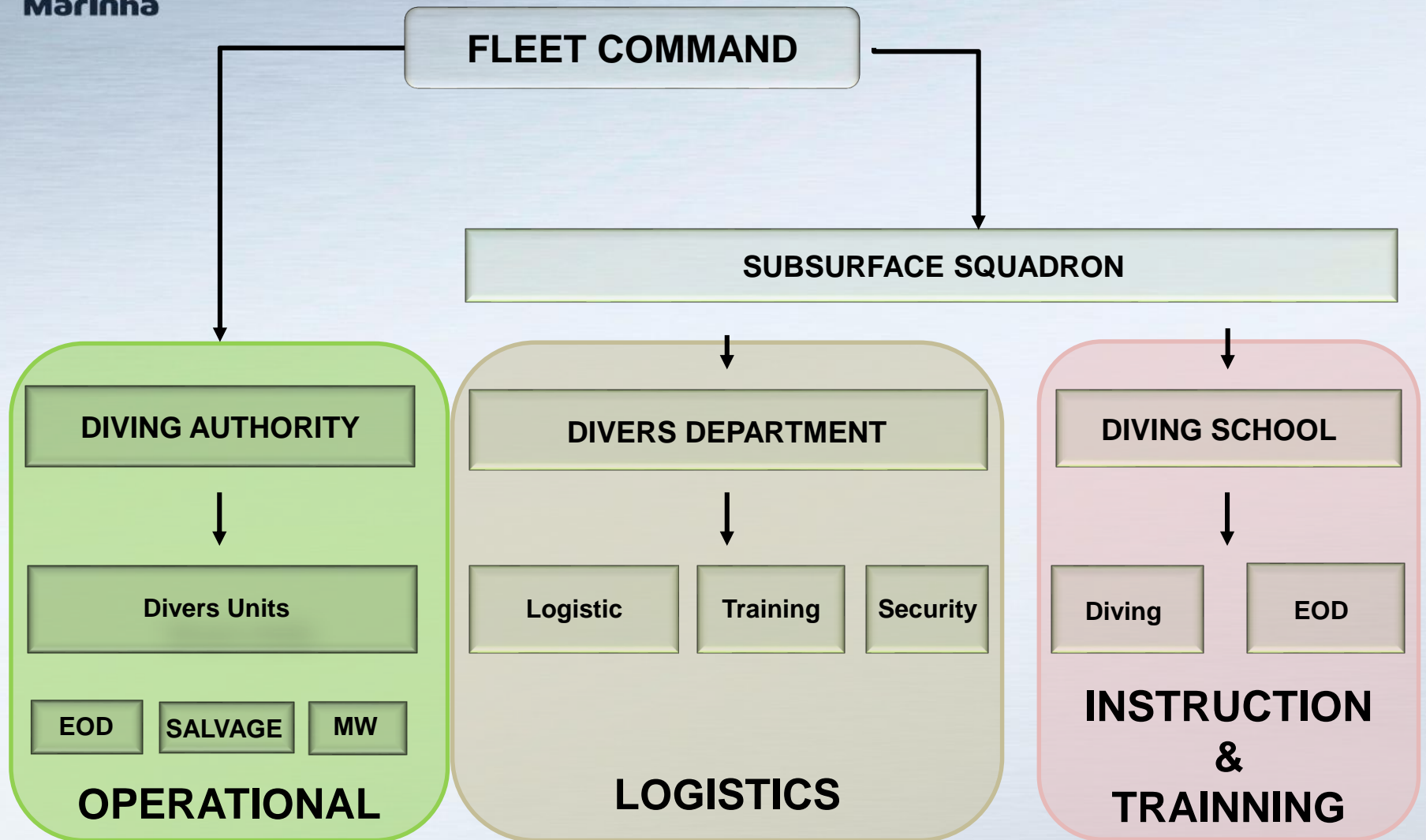
70's



2004

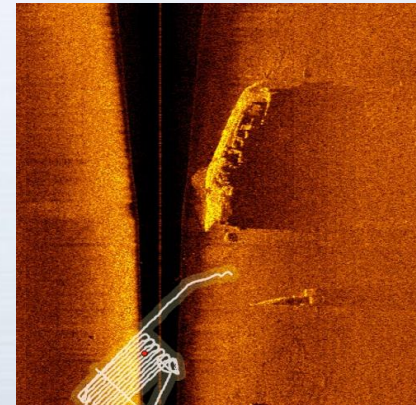


2008



**MWD contributes to the safe use of the sea for military and non-military purposes, by reducing the risk of sea mines and other underwater explosive devices threats.**

**Portuguese MWD is a high readiness Unit supported by Diving Teams and Unmanned Underwater Vehicles that can be quickly deployed to detect, locate, classify, identify and neutralize sea mines and other underwater explosive devices threats in order to ensure the safe use of the sea.**



- **SEARCH & FIND**
- **IDENTIFICATION**
- **NEUTRALIZE OR REMOVE THE THREAT**

**DANGER / SUSPICIOUS AREA**



## ➤ SEARCH & FIND

### Autonomous Underwater Vehicles (AUV's)

#### AUV SEACON

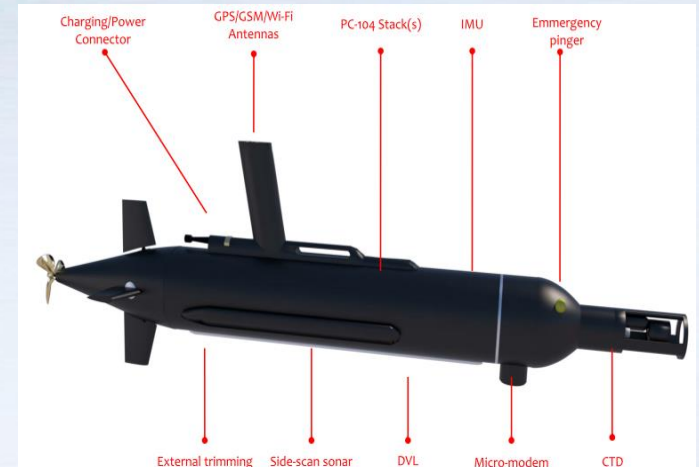


#### AUV GAVIA



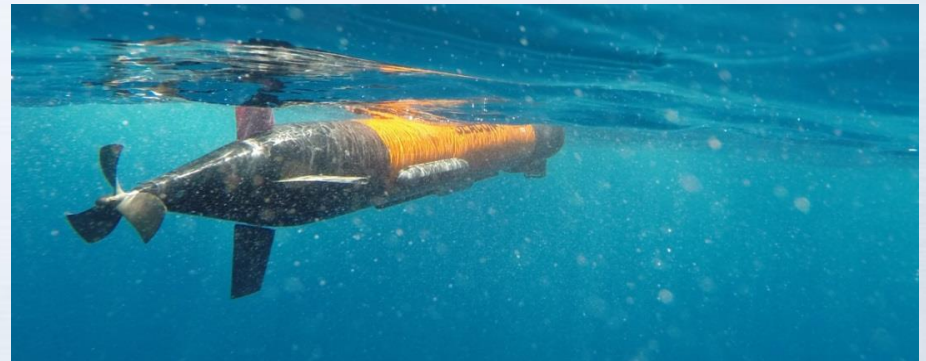
## Typical MW configuration

- Size/ Weight : 1.8-2.1m / 25 Kg
- Endurance: up to 6 hours @ 2 knots
- Top Speed: 3 knots
- Depth: up to 100m



## Navigation sensors

- GPS
- DVL
- IMU HONEYWELL (INS)
- LBL system





## MW Sensors

- High resolution colour camera system
- SSS Imaginex 330/770kHz (dual freq.)
- Multibeam - DeltaT
- Colison Avoidance Sonar

## Surface Comms

- Wireless LAN
- GSM connection and text messaging
- Emergency mode and location pinger
- Acoustic modem

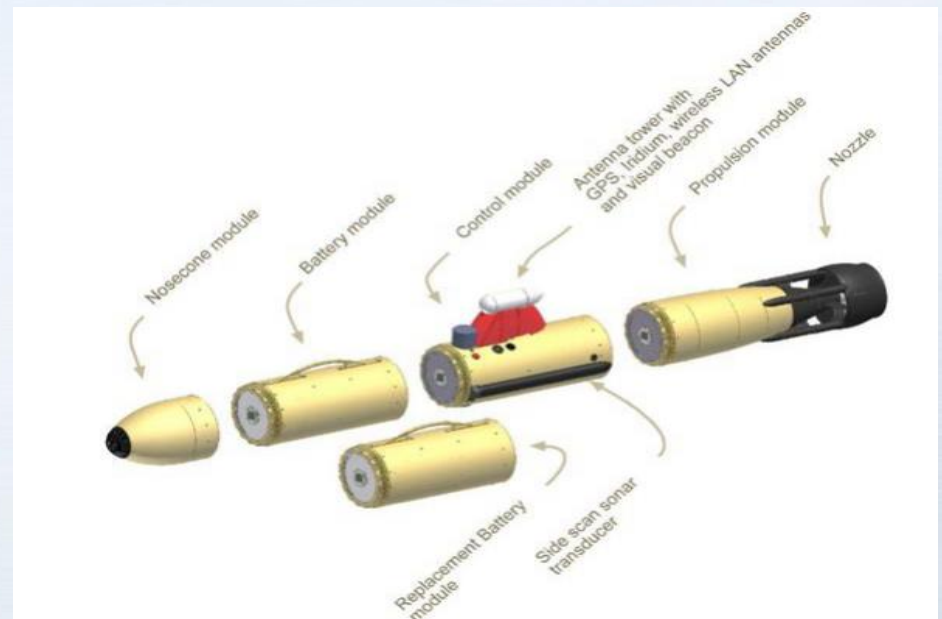


- **Modularity and flexibility**



## Typical MW configuration

- **Size/ Weight : 2.2m / 60 Kg**
- **Endurance: 6 hours @ 4 knots**
- **Top Speed: 5+ knots**
- **Depth up to 200m**

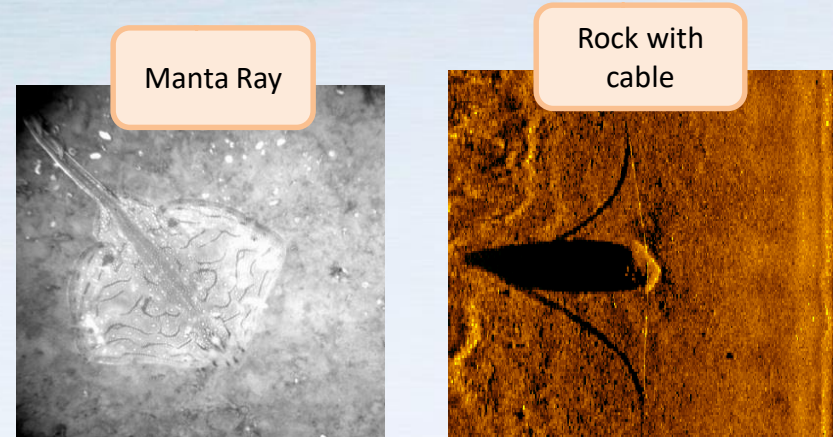


## MW Sensors

- High resolution camera system
- SSS MarineSonic 900/1800kHz
- Colison Avoidance Sonar

## Surface Comms

- Wireless LAN
- Satellite and GSM connection and text messaging
- Emergency mode and location pinger

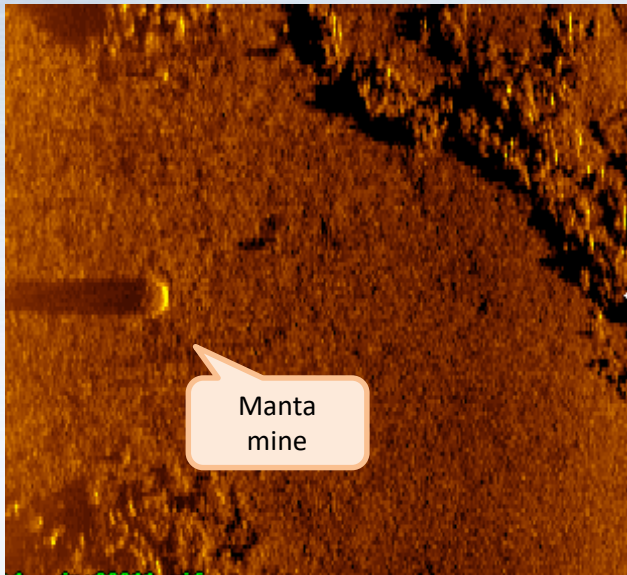


## Navigation sensors

- GPS
- DVL assisted INS
- Kearfott T-24 KI-4901 IMU
- LBL system

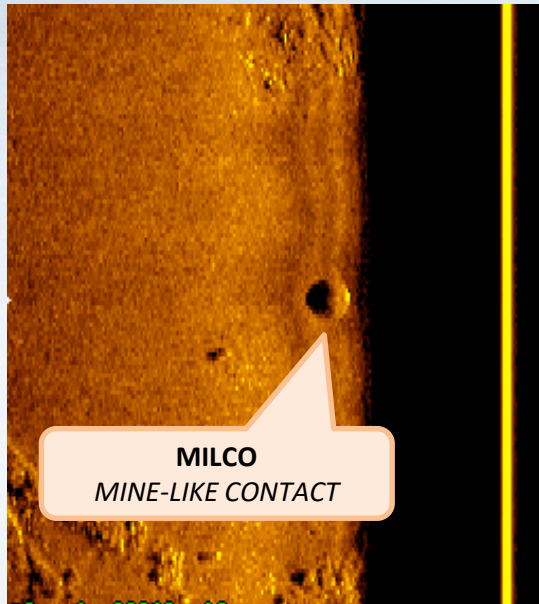


## MW Sensor – Typical Side Scan Sonar (SSS) picture



## Mine recovery – lifting bag

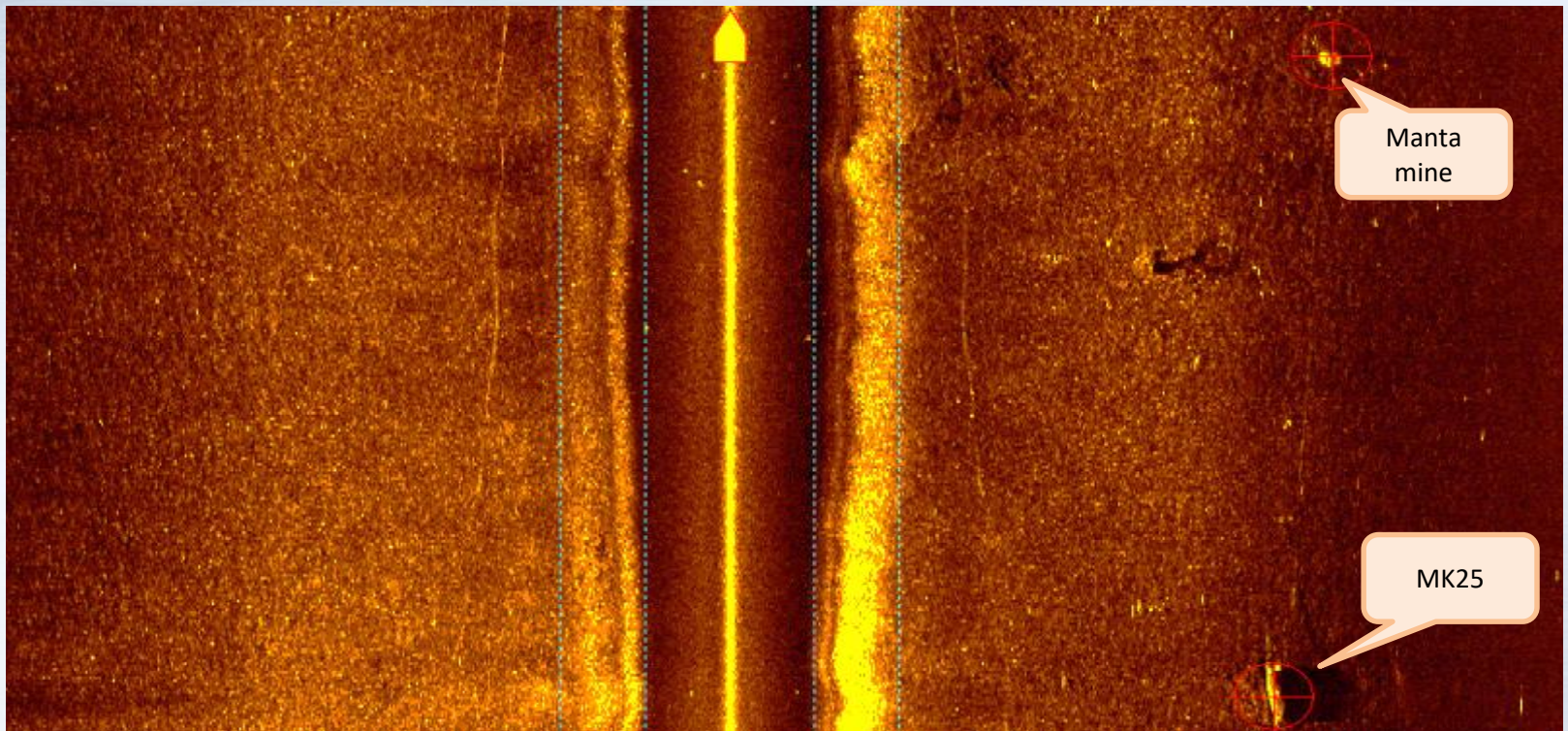
## MW Sensor – Typical Side Scan Sonar (SSS) picture



**Positive identification**  
**WWII moored Mine “Type GY”**



## MW Sensor – Typical Side Scan Sensor (SSS) picture





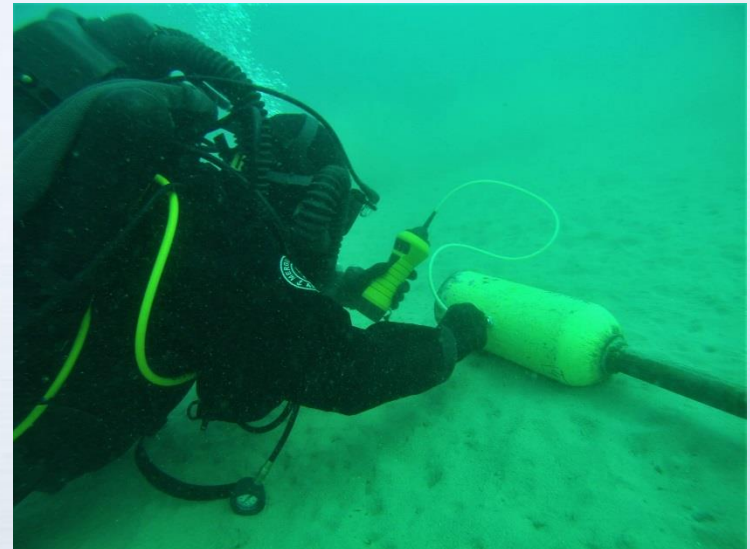
## ➤ IDENTIFICATION

### Remote Operate Vehicle (ROV) & Divers

ROV Seabotix



Divers



## ROV configuration

- Colour camera system with record system
- Sonar
- Claw up to 6Kg strength





# MINE WARFARE – IDENTIFICATION BY DIVERS

## Divers RECON:

- Shape
- Thickness
- Measures
- Details (rings, brackets, letters or numbers)





## ➤ NEUTRALIZE OR REMOVE THE THREAT

### Divers

**Viper SC – Nitrox 54m**



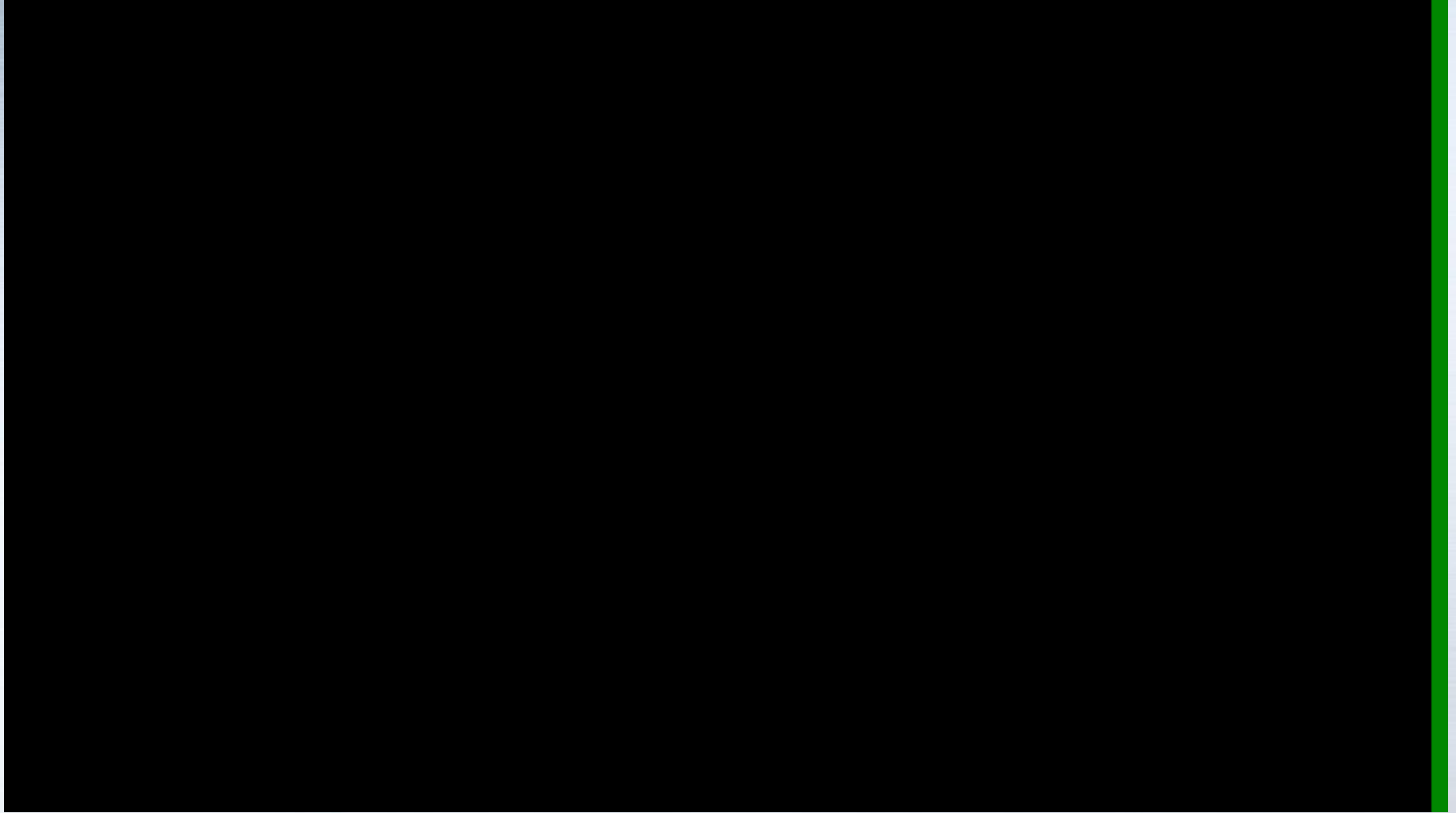
**Viper Plus – Heliox 81m**





**MINE  
DISPOSAL**







***“IN AQUA OPTIMI”***