TITAN SENTINEL V4.1
VESSEL MONITORING SYSTEM

NAME: CLIPPER III
MMSI: 937856012
DESTINATION: SEATTLE
SPEED: 3.4
CALL SIGN: 3FTJ5
TYPE: CARGO
TARGET TYPE: CLASS A
STATUS: MOORED
ID: 23526890002
IMO NUMBER: 9347544
FLAG COUNTRY: PANAMA
VESSEL SIZE: 340.0, 46.0
Maritime Domain Awareness (MDA) is the effective understanding of anything associated with the global maritime environment that could impact the security, safety, economy and environment of Ports and Coastlines.

Maritime Domain Awareness means having true and timely information about everything on, under, related to, adjacent to, or bordering a sea, ocean or other navigable waterway. This includes all related activities, infrastructure, people, cargo, vessels, or other means of transport. For marine port & harbor security, it means being aware of anything in the marine domain that could threaten security of the Port/Harbors Area of Responsibility (AOR).

Maritime Domain Awareness is a key component of an active, layered vessel traffic services (VTS) system. The TITAN Sentinel VTS system layers various surveillance, observation, and navigation systems into one common operating picture which allows operators to make informed decisions.
BACKGROUND ON VTS SYSTEMS

The movement of goods by sea has supported world commerce for centuries, giving rise to a need for ships to navigate safely and efficiently. To assist in the safe navigation of ships, authorities throughout the world have provided aids to navigation in and around their coastal waters beginning with shore-side beacons and lights, eventually followed by the introduction of buoys.

However, it became clear that short range, audio-visual aids to navigation were unable to offer the full utilization of port facilities in all conditions of visibility and increasing traffic density. This resulted in delays of vessel traffic movement, which in turn created serious disruption to port operations with consequences for other modes of transport.

A consensus emerged among maritime experts that traffic monitoring using shore-based radar combined with communications could be applied to enhance safety and efficiency in port areas and their approaches. This lead to the first radar based Port Control station which was established in 1948. Over the next few years a number of additional shore-based radar sites were established.

These early systems were intended to minimize traffic delays and increase the efficiency of traffic flow but it was also recognized that the number of accidents was also being reduced. With the positive outcome of these radar based systems being realized the view on how to proceed further was being debated among the various authorities, including pilots and shipmasters. The advancement of Vessel Traffic Systems (VTS) was made possible with the development and integration of new technologies including Automatic Identification Systems (AIS).
Xanatos Marine’s President, Bill English, was one of the individuals which helped realize the potential of AIS technologies in Western Canada. A new and improved version of VTS systems were developed in the early 2000’s including the first VTS which integrated AIS technology. -TITAN AVIPS, Xanatos Marine Ltd.

The development of modern technologies was very important for the technical concept of VTS systems. The concept developed from a simple radar and voice radio system, with the aim of enhancing navigation in poor visibility, to a modern system using multiple sensors with the objectives of enhancing safety of navigation, improving the efficiency and accuracy of maritime traffic and protecting the marine environment.

The realities of modern shipping, with larger and less maneuverable ships, traffic congestion in ports and waterways, hazardous cargoes, piracy and smuggling acts along with the potential for environmental damage, demanded that sophisticated measures be taken to reduce risks. Establishing a VTS was and still is a significant response to that demand.

As a result of the improvements in efficiency, safety and the reduction of potential environmental pollution experienced by authorities using a VTS, together with the rapid developments in computer technology, the number of VTS type operations has increased considerably and there are now well over 500 operating worldwide.

Xanatos Marine’s TITAN Sentinel VTS systems are currently being used by Ports, Harbors, Coast Guards, and other Authorities. The comprehensive and reliable TITAN platform is customized for each client’s needs and has a modular design which allows for future.
TITAN SENTINEL VTS ARCHITECTURE

- RADAR
- CAMERA
- AIS
- VOICE
- RDF
- WEATHER

TITAN SERVER
SENSOR FUSION SYSTEM

TITAN SENTINEL VTS
OPERATOR USER INTERFACE

- VESSEL TRACKS
- TARGET DISPLAY
- VESSEL INFORMATION
- ZONE GUARDS
- AUTOMATIC ALARMS
- HISTORY REPLAY
- VISUAL TARGET DISPLAY
- ZONE GUARDS
- HEALTH MONITORING
- WEATHER DISPLAY

EXTERNAL USERS
- COAST GUARD
- NAVY
- MARINE POLICE
- PILOTS
- OTHER AUTHORITIES

XANATOS MARINE
The TITAN Sentinel VTS System Interface is a comprehensive platform that displays all the integrated sensors in a single display. The interface is user-friendly, fully customizable and has over 50 features to assist operators in their daily tasks.

The user interface is the front end of the overall VTS system and is used for data display & data evaluation which leads to informed decision-making. The TITAN Sentinel VTS interface is among the most advanced systems in the industry and has a number of unique proprietary features.

Xanatos Marine is committed to constantly developing new features to satisfy the changing needs of VTS operators and provide a VTS interface which increases efficiency, accuracy and user-experience.
TITAN SENTINEL VTS SYSTEM INFORMATION

SOLAS V-12 states, “Vessel Traffic Services (VTS) contribute to the safety of life at sea, safety and efficiency of navigation, the protection of the marine environment, the adjacent shore area, worksites, and offshore installations from possible adverse effects of maritime traffic.” This statement outlines the basic principle of the TITAN Sentinel VTS system’s functionality. The TITAN Sentinel VTS system provides enhanced situational awareness allowing operators to aid mariners in the safe use of navigable waterways, contribute to keeping the seas and adjacent environment free from pollution and increase security for the Authorities “Area of Responsibility.”

The TITAN Sentinel VTS system is based on IALA recommendations and as stated in section 0402 – Functions of a VTS, IALA VTS Guide-12. The system functionality of the TITAN Sentinel VTS system can be subdivided into internal and external functions. Internal functions are the preparatory activities that are performed to enable the TITAN Sentinel VTS system to operate. These include data collection, data evaluation and decision-making.

External functions are activities that are executed with the purpose of influencing the traffic characteristics. They relate to the primary traffic management functions of rule-making, allocation of space, routine control of vessels and maneuvers to avoid collisions, as well as to other management functions such as enforcement, remedial and ancillary activities. The TITAN Sentinel VTS system allow operators to have a real-time situational display which they can base their decisions on.
Amongst the most important functions that VTS Authorities may carry out are those related to, contributing to and thereby enhancing:

- Safety of life at sea;
- Safety of navigation;
- Efficiency of vessel traffic movement;
- Protection of the marine environment;
- Supporting maritime security;
- Supporting law enforcement; and
- Protection of adjacent communities and infrastructure.

“Incidents involving vessels can lead not only to material damage and injuries, but also to loss of life. VTS endeavors to prevent incidents resulting from vessel traffic movements, thereby contributing not only to the improvement of vessel traffic safety but also to the improvement of safety of life at sea and protection of the environment.” - IALA VTS Guide 2012 Section 0403.

In a comprehensive VTS such as TITAN Sentinel, real-time data is layered for enhanced situational awareness allowing VTS operators to proactively increase safety of life at sea through the mitigation of threats or incidents. By using TITAN VTS systems with a proactive operator the VTS is able to:

- Prevent incidents from developing;
- Prevent incidents from developing into accidents;
- Prevent accidents from developing into disasters; and
- Mitigate the consequences of incidents, accidents and disasters.

Along with mitigating threats or incidents the TITAN Sentinel VTS system also increase the efficiency of vessel traffic by reducing the number of accidents and increasing the utilization of waterways, ports, and other infrastructure.
**TITAN SENTINEL VTS SYSTEM INFORMATION**

Xanatos Marine’s TITAN Sentinel VTS system was designed around the guidelines of IALA with input from the Western Marine Community, Transport Canada and the Canadian Coast Guard. IALA guide 1089 – Provision of Vessel Traffic Services with reference to VTS information service, VTS traffic organization services and VTS navigational assistance services, outlines and number of service that the Xanatos Marine’s TITAN VTS System conforms to. Below are examples of these services:

**VTS INFORMATION SERVICES**

- Display the position, identity, intention and destination of vessels equipped with AIS within AIS network range;
- Display the position, intention of non-AIS compliant vessels within radar coverage area;
- Display the position visually within CCTV camera coverage area;
- Amendments and changes in broadcasted information concerning the VTS area such as boundaries, procedures, radio frequencies, reporting points;
- Display vessels actual position vs. reported position for mandatory reporting of vessel traffic movements;
- Display customized vessel tracks for visual recognition of vessel movement;
- Send private AIS messages to vessels in regards to maneuverability limitations in the VTS area that may impose restrictions on the navigation of other vessels, or any other potential hindrances;
- Display/broadcast safety related messages;
- Layer a variety of sensors on top of a certified nautical chart to provide comprehensive maritime domain awareness and increase situational awareness;
- Display/broadcast meteorological and hydrological conditions, notices to mariners, status of aids to navigation;
- Cycle Display for user-defined zones allowing operators to have an overview of area of responsibility;
VTS TRAFFIC ORGANIZATION SERVICE

- Establishment of specific and special routes with automatic alarms if vessel goes off track;
- User defined vessel coloring is used for prioritizing or preventing congestion;
- Vessels defined as carrying Dangerous Cargo are defined by specific symbol;
- Measure distance and bearing from a vessel to dangerous situation or obstacle;
- User defined speed limits with automatic alarms and visual record if applicable;
- Set-up virtual buoys for nautical activities such as marine works in progress (dredging) that could be a hindrance to vessel traffic;
- Assign “VTS operator note” to vessel for all other connected VTS/VTMIS systems to read, assign follow-up note or take action on. (eg. - AIS transponder is not set-up correctly. Warning was issued to fix before next Port visit);

VTS NAVIGATIONAL ASSISTANCE SERVICE

- Provide range and bearing from fixed objects, vessels, Navigational Aids;
- Provide Information on Meteorological & Oceanographic conditions;
- Provide Information related to navigation into channel/fairway/lane with waypoints and use of up-to-date navigation charts;
- Provide warning about diverging from recommend track;
- Provide warning about Closest Point of Approach/Time to Closest Point of Approach (CPA/TCPA);
- Provide warning about entering restricted zone (potential grounding, wreck, reef, diving operations, etc);
- Provide information on vessel position if vessel is unable to determine its position;
- Assist vessel to available anchorage and easy-to-see anchorage availability feature for operator;
Over the past ten years Xanatos Marine has sold over 20,000 Maritime Domain Awareness sensors, systems and networks globally. Xanatos Marine is a full solution provider who is able to assist with the entire process from the conceptual design to the installation, training and ongoing support.

“It would be our pleasure to discuss your unique needs/requirements and use our experience to deliver a reliable and comprehensive system to aid in safety, security, environmental stewardship and precise navigation.”

Bill English – President of Xanatos Marine