Autonomous Underwater Vehicles

Remotely Operated Vehicles and Underwater Drones

Emirates Specialized Contracting and Oilfield Services L.L.C (ESCO)

Doc No: ESCO-CORP-ST-HSE-UAS-0002
Rev: R01
Rev Date: Oct 2023

Revision and Issue

Revision Number	Date of Revision	Revised By	Description of Changes	Approved By
Rev 00	Dec 2019	MJ	Initial creation of the document.	KA
	Mar 2020	TM	Added new section on safety protocols.	JB
	Mar 2021	MB	Updated compliance requirements as per new legislation.	JB
	May 2022	MB	Minor edits to the risk assessment procedures and incorporation of Underwater Drones	JB
	May 2023	JB	Incorporated feedback from internal audit based on ABS and DNV approvals	JB
Rev 01	Oct 2023	BS	Incorporation of Underwater Drones Technologies and applications specifics.	JB
	Mar 2024	tbc	tbc	

History Extract

Underwater Drones

Since their inception in the 1950s, underwater drones, also known as remotely operated vehicles (ROVs), have undergone significant development and have become integral tools in marine exploration and offshore operations. Notably, the pioneering efforts in this field were led by many including the navies of the United Kingdom and the United States. In the 1960s, these naval forces began utilising underwater cameras and drones for tasks such as retrieving lost equipment and exploring shipwrecks.

A key milestone in the history of underwater drones was achieved in 1985 when an ROV was instrumental in locating the wreck of the RMS Titanic, demonstrating their capability in deep-sea exploration. The turn of the millennium marked a period of rapid advancement in drone technology. Contemporary underwater drones have surpassed their predecessors in every aspect, boasting enhanced capabilities, greater operational reach and more sophisticated technology.

These modern drones are equipped with advanced sensors, high-definition cameras and innovative navigation systems, allowing for precise and detailed underwater surveys and explorations. The field of underwater drone technology continues to evolve, driven by ongoing innovations and increasing applications in various marine-related fields.

The Evolution of Underwater Drones

The origins of underwater drones trace back to the 1950s, with significant contributions from both the United Kingdom and the United States. Initially conceptualised for military and academic research, these drones were a product of defence funding, reflecting the technological race of the Cold War era.

In the United Kingdom, early developments in underwater technology during this period were driven by the need for advanced maritime capabilities. The UK's focus on marine exploration and naval superiority laid the groundwork for several innovations in underwater drone technology.

As the 1960s unfolded, technological advancements led to remarkable feats, including the retrieval of a lost nuclear bomb off the coast of Spain, a mission shrouded in secrecy for many years. Both the UK and the US played pivotal roles in advancing the technology that made such operations possible.

The 1970s marked a broader commercial adoption of underwater drones, highlighted by their use in rescue missions for sunken submarines. This era demonstrated the drones' ability to perform tasks far beyond human reach, a testament to their growing versatility.

The 1980s are often heralded as the golden era of underwater drones, notably with the discovery of the Titanic. This mission, led by Robert Ballard, required a new type of ROV, developed with assistance from the Navy. In the UK, similar advancements were made, contributing to the exploration and understanding of underwater environments.

Throughout the 1990s, underwater drones evolved to undertake more complex tasks, such as disabling mines, previously reliant on human divers. The UK, with its long-standing naval tradition, contributed significantly to these advancements, particularly in mine countermeasure operations.

The 2000s saw a quantum leap in drone technology, spurred by improvements in lithium-ion battery technology. The evolution from large, tethered vehicles to more compact and versatile drones marked a significant shift in their deployment and operational capabilities, with the UK playing a key role in these technological advancements.

Today, the usage of underwater drones continues to expand globally, with significant contributions from both the UAE, UK and the US. These drones are used for a wide range of applications, from military missions to environmental research, showcasing a journey of continuous innovation and cross-national collaboration in underwater technology.

The use of underwater drones in the United Arab Emirates (UAE) has seen significant development in recent years, particularly in the realm of customs and security. Dubai Customs, for instance, started deploying an ROV in August 2020 to enhance its marine inspection capabilities. This move represented a significant advancement in the UAE's use of underwater drone technology for practical, operational purposes.

The ROV used by Dubai Customs, known as the mini submarine, can travel at 15 kilometres per hour and is connected to a wire with a range of about 30 meters. It is equipped with a 4K high-definition camera, enabling it to take live video and clear photographs for thorough vessel inspections. This technology has proved especially useful in tackling trafficking and criminal activities by allowing for the inspection of areas of vessels that are typically challenging to access, such as the hulls where contraband or prohibited goods might be hidden.

Prior to the adoption of the underwater drone, Dubai Customs relied on the services of Dubai Police for underwater inspections, as they did not have their own diving team. The Customs rummage team would normally search the cabins and decks of a boat but not underneath. The drone has enabled inspections of any part of a boat up to 50 meters in the water, significantly reducing the inspection time to less than 15 minutes. The images captured by the ROV are sent to a command centre for analysis and if anything suspicious is identified, Customs still relies on Police divers for further inspection or requires the boat to be placed on dry dock.

The drone is particularly used to inspect wooden boats coming into Dubai Creek from neighbouring countries and is also employed in larger operations at Jebel Ali Port. Despite its effectiveness, the equipment does have limitations, such as varying visibility due to weather conditions, water depth and currents. Dubai Customs is working on upgrading the drone by mounting sensors to enhance underwater visibility and installing stabilizers to navigate strong currents.

This implementation of underwater drone technology in the UAE underscores the region's commitment to integrating advanced technological solutions for security and customs enforcement, marking a significant step in the application of ROV technology in the Middle East.

ESCO are now using underwater Drones in Abu Dhabi for fast and reliable subsea data in support of life-cycle asset management for rigs, barges, pipelines, platforms, complexes and other energy related assets.

Understanding the Functionality of Modern Underwater Drones

Modern underwater drones and mini submarines, operate in a complex marine environment where conventional radio signals are ineffective. These sophisticated machines can be autonomous, relying on their onboard sensors for navigation and operation. Alternatively, they may be operated through a long tether, establishing a direct connection between the drone and the controlling vessel.

The fundamental mechanism of an underwater drone involves controlling its buoyancy to prevent sinking. Like all subaqueous vehicles, these drones have specific crush depths and are engineered to function under varying operational conditions. Their propulsion systems, utilising specialised motors, propel water to manoeuvre the drone, guided either by remote commands or autonomously.

A typical operational setup for these drones involves a tethered connection to a control room. In this control room, operators precisely manage the drone's tilt, elevation, and orientation in real-time. Equipped with cameras that function as the drone's eyes, operators can navigate the vehicle, guiding it towards its intended target or area of exploration.

This intricately designed system allows underwater drones to perform a myriad of tasks in the oceanic depths, from scientific research to naval operations, showcasing a blend of advanced engineering and technological innovation in maritime exploration.

This version maintains a formal and technical tone, making it accessible and informative for a general audience curious about the workings of underwater drones.

The Integral Role of Cameras in Underwater Drones

At the heart of an underwater drone's functionality is its camera system. This vital feature transforms the drone into a powerful tool for underwater exploration and operation. The camera acts as the eyes beneath the surface, allowing users to undertake a myriad of tasks including inspection, retrieval and observation.

Equipped with high-resolution, often high-definition cameras, these drones provide clear and detailed imagery from the underwater world. This capability is essential across various fields, from scientific research to commercial and industrial inspections. Researchers utilise these cameras to study marine life and ecosystems, while industries employ them for inspecting underwater infrastructure, such as pipelines, cables and offshore platforms.

In search and retrieval operations, the camera’s ability to capture clear images in challenging underwater environments is invaluable. It enables operators to locate and recover objects, assess damage and conduct surveys in conditions where human divers might face significant risks.

Moreover, the camera systems in modern underwater drones are often enhanced with advanced features like adjustable lighting, zoom capabilities and sometimes even sonar technology. These additions further augment the drone's ability to navigate and document the undersea environment, regardless of visibility conditions.

The versatility of underwater drone cameras also extends to environmental monitoring and maritime security. They provide critical data for environmental assessments and are instrumental in monitoring marine habitats and wildlife. In security applications, they assist in harbour surveillance and underwater security checks, adding an essential layer of safety.

In conclusion, the camera on an underwater drone is not just a component; it is the key to unlocking the potential of these sophisticated machines. By providing a window into the depths, these cameras enable a wide range of critical underwater activities, making underwater drones indispensable tools in modern marine exploration and operation.

Payload Attachments and Accessories

Lightweight, Low Drag Tether: These drones are designed with onboard power sources, eliminating the need for heavy tethers. The use of a low-drag, minimal diameter tether, which is neutrally buoyant, allows the drone's power to be fully utilised for manoeuvring rather than dragging a heavy tether through water. The tether is reinforced with high-strength fibres, enabling easy management of the drone.

Innovative Pitching System: Underwater drones feature a unique internal pitching system that allows movement in all directions using horizontally mounted thrusters. This system enables the pilot to adjust the drone's orientation through a vertical arc, directing the thrusters for precise movement.

Fully Integrated Viewing and Control: The drones are equipped with integrated controllers featuring bright screens for clear visibility even in sunlight. These user-friendly, gaming-style controllers simplify piloting and may include additional capabilities for integrating SONAR and other sensors.

360 Degree Viewing Capability: With a combination of a 360-degree viewing window, a 270-degree camera sweep and a 180-degree pitch angle, underwater drones offer comprehensive visual coverage using a single HD, low-light camera. This feature is complemented by an LED lighting system that aligns with the camera's movements.

Modular Add-Ons for Enhanced Functionality: The drones can be customised with various add-ons, such as multibeam imaging sonar, to extend their capabilities. This is particularly useful in challenging environments, improving visibility in murky or zero-visibility conditions and making complex missions like search and recovery or confined space inspections safer and more feasible.

Durable and Low-Maintenance Design: These underwater drones are built for longevity, featuring sturdy construction with materials like cast aluminium for corrosion resistance. The unique spherical design adds strength, and the maintenance-free thrusters contribute to the drones' durability. For evolving project needs, various attachments are available to enhance functionality and extend the drone's lifespan.

These features collectively make underwater drones highly effective for a wide range of applications, from scientific research to commercial inspections and security operations, showcasing the cutting-edge technology and engineering behind these sophisticated marine tools.

Applications for underwater Drones

As technology continues to advance, the accessibility and applications of underwater drones are expanding, making them an asset in a growing number of ocean-based industries and activities.

Naval Operations: The Navy has been a key player in the development and innovation of underwater drone technology. Navies around the world use these drones for surveillance, mine countermeasure operations and other underwater military activities.

Commercial Sector: The modern commercial industry has adopted underwater drones for numerous applications. For instance, oil and gas companies use them for exploring potential drilling sites and monitoring existing operations. These drones facilitate inspections of underwater infrastructure and are instrumental in ensuring the efficient and safe operation of these facilities.

Oceanic Research: Research organisations and foundations utilise underwater drones for seafloor exploration and analysis. These drones enable scientists to study marine environments, conduct oceanographic research and monitor ecological changes without the limitations imposed by human diving.

Infrastructure Monitoring: Companies with infrastructure beneath the water surface, such as pipelines and cables, deploy underwater drones for regular monitoring and maintenance. These drones are capable of enduring harsh underwater conditions, making them suitable for repetitive use.

Aquaculture Industry: In aquaculture, underwater drones play a crucial role in net inspections, monitoring lighting and feeding systems, troubleshooting and stock monitoring. They offer a cost-effective solution for ensuring the health of fish stocks, efficient harvesting and environmental protection.

Commercial Diving and Inspections: For commercial divers, underwater drones enhance safety by allowing inspections in confined and potentially hazardous environments, such as tanks and seawater intake systems and structures, thereby reducing the risks associated with diving.

Hobbyists and Professionals: Beyond these industries, underwater drones are also increasingly accessible to a broader audience, including hobbyists and commercially by professionals. Hobbyists use them for underwater photography and exploration, while professionals in various fields leverage these drones for specialised tasks related to their industries.

Underwater Exploration: These drones explore marine life, coral reefs, and unique underwater formations, providing valuable insights into the marine ecosystem.

Underwater Photography and Videography: Drones equipped with cameras capture stunning underwater imagery and footage, useful in documentaries, research and leisure activities.

Wreck Diving and Exploration: They enable the exploration of sunken ships and aircraft, offering a safer alternative to human diving for archaeological and historical research.

Data Recording: This includes inspections or environmental monitoring, where drones gather crucial data on underwater conditions and infrastructure.

Offshore Oil and Gas Industry: Underwater drones play a vital role in inspecting, maintaining, and repairing underwater infrastructure like pipelines, wellheads and subsea equipment.

Hydroelectric and Dam Inspections: Drones assist in identifying potential issues such as cracks, sediment build-up or structural damage in hydroelectric facilities and dams.

Military and Defence: The UK and US Navy and other defence forces use underwater drones for mine countermeasures, explosive ordnance disposal, intelligence, surveillance, reconnaissance missions, salvage and recovery operations.

Search and Recovery: Police, fire departments, and first responders employ drones to locate missing persons, drowned victims, weapons, contraband and other submerged objects.

Aquaculture: These drones aid in monitoring fish health, inspecting nets, feed monitoring, water quality sampling and overall maintenance of aquaculture facilities.

Infrastructure Inspections: They are instrumental in inspecting sewer and wastewater pipelines, hydroelectric dams, underwater cables and other critical infrastructure components.

Scientific Exploration and Archaeology: Underwater drones explore archaeological sites, investigate underwater geology, conduct surveys, gather data, capture images, collect samples, conduct biological surveys, map ecosystems, observe marine life behaviour and recover artifacts from submerged locations.

These applications highlight the versatility of underwater drones, making them indispensable tools in commercial, scientific, environmental, and defence-related fields.

Advantages of underwater Drones

Underwater drones offer several significant advantages over traditional methods of underwater exploration and work, such as deploying human divers.

Enhanced Safety: One of the primary benefits of using underwater drones is the increased safety they offer. Operators can control the drones remotely from the safety and comfort of a control room, eliminating the risks associated with human diving. Drones can also increase the safety of accompanying divers by monitoring for potential hazards.

Extended Operational Duration: Unlike human divers who are limited by the duration of scuba tanks, underwater drones operate on battery power, allowing them to function for extended periods. This continuous operation capability is particularly beneficial for tasks like constant monitoring of work sites, extensive pipeline checks and thorough seabed or seafloor exploration.

Scalability and Customisation: Underwater drones can be scaled and customised according to the specific needs of a mission. ESCO offers commercial-grade underwater drones that are versatile and can be tailored to various applications without unnecessary expenditures on features that are not required. For instance, simpler tasks may only require a basic underwater drone camera, while more complex operations might necessitate a fully functional ROV.

Cost-Effectiveness: Deploying underwater drones is generally less expensive compared to the costs associated with human diving. This includes savings on insurance, contracting and operational expenses. Some drones can be deployed by a single individual from any boat, reducing the need for a large crew or team, thus considerably lowering operating costs.

Reduced Physical Limitations: Drones are not affected by human limitations such as oxygen consumption or physical strain. This allows them to perform tasks in environments that might be challenging or dangerous for human divers, such as deep or turbulent waters.

Consistent Performance: The best underwater drones are those that can reliably perform a range of missions. High-quality drones like those utilised by ESCO can fulfil diverse missions consistently and safely, effectively reducing the risks to human lives.

In summary, underwater drones provide enhanced safety, extended operational capabilities, scalability, cost-effectiveness and reduced physical limitations, making them an asset in various underwater operations. They enable more efficient and safer exploration and work in underwater environments, catering to a wide range of commercial, scientific and recreational needs.

The Enduring Presence and Impact of Underwater Drones

Over the past seven decades, underwater drones have transformed from novel inventions into indispensable tools in maritime operations. Their journey from the early days of development to their current state highlights their versatility and growing importance in various ocean-related tasks.

Today, underwater drones serve a multitude of roles, ranging from performing rescue missions to functioning as repair technicians. They have been pivotal in responding to undersea disasters and have even played roles in diplomatic incidents, showcasing their influence in international waters.

These drones have significantly advanced our understanding of the ocean. They have made contributions that are critical in areas such as marine research, underwater infrastructure maintenance and environmental monitoring. The data and insights provided by these drones have led to a deeper comprehension of marine ecosystems, which, in turn, has aided in conservation efforts and sustainable oceanic practices.

The advancement of underwater drone technology has also made the oceans more accessible and less mysterious. These drones have enabled exploration in depths and areas that were previously unreachable or too dangerous for human divers. From mapping uncharted territories to discovering hidden underwater treasures, their contributions have been invaluable.

In essence, underwater drones have cemented their place as a permanent and evolving fixture in ocean work. As technology continues to advance, these drones are expected to become even more sophisticated, further enhancing our ability to explore, understand and protect the world's oceans. Their ongoing development and deployment are a testament to their lasting impact and importance in the maritime world.

Choosing the appropriate underwater drone for your specific needs is crucial to the success of your maritime endeavours. If you're considering the use of an underwater drone for your project, ESCO is a reliable option to consider. They emphasise the importance of not risking financial resources and more importantly, lives, by offering technology that is at the forefront of changing how we interact with and understand the underwater world. By consulting with a knowledgeable and experienced provider like ESCO, you can ensure that you're utilising the best available technology for your specific requirements. This approach not only enhances the efficiency and effectiveness of your underwater operations but also aligns with the best practices for safety and technological innovation in the field.

Background to use of Underwater drones used for inspections.

UWILD, or Underwater Inspection in Lieu of Dry-Docking, represents a progressive and often more advantageous approach compared to traditional dry-docking methods for marine vessel inspection. This technique is increasingly recognised for its safety and efficiency benefits. Unlike dry-docking, where vessels must be taken out of the water for examination, UWILD inspections are conducted while the vessel remains submerged. This method not only reduces downtime but also minimises the disruption to normal vessel operations.

The core of a UWILD inspection is a thorough examination of the vessel's underwater structure. This includes the hull, propellers, rudders and other components that are typically submerged. These inspections are critical for identifying issues such as corrosion, biofouling, structural damage or any other abnormalities that could compromise the vessel's integrity or performance. Utilising advanced underwater technology and expert divers, UWILD inspections offer a detailed assessment of these areas, ensuring that the vessel meets all safety and operational standards.

Moreover, the adoption of UWILD can lead to significant cost savings for vessel operators. By eliminating the need for dry-docking, which often requires extensive planning and logistics, UWILD inspections can be more cost-effective and less time-consuming. Additionally, this method allows for more frequent and flexible inspections, facilitating early detection of potential issues and thereby reducing the likelihood of costly repairs or accidents in the future.

In summary, UWILD provides a safer, more efficient and cost-effective alternative for marine vessel inspections, aligning with modern industry needs while ensuring compliance with maritime safety regulations.

Payload Attachments and Accessories

While thickness testing may not be a standard requirement for all UWILD inspections, its relevance becomes critical when a surveyor identifies areas of concern. In such scenarios, precise measurements of material thickness are essential to assess the vessel's structural health. ESCO's advanced Remotely Operated Vehicles (ROVs) are specifically designed to support these detailed inspections with their modular capabilities, allowing for easy integration of various inspection tools.

One of the key features of ESCO’s ROVs is the option to incorporate sonar technology. This addition is particularly useful in environments where water clarity is compromised. The sonar equipment provides clear and accurate imaging, enabling surveyors to conduct thorough inspections even in turbid waters. This capability ensures that no structural anomalies go unnoticed, regardless of underwater visibility conditions.

Furthermore, the integration of the Cygnus thickness gauge with ESCO's ROVs marks a significant advancement in underwater inspection technology. This tool allows operators to precisely measure the thickness of ship hulls and internal compartments, providing vital data on the vessel’s structural integrity. Such measurements are crucial in determining the longevity and safety of the vessel, particularly in identifying areas susceptible to corrosion or wear.

Lastly, the addition of a laser scaler to ESCO’s ROVs enhances the accuracy of defect assessment. This tool is invaluable for estimating the dimensions of cracks, dents or other defects found during inspections. By providing precise measurements of these irregularities, the laser scaler aids in the accurate evaluation of the vessel's condition, facilitating informed decisions about necessary repairs or maintenance.

In essence, ESCO’s innovative ROV technology, equipped with these specialised tools, significantly elevates the effectiveness and accuracy of UWILD inspections. These advancements not only streamline the inspection process but also contribute to maintaining high standards of maritime safety and vessel integrity.

Introduction to Underwater Inspection in Lieu of Dry-Docking (UWILD): This section provides a comprehensive overview of UWILD, explaining what it entails and how it differs from traditional dry-docking methods. It aims to familiarise readers with the concept and process of UWILD, setting a foundational understanding for the rest of the article.
The Significance of UWILD Certification: Here, the focus shifts to the importance of obtaining UWILD certification. This part discusses the benefits and requirements of being certified, emphasising why it's crucial for organisations and surveyors involved in maritime inspections.
Hull Inspection and Maintenance Program (HIMP) & American Bureau of Shipping (ABS) Certification:This segment delves into the specifics of the HIMP program and its integration with ABS certification standards. It explains how these programs work in tandem to ensure the structural integrity and safety of vessels through regular inspections and

maintenance.

UWILD Inspection Checklist: An essential part of the article, this section outlines a detailed checklist for conducting UWILD inspections. It serves as a practical guide for surveyors and inspectors, covering the key areas and components that need to be assessed during an underwater inspection.
The Utility of UWILD Inspections: This portion addresses the question, "Why are UWILD Inspections Useful?" It highlights the advantages of UWILD over traditional inspection methods, including cost-effectiveness, efficiency, safety and minimal operational disruptions.
Conducting UWILD with Remotely Operated Vehicles (ROVs): The final section explores the use of ROVs in UWILD. It discusses how ROVs enhance the inspection process by providing detailed, accurate underwater assessments and how they are revolutionising the field of underwater inspection.

When undertaking a UWILD, it's essential to meticulously inspect certain key underwater areas of the vessel, as these are prone to wear and damage that could lead to significant operational issues. The inspection process typically involves a detailed examination of several critical components:

Stern Bearings and Rudder Bearings: These bearings play a pivotal role in the vessel's navigational capabilities. Inspectors look for signs of wear, corrosion or damage that could impede the vessel's manoeuvrability.
Sea Suctions and Sea Valves: These components are crucial for the vessel's water intake and discharge systems. Inspectors assess them for blockages, corrosion and structural integrity to ensure they function correctly and do not pose a flooding risk.

Shell Plating: The shell plating forms the outer skin of the vessel and is crucial for maintaining its watertight integrity. Inspectors examine the shell plating for cracks, corrosion and any deformations that could compromise the vessel's strength and safety.
Additional Areas of Inspection: Depending on the vessel's design and operational history, other areas might also require inspection. This could include the propeller, thrusters, hull coatings and any other underwater fittings or structures.

These inspections are not just about identifying current problems but also about foreseeing potential issues. Regular UWILD inspections can detect early signs of wear or damage, allowing for timely maintenance and repairs. This proactive approach is vital for prolonging the lifespan of the vessel, ensuring safety, and maintaining operational efficiency.

Furthermore, while UWILD inspections provide a non-intrusive and cost-effective alternative to dry-docking, it's important to note that not all vessels or situations will be suitable for UWILD. The decision to opt for UWILD should be made after a thorough assessment of the vessel's condition and considering any previous recommendations for repairs. In cases where significant repairs are required, especially to critical components like propellers or rudders, dry-docking might still be the necessary choice to ensure the vessel's safety and seaworthiness.

In addition to the initial visual examination during a UWILD, video documentation plays a crucial role. It must provide a clear and comprehensive view of various critical components of the vessel.

This includes:

Hull Markings: The condition of the hull markings is inspected to ensure the vessel's identification and draft marks are visible and accurate. This is important for compliance with maritime regulations and for assessing the vessel's loading condition.
Sea Chests, Inlets, and Discharges: These areas are vital for the vessel's water intake and outflow systems. The video must show their condition clearly to assess any blockages, corrosion or structural weaknesses.
Rudders, Pintles, and Propeller: The inspection focuses on these navigational and propulsion components, looking for signs of wear, damage or misalignment that could affect the vessel's manoeuvrability and efficiency.

When areas of corrosion or damage are identified, a more in-depth examination is necessary. This often involves internal inspections and may require thickness testing to evaluate the extent of material degradation. While not all UWILD inspections necessitate thickness testing, it becomes imperative when the surveyor identifies areas of concern. Thickness testing is essential for assessing the structural integrity of the vessel, especially in sections where corrosion or damage is evident. It helps determine whether repairs or replacements are needed, ensuring the vessel remains safe and seaworthy.

The comprehensive approach of UWILD inspections, combining visual assessments with detailed technical evaluations like thickness testing, ensures a thorough understanding of the vessel's condition. This is crucial not only for compliance with safety regulations but also for effective maintenance planning. By identifying potential issues early, vessel owners can undertake necessary repairs before they escalate into more serious problems, thus maintaining the vessel's operational readiness and prolonging its service life.

Certification and Training

The rigorous process of UWILD certification, as governed by classification societies like ABS, DNV-GL, Bureau Veritas, and Lloyd's Register, plays a pivotal role in maintaining maritime safety and operational standards. The evolution of these classifications from mere technical assessments for marine insurers to comprehensive, unbiased evaluations by third-party organisations underscores their significance in the maritime industry. These societies operate with a key principle of maintaining neutrality and credibility, as their primary objective is not commercial gain but the overall safety and integrity of the maritime sector.

For vessel owners and stakeholders, obtaining certification from these societies is not just a regulatory requirement; it's a commitment to safety, reliability, and sustainability. Certification ensures that vessels are not only structurally sound but also operationally efficient and environmentally compliant. It acts as a testament to the vessel's seaworthiness, providing assurance to owners, employees, insurers and all parties relying on the vessel’s operations.

Particularly for large vessels, regular inspections and certifications are crucial. The rigorous inspection every five years, as mandated by bodies like ABS, involves a thorough assessment of the vessel’s structural and operational integrity. This comprehensive inspection is instrumental in identifying any potential issues that could compromise safety or efficiency.

Moreover, the Hull Inspection and Maintenance Program (HIMP), as utilised by ABS, exemplifies the proactive approach to vessel maintenance. HIMP not only facilitates the process of maintaining certification but also aids in reclassification in cases where a vessel's certification has been suspended. This program is integral to ensuring the long-term sustainability of the vessel, emphasising continuous monitoring and maintenance over periodic checks.

For Mobile Offshore Drilling Units (MODUs), the guidelines mirror those for maritime vessels, underscoring the universal importance of these standards across various maritime assets. The overarching aim of these certifications and inspections is to safeguard not only the physical asset but also the lives dependent on its safe operation and the environmental impact of its functioning.

In conclusion, the process of obtaining and maintaining UWILD certification, as governed by these classification societies, is fundamental to the maritime and offshore drilling industries. It represents a holistic approach to ensuring the safety, efficiency and longevity of vessels and offshore units, reflecting a commitment to excellence in maritime operations.

The HIMP program, tailored specifically for ABS-classed vessels, represents a structured and systematic approach to hull inspection and maintenance. This program underscores the commitment of the American Bureau of Shipping (ABS) to uphold the highest standards of vessel safety and operational integrity. To participate in this program, vessels must not only be ABS certified but also meet several key prerequisites. These include having an ABS certified inspector for the hull and the necessary HIMP software installed on the vessel’s computers. Additionally, a comprehensive review of all previous documentation pertaining to the vessel is conducted by an ABS surveyor to ensure compliance and to establish a baseline for ongoing inspections.

During the HIMP inspections, an ABS certified inspector, typically from the vessel’s owning company, conducts both above-board and underwater inspections. An ABS surveyor is also present during these inspections to verify the process and findings. The surveyor’s role is crucial, as they are responsible for ensuring that all critical aspects of the vessel, including the hull, engines, ballast tanks and maintenance equipment, are in optimal operating condition. This collaborative inspection approach ensures that any potential issues are identified and addressed promptly.

If, during an inspection, any area of the vessel is suspected of needing repair, a unique aspect of the HIMP program comes into play. The vessel may be placed on temporary suspension, allowing for necessary repairs to be carried out without the vessel losing its overall certification. Once the repairs are completed, the inspector and surveyor reassess the vessel to determine if it meets the required safety standards to resume operation.

The HIMP program mandates regular inspections at specific intervals: annual, intermediate (every three years), and comprehensive (every five years). These intervals are strategically planned to provide a continuous assessment of the vessel's condition, ensuring that any emerging issues are addressed promptly and effectively. The Annual Inspection is a general review of the vessel's condition, while the Intermediate and 5-Year Inspection Intervals involve more in-depth evaluations, focusing on different aspects of the vessel's structure and systems.

In essence, the HIMP program and ABS certification are not just regulatory requirements; they represent a proactive and thorough approach to maritime safety and vessel maintenance. By adhering to these standards, vessel owners and operators demonstrate their dedication to maintaining the highest levels of safety, thus safeguarding their assets, crew and the environment.

Special Periodic Surveys | Periodic Inspections

The Annual Inspection of a vessel is a critical component of maintaining maritime safety and operational integrity. During this inspection, several key areas of the vessel are thoroughly examined and reported to the surveyor. The focus of these inspections includes:

Suspect or Critical Structural Locations: Areas previously identified as potentially problematic or showing signs of wear, corrosion or damage are given priority. This ensures that any ongoing issues are monitored and addressed promptly.
Deck Area: The condition of the deck is assessed for structural integrity, safety and functionality. This includes checking for any signs of wear, corrosion, or damage.
Ballast Tanks (Including Cargo Tanks, Peak Tanks, etc.): The structural and coating condition of all ballast tanks is scrutinised. These inspections are vital for ensuring the integrity of the tanks and preventing leakage or contamination.
Hatch Covers and Access Hatches with Closing Appliances: These are checked for proper operation and sealing to ensure they are watertight and secure, preventing water ingress.
Deck Equipment, Fittings, Helicopter Landing Pads: This includes examining all equipment and fittings on the deck for operational integrity and safety, including specialised structures like helicopter landing pads.
Piping and Supports: The inspections cover all accessible piping systems and their supports, checking for signs of corrosion, leakage or any other issues that might compromise their functionality or safety.
Superstructures and Deckhouses: These are assessed for structural integrity and condition, ensuring they can withstand the stresses of maritime operations.
Shell Plating Above the Waterline: This area is inspected for any signs of damage, corrosion or other defects that could affect the vessel's structural integrity.
Cargo Holds, Tanks, and Spaces: The condition of these areas is crucial for safe and efficient cargo operations. They are inspected for structural soundness and operational integrity.
Voids and Cofferdams: These are inspected to ensure they are structurally sound and not compromised in any way.
Pipe Ducts and Tunnels: The inspection ensures that these areas are clear of obstructions and structurally sound.
Longitudinal Box Girders and Cross Deck Box Beams: These structural elements are vital for the vessel's strength and are carefully examined for any signs of stress or wear.
Sea Connections and Overboard Discharges: These are inspected to ensure they are functioning correctly and not posing any environmental or operational risks.

The Annual Inspection is comprehensive, covering every aspect of the vessel to ensure it remains safe, efficient and compliant with maritime safety regulations. It is an essential practice for early detection of potential issues, allowing for timely maintenance and repairs, thereby prolonging the vessel's service life and therefore, ensuring the safety of its crew and the environment.

Intermediate Inspections (Every 3 Years):

Intermediate Inspections, conducted triennially, encompass all areas included in the Annual Survey and further extend to additional critical components:

External Shell Plating Below the Waterline: This area is scrutinised for integrity and condition. Inspectors look for signs of corrosion, damage or fouling that could impact the vessel's performance or safety.
Internal Condition of Boundary Plating, Internal Bulkheads, Framing, Girders: The structural integrity of these internal components is vital for the vessel's overall stability and safety. Inspectors assess them for corrosion, deformation or any other signs of wear.

Internal Condition of All Tanks Containing Bilge or Oily Water: These tanks are inspected for leaks, corrosion, and proper functioning of their containment and discharge systems. Ensuring the integrity of these tanks is crucial to prevent pollution and maintain operational efficiency.

Intensive Inspections (Every 5 Years):

The 5 Year Inspection is the most comprehensive, incorporating all elements from the Annual and Intermediate Surveys, with an added focus on the vessel's entire tank system:

All Tanks Including Fresh Water Tanks, Fuel Tanks, Diesel Tanks, Lube Oil Tanks, etc.: This extensive inspection covers every tank on the vessel. Inspectors examine the tanks for structural integrity, proper functioning and cleanliness. This includes assessing for corrosion, leaks and ensuring that the tanks are free from contaminants.
Additional Structural and Safety Assessments: Given the comprehensive nature of the 5 Year Inspection, it may also include a more in-depth analysis of the vessel's overall structural integrity, safety systems and operational readiness.

The Intermediate and 5 Year Inspections are designed to be progressively more thorough, ensuring that any potential issues are identified and addressed. These inspections are critical for maintaining the long-term safety, efficiency and regulatory compliance of the vessel. By adhering to these rigorous inspection schedules, vessel operators can ensure that their assets are not only compliant with maritime regulations but are also operating at their highest possible standards, thus safeguarding the vessel, its crew, and the environment.

These regular and detailed inspections play a pivotal role in the lifecycle management of maritime assets, ensuring their continued suitability for service and contributing to the overall safety and reliability of the maritime industry.

UWILD Inspection Checklist: Key Elements and Procedures

General Hull Inspection: The hull's structural integrity is paramount. Inspectors must meticulously note any defects, discolouration’s, dents, scratches or imperfections. Advanced technologies like sonar add-ons enhance the detection of minute cracks that might be invisible to the naked eye.
Paint Condition: Efficient water navigation and fuel economy are significantly influenced by the vessel's paint condition. Smooth, well-maintained paint contributes to vessel efficiency. ROV inspections help assess paint quality and inform maintenance schedules.
Fouling: Hull fouling can impact speed, fuel efficiency, and even pose risks to crew, cargo and marine life. Regular ROV inspections are essential for monitoring fouling and determining optimal cleaning schedules.
Hatch Covers: These covers must be watertight to protect cargo and prevent ocean water from causing internal structural damage through corrosion. Inspections should focus on identifying any structural damage.
Ports: Inspections ensure the watertight integrity of all ports below the freeboard deck. Freeing ports should be examined for corrosion-free movement of shutters, pins and hinges.
Anchors: Careful inspection of anchors and chains is vital for detecting wear, damage, or weakness. This includes a thorough visual assessment of shackles, swivels and the anchor itself.
Propellers (Props):Blades: Inspect for dings, dents, or bends to ensure safe operation.Shafts: Check shafts for structural integrity and straightness to avoid unsteadiness.Hubs: Regular inspections of propeller hubs are crucial to confirm their strength and effectiveness.Seals: Shaft seals must be in good condition to ensure proper propeller function.
Stern Bearings: Inspect oil-lubricated bearings for intact seal assemblies and acceptable clearance or wear. Check for oil loss and seawater contamination. Wood and rubber bearings should be examined for clearance through the rope guard.
Rudder Bearings: Assess the condition and clearance of rudder bearings, including the integrity of pintle and gudgeon assemblies. Clearance verification may be waived if the surveyor is satisfied with the physical condition and securing arrangements, considering the vessel’s operating history and onboard testing.
Sea Suctions and Valves: Ensure Sea suction openings are clear and in good condition. Examine sea valves and their attachment to sea chests, including expansion pieces in seawater cooling and circulating systems.
Shell Plating: Inspect the majority of the vessel's surface area, focusing on areas where seals are made or surfaces join. Start with above-waterline plating and appendages, then proceed underwater.
Inspection Recording and Communication: Ensure two-way communication between the inspector and surveyor throughout the inspection. All inspection phases, from the start of the diver or ROV inspection to its conclusion, must be thoroughly documented.

This comprehensive checklist is critical in ensuring the thorough and effective inspection of a vessel's submerged areas and components. By adhering to this detailed protocol, operators can maintain their vessels in optimal condition, ensuring safety, efficiency and regulatory compliance in maritime operations.

Advantages of UWILD Inspections:

Cost and Time Efficiency: Dry docking is not only expensive but also time-consuming. It involves extensive logistics, from transporting the vessel to a dry dock facility to the actual maintenance and repair processes. UWILD inspections, on the other hand, significantly reduce these costs and time commitments by eliminating the need to remove the vessel from its operational environment.
Safety and Convenience: The process of dry docking, especially the transition of setting the vessel on keel blocks, poses risks of damage and injury. UWILD inspections mitigate these risks as they are conducted with the vessel in its natural, buoyant state.
Reduced Preparation and Downtime: Dry docking necessitates extensive preparatory work, including the removal of equipment and cargo. This preparation is not required for UWILD, allowing for less disruption to the vessel's operations and schedules.
Comprehensive Hull and Tank Inspections: Inspecting submerged parts like the hull and interior of liquid-filled tanks is challenging. UWILD inspections offer a practical solution, allowing for thorough examination of these critical areas without the need for dry docking.
Adaptability Across Vessel Types: While the frequency of dry docking varies based on the type of vessel and its use, UWILD provides a flexible and efficient alternative suitable for commercial vessels, naval ships and pleasure crafts alike.

Role of ROVs in UWILD:

The incorporation of Remotely Operated Vehicles (ROVs) in UWILD inspections revolutionises the process by enhancing safety and efficiency:

Enhanced Safety: Traditional UWILD inspections, often conducted by divers, pose risks due to the challenging underwater environment. ROVs eliminate the need for human divers, thus significantly reducing the risk of accidents or injuries.
Improved Inspection Quality: ROVs equipped with advanced imaging and sonar technologies provide high-quality, detailed views of the vessel's submerged parts. This leads to more accurate and comprehensive inspections.
Accessibility and Coverage: ROVs can access areas that might be challenging or risky for human divers, ensuring a more thorough inspection. They can manoeuvre around the entire submerged portion of the vessel, including hard-to-reach areas.
Real-Time Monitoring and Documentation: With ROVs, inspections can be monitored in real-time by the surveyor and detailed documentation can be recorded for review and compliance purposes.
Efficiency and Cost-Effectiveness: The use of ROVs can significantly reduce the time and cost associated with underwater inspections, making UWILD a more efficient alternative to dry docking.

In summary, UWILD inspections, particularly those utilising ROVs, offer a safer, more efficient and cost-effective alternative to traditional dry docking. They provide comprehensive and detailed inspections while minimising the risks and operational disruptions associated with dry docking, thereby benefiting vessel owners, operators, and the maritime industry.

Operational Advantages of Using ROVs in UWILD:

Enhanced Safety and Efficiency: ROVs provide a safe and efficient alternative to traditional diver-based inspections. By utilising ROVs, operators can conduct thorough inspections without exposing human divers to underwater hazards. This approach significantly reduces the risks associated with underwater inspections.
User-Friendly Control and Quick Deployment: ROVs are now designed for ease of use with handheld LCD screen controllers, making them accessible even to those with limited ROV operating experience. Their quick deployment capability and battery-operated design ensure that inspections can be conducted promptly, minimising downtime.
Advanced Inspection Capabilities: The modular design of these ROVs allows for the integration of various tools to enhance inspection quality. Options like sonar imaging enable clear visibility in turbid waters, while integrated tools like the Cygnus thickness gauge assist in assessing the structural integrity of a vessel's hull and compartments. The addition of a laser scaler aids in accurately measuring the size of any detected damage, such as cracks or dents.
Cost-Effectiveness and Timesaving: ROVs streamline the inspection process, reducing the need for multiple personnel and cutting down on the time and costs associated with traditional inspection methods. This efficiency is crucial for regular maintenance and compliance with regulatory standards.

Pre-Inspection Advantages: Having an ROV on hand allows for preliminary inspections before the official survey. This pre-inspection can identify potential issues, allowing for pre-emptive corrective measures. Addressing issues before the formal inspection can prevent costly classification suspensions or removals, saving significant time and resources.
Acceptance of Historical Data in Surveys: Surveyors may accept time-stamped data from ROV inspections as part of the evaluation process. This historical data can be crucial in demonstrating consistent maintenance and compliance over time.
Flexibility in Inspection Planning: The ability to conduct unscheduled, quick inspections or rehearsals provides vessel owners with greater flexibility and control over maintenance schedules. This proactive approach to vessel management can prevent last-minute discoveries and ensure continuous compliance.
Expert Support and Customisation: ESCO's team of experts offers support and guidance in choosing the right ROV setup. Operators can get customised solutions tailored to their specific inspection needs, ensuring they have the most effective tools for their UWILD requirements.

In conclusion, the use of ROVs in UWILD inspections presents a modern, innovative solution that enhances safety, efficiency and cost-effectiveness. These advanced vehicles not only streamline the inspection process but also provide operators with greater control and flexibility in maintaining their vessels, ultimately contributing to improved maritime safety standards and operational excellence.

1. Document Overview

1.1. Purpose

The purpose of this standard is to ensure Quality, Health, Safety and Environmental (QHSE) requirements are described and managed in accordance with ESCO Policy and International Standards. The QHSE function should be a support provider to the various departments within ESCO with the added responsibility for ensuring that actions are carried out at pre-determined periods throughout the year.

1.2. Scope

This policy applies to all employees regardless of the nature of their contract, which is: including contracts which are permanent, fixed term, casual, temporary, and includes temporary staff from agencies, and staff supplied by Labour brokers; contractors and sub-contractors, and any other persons who assists in the carrying on of the business.

Services and Products include:

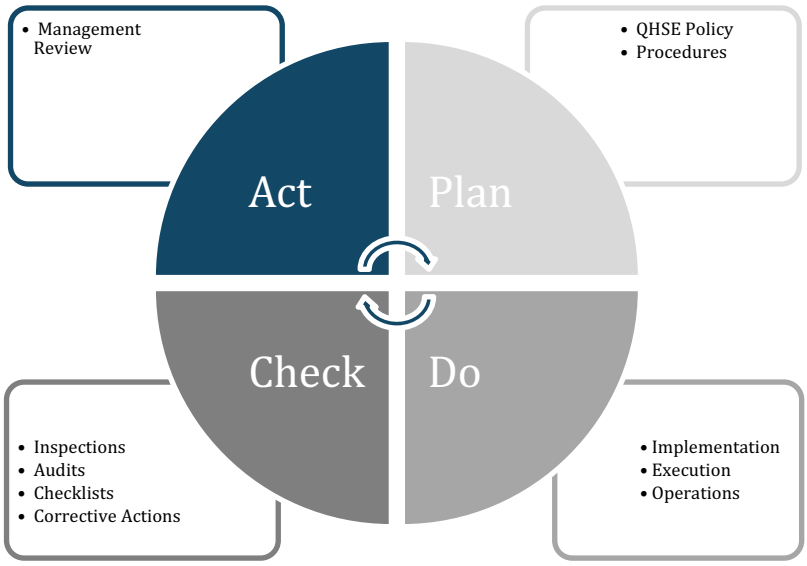
- Diving Operations Air, Nitrox, Mixed Gas and Saturation Diving
- Remote Operated Systems including Remote Operated Vehicles, Autonomous underwater Vehicles and Underwater Drone Services.
- Non-Destructive Testing and inspection services include access via Rope access and Aerial Drone Inspection
- Hyperbaric Welding and specialist subsea inspection and repair solutions
- Marine Vessel operations and repair.
- Subsea Engineering

The continuous improvement and compliance with all legislation that covers ESCO’s activities is fundamental to our safe operations and to sustainable profitability. Safe operations mean that safety has equal status and priority with all other key business objectives and that safety can never be sacrificed for expediency or profit.

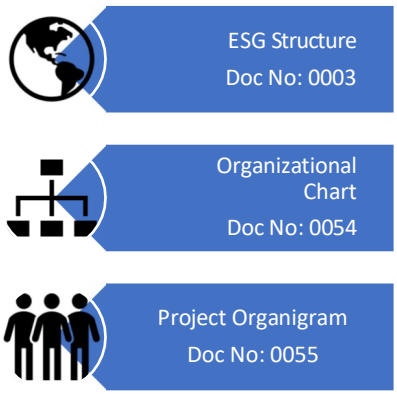
This QHSE standard references the legal and policy obligations that ESCO must implement and maintain to ensure an effective QHSE Management System. It also details the responsibilities of Managers, Supervisors, and the employees/contractors and subcontractors in complying with ESCO’s QHSE Policy and provides the basis for continual improvement in ESCO’s Quality, Health, Safety and Environmental performance.

1.3. QHSE Management Methodology

ESCO QHSE methodology is based on the PDCA "PLAN-DO-CHECK-ACT" methodology described below:



PLAN: establish the objectives and processes necessary to deliver results in accordance with the QHSE Policy
DO: implement the processes
CHECK: monitor and measure the processes against the QHSE Policy, objectives, legal and otherrequirements and report these results
ACT: take actions to continually improve QHSE performance



1.4. Organization

ESCO's organizational structure defines its processes, communication routings and responsibility.

The ESG Structure Standard Doc No: 0003 Clearly defines the organizational arrangements.

2. QHSE Policy

ESCO QHSE Policy Statement is the overriding QHSE Policy applicable across all business units and work sites. The primary purpose of the QHSE Policy Statement is to communicate ESCO's commitment to protecting the health and safetyof all employees and to minimizing any adverse effects on the environment.
The QHSE Policy provides the structure for establishing specific goals and objectives and provides direction for continual improvement in Quality, Health, Safety and Environmental performance. Copies of the QHSE Policy, and all other Policy Statements, are available on ESCO Intranet site, notice boards and discussed as part of the general induction process for allnew employees.

The QHSE Policy Statement is Doc No: 0072.

2.1. QHSE Principals

2.1.1. QHSE Common Principals

The following principles provide a common foundation across ESCO on which our QHSE and Security policies are built:

- We are first and foremost a team. A team that looks out for each other's Health and Welfare.
- We work according to applicable laws, codes, and regulations.
- We comply with approved procedures, rules, and instructions.
- We provide our people with all necessary information, instruction, and supervision.
- Our people are trained and competent for the tasks they are expected to complete.
- We provide Safe Systems of Work facilitated by efficient planning, robust risk assessment and effective management of change.
- We report all incidents and investigate all accidents, we ensure remedial actions assigned and completed.
- Clear objectives are set, and progress is regularly reviewed.
- Documentation is reviewed in accordance with a scheduled program or after a significant change.

2.1.2. Quality Core Principals

ESCO is absolutely committed to providing our clients with a quality product and exceptional reliable service.

Quality principles and what we will do:

- Promote and maintain a positive quality culture.
- Assess and manage risks so that we can ensure a repeatable and quality service and product delivery.
- Take account of quality issues in all aspects of our operations and planningKey points
- Refer to Works Instructions / Method Statements when executing work scopes.
- Document our Lessons Learnt and industry norms to achieve Customer Satisfaction

2.1.3. Health Core Principals

We manage business activities to keep health risks to a minimum. We provide a healthy working environment with the appropriate level of surveillance and support. We provide expert medical support to our people to ensure that appropriate health examinations and preventative medicines are provided. We promote good occupational health by ensuring compliance with regulatory requirements and by providing clear guidance and information through our health principles.

Health principles and what we will do:

- Work according to applicable health laws, codes, and regulations
- Promote and maintain a positive health culture.
- Provide and maintain healthy working conditions.
- Consult our people on matters affecting their health.
- Assess and control the health risks arising from our work activities.
- Strive to prevent work-related ill health.
- Make appropriate medical care available at all worksites.
- Establish emergency response plans at all worksites.

2.1.4. Safety Core Principals

We operate a risk management approach to our activities whereby we identify hazards, assess the associated risks, and then work to eliminate the hazards or reduce the risks to a tolerable level. Everyone who observes an unsafe situation or who feels it is not safe to continue with a task has a duty to intervene and stop the job. Such intervention will always be supported by ESCO management. We are convinced that encouraging safe behavior and highlighting the importance of personal safety as a way of life will help to create a work environment where our people are safe and secure. Our safety culture and management are supported by the subsea safety principles which includes all safety training.

Safety principles and what we will do:

- We will work according to applicable safety laws, codes, and regulations.
- Promote and maintain a positive safety culture through the application of the IOGP Safety Rules
- Review every incident and implement actions to prevent future occurrence.
- Assess and control any safety risks arising from our work activities.
- Consult our people on matters affecting their safety.
- Provide and maintain safe work equipment and places of work.
- Control, use and store hazardous substances safely.
- Design the risk out of all work scopes as a first priority.

2.1.5. **Environmental Core Principals**

We always conduct our business in a way that considers the environment, and which aims to keep any negative impact to a minimum. This policy is managed by close attention to achieving regulatory compliance and continually improving our environmental performance through careful selection of consumables and working practices designed to reduce waste, energy consumption and emissions. Awareness of the impact that our activities may have on the environment and the management of measures to control such impacts is encouraged through our environmental principles.

Environmental principles and what we will do:

- We will work according to applicable environmental laws, conventions, protocols, and regulations.
- Promote and maintain a positive environmental culture.
- Manage our activities to eliminate or reduce any potential negative environmental impact.
- Consider sustainability an important element in the way we do business.
- Use planning, design, and risk assessment to avoid and reduce environmental risk; environmental aspects and registered work are assessed on worksites and projects.

2.1.6. **Security Core Principals**

ESCO is absolutely committed to providing our people with secure arrangements for their work environment and for away from home activities such as travel and business trips.

Security principles and what we will do:

- Promote and maintain a positive security culture.
- Assess and manage threats so that we can protect our people and assets.
- Take account of security issues in all aspects of our operations and planningKey points
- Refer to our appointed travel agencies travel packs when travelling overseas.
- Follow all travel instructions and local rules.
- Keep your possessions close to you.
- Do not attract attention to yourself.
- Always have a contact list in country

2.2. QHSE Function

ESCO QHSE organizational function will pursue the following QHSE areas of responsibility including Leadership, Operational and External:

Leadership	Operational	External
• Ensure HSE resources meet business needs in projects, supply chain and services. • Devise effective & innovative Group operating standards and guidelines to define the HSE management system. • Develop and sustain HSE Climate and leadership engagement. • Foster cross-collaboration and information sharing within the organization.	• Performance monitoring and process improvement, throughour ESCO operations • Identify opportunities for continuous improvement. Provide advice and harmonization for standards implementation. • Conduct regular audits toensure conformity. • Lead investigation in case ofincidents. • Ensure lessons-learnt are identified and implemented.	• Represent organization interests towards professionalassociations and authorities.

2.3. Objectives and programs

QHSE Objectives are set during annual QHSE Workshop meetings. The approved QHSE objectives are rolled-out duringthe Management Review meetings. To ensure that the objectives are achieved, regular review meetings are held to confirm progress and, where necessary, objectives can be adjusted.

3. ESCO QHSE Management System

ESCO QHSE management system relies on the following controls to ensure compliance and effectiveness.

3.1. QHSE Management Controls

3.1.1. Control of Documents

ESCO has an established Document Control system within the CRMS management system, where all documents, records and forms are controlled.

It ensures:

- The current versions of relevant documents are easily located, periodically reviewed and revised as necessary and approved by authorized personnel.

- Each procedure (form, record) identifies the author and the person(s) responsible for review and approval of the document.
- All updates and amendments are carried out in a controlled manner with the document reissued following these changes.
- All update / amendment comments are submitted and tracked electronically via the CRMS management system.
- Obsolete documents are withdrawn from the system on reissue of an updated document.
- Documents are available to all ESCO employees, are legible, dated, and identifiable by use of a unique document number.
- The Health & Safety Management system operated by ESCO consists of this standard, supported by a suite of health and safety procedures / process maps / forms all maintained on the CRMS management system.
- All QHSE management procedures are prepared by the assigned manager in consultation with the relevant internal discipline / technical authorities.
- These procedures, and associated forms and records, are controlled via the CRMS management system.

3.1.2. Control of Records

ESCO maintains records, associated with demonstrating compliance with the latest QHSE International Standard, in a legible, identifiable, and traceable manner. These records will be stored in such a way as to prevent against accidental destruction, damage, or loss.

Examples of such records include job completion records, quality control plans and certificates, training records, audit reports, incident investigations and risk assessments. These records are retained in accordance with either legal or contractual requirements.

The following table details some of the types of records maintained by ESCO and their location:

RECORD TYPE	HELD BY	LOCATION
Training records	HR Department	CRMS
Accident & Incident Reports	QHSE Department	CRMS
Risk Assessments	QHSE Department & Project Teams	CRMS
COSHH Substance Assessments	QHSE Department & Project Teams	CRMS and Specific Vessel/Base
Audit Reports	QHSE Department	CRMS
Emergency Drills	Offshore Management Team	CRMS and Specific Vessel / Base
Maintenance Records	Offshore Management Team	Vessel Specific
	Base & Equipment Supervisors	CRMS

3.1.3. Management of Change

The requirement for effective Management of Change is embedded within all our operations. ESCO recognizes the risks inherent with poorly controlled change and has a documented procedure, to ensure that any requirement for change during offshore operations is risk accessed and communicated effectively to all involved.
Training has been provided to ensure that the Management of Change process is properly understood and utilized by the workforce.

See Doc No: 0147 for more information.

3.1.4. Operational Control

Procedures and work instructions have been developed to manage and control health and safety risks associated with ESCO operations. Project specific QHSE documents are developed, which include Project QHSE Plans and work-scope specificOperations Reviews and HIRA documents. Any additional risks captured as part of the Operations Review and / or HIRAmeeting will result in additional control measures being identified and implemented.
ESCO operates a Safe System of Work (SSOW) on all worksites and Vessels. This SSOW includes a detailed Permit to Work (PTW) system to control all potentially hazardous work activities. An electronic Planned Maintenance System (PMS) is also in place across ESCO. This system is utilized to ensure that all items of plant and equipment, utilized by the Vesselsand worksites, is fit for purpose.

3.1.5. Legal and other requirements

ESCO, in common with industry at large, operates within a framework of QHSE legislation, standards, procedures and instructions. Arrangements are in place to ensure that legal requirements are identified and that those relevant standards are available to personnel who need to use them.

These include, for example:

- QHSE Legal Register
- An online technical library
- Specialist QHSE resources
- Membership of professional bodies and industry associations e.g.: IMCA
- Internal and External training programs.
- A system of formal correspondence and communication for QHSE matters.

Mechanisms exist within the management system, including audits, to provide for review of deviations from accepted standards. Approved deviations must achieve equivalent, or better, QHSE protection.

3.2. QHSE Resources, Roles, and Responsibility

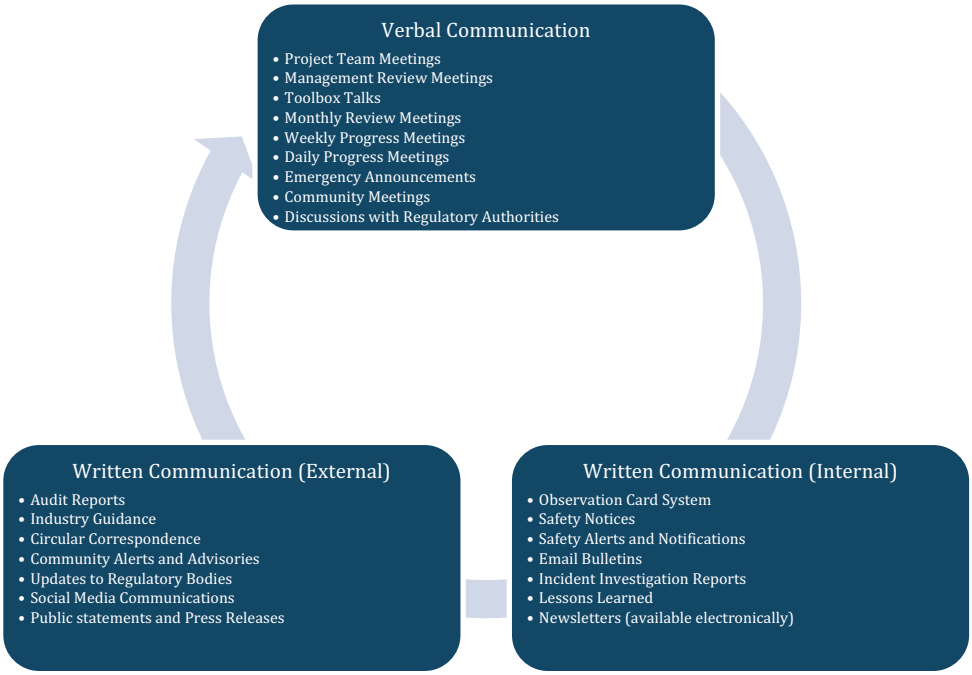
3.2.1. Participation and Consultation

ESCO recognizes the importance of employee participation and consultation on health and safety issues. On all ESCO vessels and worksites, Safety Committees are established with the primary objective to promote co-operation on matters affecting occupational health and safety and protection of the environment. All meetings will be fully documented, with minutes being copied to Senior Management as soon as available.
During the lifecycle of ESCO projects, where it is operationally possible, offshore personnel are involved in onshore engineering phases and the development of methodologies and procedures. Offshore personnel are also invited to attend Operations Reviews and HIRA meetings to ensure they have an input into the work-scope planning, and so that the Project Management Team can learn from their experiences.

3.2.2. Communication, Participation and Consultation

ESCO recognizes that effective QHSE communication, upwards and downwards through the organization, is vital to promoting an open, fair, and just safety culture across ESCO where employees feel encouraged to report safety concerns totheir supervisors / line managers / QHSE department.
ESCO has implemented an innovation program to support a high-performance culture. This is outlined in detail in ESCO standard Doc no: 0529.

Information is communicated via several formal and informal routes, for example:

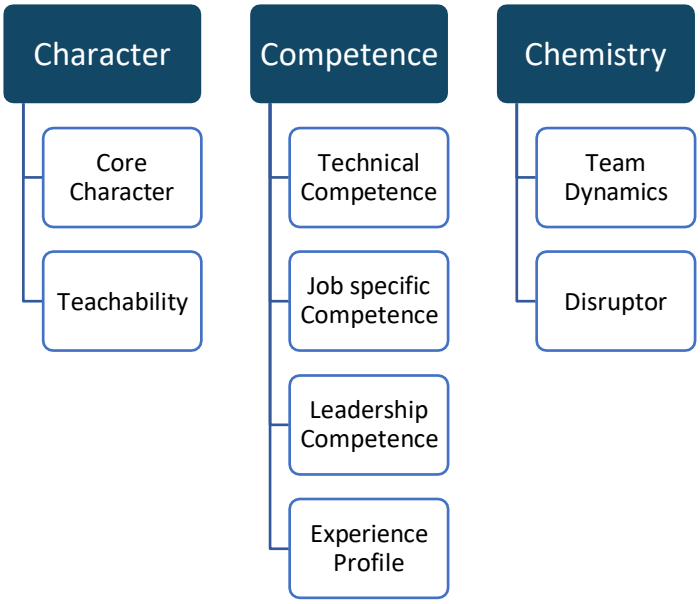


Feedback to the QHSE Department on health & safety issues can come through any of the above routes, through verbal reports or through use of the Observation Card system.

Routines have already been established within the organization with regards to handling external communications,including:

3.2.3. Competence, Training and Awareness

ESCO will employ using the following three criteria, namely the Three C's:



The assessment will ensure that the personnel meet the standards required to achieve the Health, Safety and Environmental objectives of ESCO. ESCO operates a Competence Assurance program for onshore personnel to allow employees the opportunities to provide ongoing evidence of their competence.

ESCO has in place a Certification, Competence Assessment Standard (Doc No: 0037) to guide employees through the competency process.

Comprehensive Training Matrices for ESCO's offshore project and marine personnel are held in the respective CRMS Management Systems. These identify the training requirements (legislative and ESCO required) for personnel relative to their current, or intended position.

Safety Awareness programs and initiatives will be delivered across the business and / or in conjunction with ongoing Project activities / worksites. The goal is to influence behaviors, improve safety culture and to motivate personnel to help prevent accidents and incidents.

The key Safety Awareness programs are:

- **Think TWICE (**Think What I Could Affect**) -** ESCO Safety Management Process designed to improve ESCO culture across the business in all things. To promote a culture of planning, checking, personal accountability and changing for the better.
- **Our Non Negotiables (N-N)** ESCO has a set of "QHSE Actions" that are Non-Negotiable.
- **Pledge to I (P2^{I}) -** All managers will pledge individual "iSafety Pledges".

3.2.4. QHSE Manager

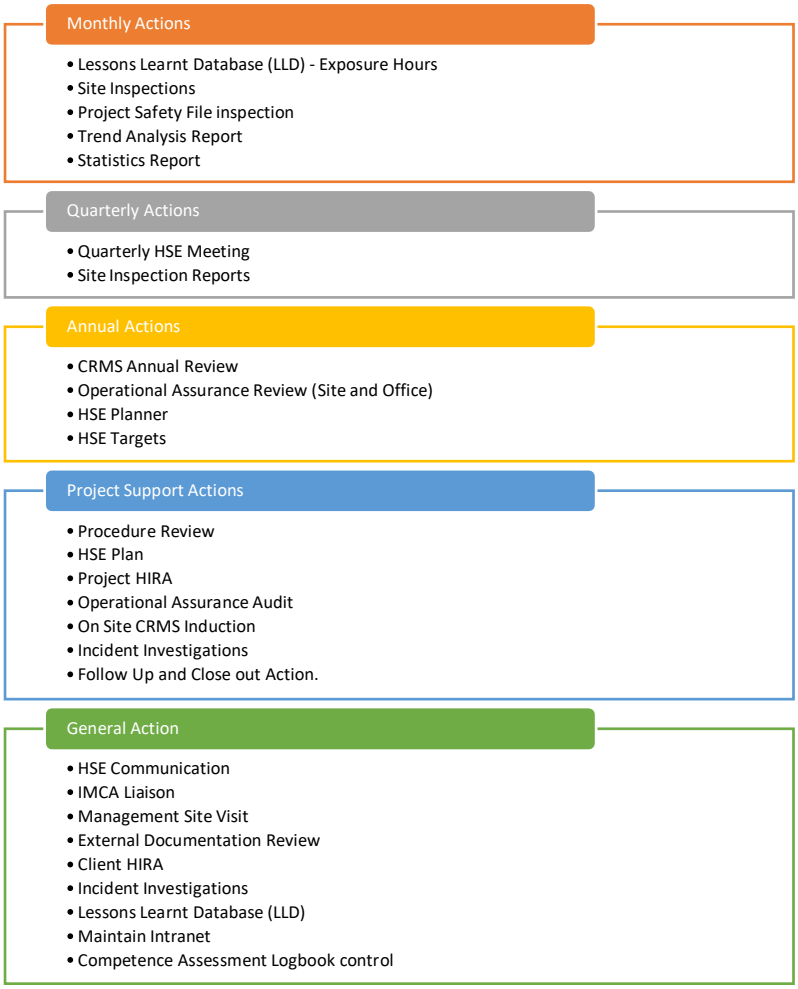
The QHSE Manager is responsible for ensuring that the periodic actions listed in this procedure are completed as and when required and that the relevant project support is given. It is the responsibility of all ESCO personnel to ensure that QHSE policies and standards are always complied with.
Safety is everyone's responsibility, but especially that of Management. Leadership and commitment demonstrated by Managers and Supervisors to the health and safety process is vital to its success.

ESCO achieves this through:

- Availability of clearly documented Organization Charts
- Training Managers and Supervisors to understand and implement safe systems of work.
- Establishing individual responsibilities for safety and environmental activities and ensuring they are understood and documented.
- Maintaining access to specialist QHSE support at all levels of the organization

3.2.5. QHSE Department Responsibilities

The following list outlines the QHSE responsibilities within the organization.



3.2.6. Monthly Actions by QHSE Department

The QHSE department's monthly actions are defined below:

3.2.6.1. QHSE Statistics and Trending Reporting

Monthly QHSE Statistics are gathered from each worksite in accordance with the Monitoring, Reporting, and Improvement standard (Doc No: 0056). All information from site must be submitted to the QHSE Team by the 02nd of the Month. Oncethe statistics have been received from all the operational work sites they are reviewed and added together to form a combined total for all ESCO worksites. The individual exposure hours (Manhours) which are reported by each site are captured onto the Database. The statistical data from the combined form is used to update the QHSE Statistics Graphs which are posted on notice boards.

3.2.6.2. Site Inspections

A monthly site inspection must be carried out in accordance with the Monitoring, Reporting and Improvement Standard (Doc No: 0056). The QHSE Manager will nominate a different person to conduct the site inspection each month. The findings of the site inspection are posted on notice boards and findings are only removed once the responsible parties have closed out their respective actions.

3.2.7. Quarterly Actions by QHSE Department

The QHSE departments quarterly actions are defined below:

3.2.7.1. QHSE Meetings

A quarterly QHSE meeting must be held in accordance with the Monitoring, Reporting, and Improvement standard. A representative from each department and all project managers should attend. A number of site supervisors from previous projects may also be invited to attend. Minutes from the meeting are to be endorsed by the representative Manager or Director and posted on notice boards as well as sent to all operational sites along with the QHSE Statistics Graphs and any other relevant information from the meeting.

3.2.8. Annual Actions by QHSE Department

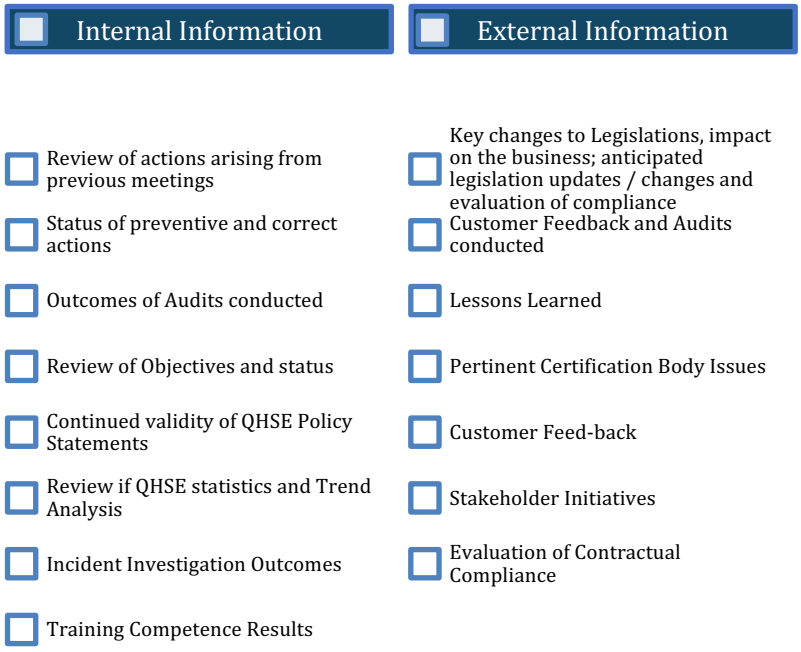
3.2.8.1. QHSE Annual Planner

An annual QHSE Planner is created on an annual basis by the QHSE Manager on the QHSE Planner Form (Doc No: 0305) This planner should indicate when all QHSE events (meetings, visits, internal audits, etc) are to take place.

3.2.8.2. ESCO Risk Management System Review

Levels two through seven of ESCO Risk Management System are to be reviewed in accordance with the Document Control Standard (Doc No: 0006) on an annual basis. The QHSE Manager is responsible for recording this process.

The review meeting agenda shall include, but is not limited to, the following:



3.2.8.3. **Regional Office Operational Assurance Audit**

The QHSE Manager is to carry out an annual audit on the regional office / remote offshore site in accordance with the Operational Assurance Audit Procedure (Doc No: 0208). It is the Regional Manager's responsibility to ensure that the findings and recommendations from the audit are closed out and feedback is given to the QHSE Manager on a quarterly basis.

3.2.8.4. **Internal Audit**

At the beginning of each year ESCO QHSE Audit Schedule is prepared, covering Internal (Project Management Teams / Management Systems) and External (Supplier / Project specific) Audits.

The objective of auditing is to provide ESCO management with reasonable assurances that activities conducted throughoutthe Business conform to planned arrangements and requirements of management system / ISO Certification / Legislation.

To deliver this objective, ESCO will conduct:

- Internal Audits to evaluate the implementation of the Management System and to assess the effectiveness of the system as a basis of continuous improvement.
- External Audits of suppliers to evaluate their capabilities to supply products / services in line with ESCO contractual requirements / ESCO expectations / ISO Certifications / Legislation.

Audits are conducted by trained, competent and experienced members of the QHSE Department. The Auditor will examine evidence in the form of documentation and hardware and will observe working practice to obtain assurances of good operational control.

The frequency of Audits is determined by:

- Perceived risk profile
- Importance of Business activity
- Results of previous Audits (NCR's / Observations raised)
- Trend analysis (Incidents / Accidents)
- Significant new Projects / Contracts being awarded.
- Criticality ratings (Supply Chain)

The Audit process is managed via the application of ESCO Audit Procedure (Doc No: 0169), which is available and maintained on the CRMS management system.

3.2.8.5. **QHSE Targets**

Annual ESCO QHSE Targets must be set at the beginning of each year. These targets are set by the QHSE Manager and agreed by the Regional Manager. The Targets are listed on the QHSE Statistics (Doc No: 0010). Comparisons between the Actuals verses the Targets are maintained on this report which are sent to all sites on a quarterly basis.

3.2.8.6. **QHSE Budget**

An annual QHSE budget is drawn up by the QHSE Manager in accordance with the Financial Management standard (Doc No: 0224)

3.2.8.7. **QHSE Appointments**

All operational support office QHSE appointments must be reviewed on an annual basis.

3.2.9. **General Actions**

The primary function of the QHSE manager is to ensure compliance with ESCO Risk Management System. This is done by maintaining the various registers and filing systems as well as ensuring that the relevant electronic registers and directories are maintained and kept up to date.

Other general actions are listed below.

3.2.9.1. **QHSE Communications**

General safety communications are generated internally from lessons learnt as well as received from external sources such as trade associations, clients and even competitors. A register of these communications is to be maintained and all communications are to be distributed to all worksites and project personnel.
A key communication requirement is the continuous improvement of simplifying and addressing the ease at which ESCO personnel understand and interface with ESCO Risk Management System.

3.2.9.2. **Management Site Visits**

Project Managers and other management personnel should be encouraged to make regular site visits. When management site visits do occur, the management representative that has made the visit must complete the Management Site Visit Form (Doc No: 0211).

3.2.9.3. **IMCA Liaison**

The International Marine Contractors Association (IMCA) is a marine trade association of which ESCO is a member. The QHSE Manager is the primary ESCO contact to IMCA. All relevant documentation and correspondences must be reviewed and forwarded to the relevant personnel. Efforts must be made to comply with guidance issued by IMCA, deviation from IMCA guidance must be approved in accordance with the Management of Change Standard (Doc No: 0147) Periodic attendance at conferences and workshops shall be approved by the Regional Manager.

3.2.9.4. **Competence Assessments**

The QHSE Manager is responsible for ensuring that the personnel competence assessments are conducted in compliance with the Competence Assurance and Assessment Scheme (Doc No: 0037)

3.2.9.5. **External Documentation Review**

Both direct and indirect client documentation describing their policies and standards which need to be complied with are received from time to time. The QHSE Manager is responsible for reviewing these documents to ensure compliance. If non-compliance is identified this must be brought to the Clients attention and where applicable deviation must be approved in accordance with the Management of Change (Doc No: 0147).

3.2.9.6. **Evaluation of Legal Compliance**

Consistent with ESCO's commitment to compliance, ESCO Risk management system is periodically evaluated in-line with ESCO Audit Schedule. ESCO's activities must be assessed for compliance with Legislation, Standards and Codes that ESCO subscribes to.
This is constantly done through accident investigations, feedback from worksites and communication with Regulators (e.g.: QHSE, IMCA and British Standards). Periodic evaluation of legal compliance is carried out through feedback at Management Review meetings, Safety Committee Meetings and Lessons Learned workshops.

3.2.9.7. **Lesson Learnt Database (LLD)**

The LLD is a database used by ESCO to report and record incidents, accidents and documented lessons learnt. All near Misses, Incidents, Accidents and Lessons Learnt are reported from the various worksites in accordance with the Incident Reporting Procedure (Doc No: 0012) on the Corporate Occurrence Report Form (Doc No: 0214). On receipt of these reports the QHSE Manager is responsible for ensuring that they are captured on the LLD, corrective actions are identified, and the incident is closed out. If applicable a lesson learnt may be generated and posted on notice boards as well as sent to all worksites and project personnel. The LLD is also used to capture exposure hours for all personnel employed by ESCO.

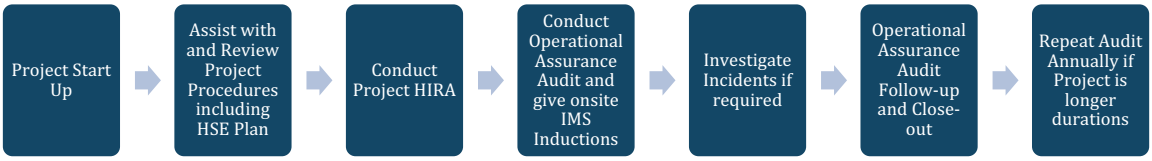
3.2.9.8. **Supervisors Cloud File**

ESCO Supervisors Cloud File is an electronic folder on the Intranet containing all required ESCO documentation as well as other useful information that may assist the site Supervisor to complete his daily responsibilities. The QHSE manager is required to ensure that this cloud folder is kept up to date and the latest revision is issued to all project personnel onsite.

3.2.9.9. **ESCO Risk Management System Inductions**

All personnel, especially site Supervisors, should receive a CRMS Induction. This induction covers all 7 Levels of ESCO Risk Management System. The QHSE Manager or Operations Manager are usually responsible to present these inductions.

The diagram below shows these support functions as well as periodic actions.



3.2.10. **Project Support Actions**

All projects require QHSE support, the amount of support is determined by the size and type of the project. The QHSE Manager is required to work closely with the Operations Manager as well as the Project Managers to determine the level of support required.

All projects are managed in accordance with the Project Management standard (Doc No: 0306)

3.2.10.1. **Project Start Up**

Once a contract has been awarded a project start up meeting is held. In this meeting the various project resources and responsibilities are identified. The site Supervisor is usually identified at this stage and tasked with drafting the project specific procedures.

3.2.10.2. **Procedure Review / Hazard Identification & Risk Assessment (HIRA)**

Once the procedures have been drafted by the site Supervisor, the Project Manager is responsible for reviewing these procedures and arranging the Project HIRA with assistance from the QHSE Manager.

The Project HIRA must be conducted in accordance with the Hazard dentification & Risk Assessment standard (Doc No: 0156)

3.2.10.3. **On Site Operational Assurance Audit**

The Project Manager is responsible for ensuring that an Operational Assurance Audit (OAA) is conducted at some stage during the project if the project duration is longer than a month. If the Project Manager cannot conduct the OAA himself then the QHSE Manager may be requested to assist.

The Operational Assurance Audit must be conducted in accordance with the Operational Assurance Audit (Doc No: 0211). The person conducting the on-site audit should also give an on-site ESCO Risk Management System Induction to all personnel on site.

3.2.11. **Project Audit plan**

3.2.11.1. **Vessel/worksite project assurance plan (ESCO Document 0169 and IMCA M149 refers)**

Before diving operations commence, ESCO will conduct an audit or inspection process that, at a minimum, includes, but not be limited to, the following:

- OVID (Offshore Vessel Inspection Database)
- Vessel/worksite HSE audit
- Diving equipment systems audit (IMCA D023/D024/D037/D040)
- Project equipment FMEA/FMECA audits
- IT/communication services capability
- Remotely Operated Vehicle (ROV) systems audit (IMCA D006)
- Survey systems audit
- Environmental audit
- IOGP policies, standards, or procedures
- Lifting appurtenance inspection and wire assurance
- Structural and mechanical integrity of all lifting equipment
- PTW and isolations
- Working at height
- Rotating machinery
- Chemical and other substances hazardous to health

3.2.11.2. **Vessel/worksite inspection (IMCA M204 refers)**

The vessel/worksite inspection should address items such as:

- Project equipment, product, and associated component sea-fastenings
- Final deck/worksite equipment layout
- Ergonomic factors involved in carrying out the work scope.
- Trip and other hazards
- Access and egress routes for executing the work and for emergencies.
- Sea fastening and vessel stability assurance
- Emergency and contingency planning
- The provision of access to emergency equipment
- Environmental contingency spill kit provision

In cases where the mobilization has been successfully completed in accordance with a well-developed and risk-assessed plan, there is often little to do for the final inspection. In other circumstances, the inspection provides an important final hold point for approving,the readiness to commence work.

3.2.11.3. **Marine Vessels used to support Diving Operations (IMCA M198 & M204 refer)**

Vessels used to support diving operations should be thoroughly assessed by diving and marine SME personnel for fitness of purpose. The anticipated scope of work and diving method intended must be considered for proper vessel selection.

Dynamically Positioned vessels

Vessels which use Dynamic Positioning (DP) systems must be thoroughly assessed by specialist personnel who have training and experience in DP systems and diving from DP vessels. The International Maritime Organization (IMO), several flag states, IMCA, IACS (International Association of Classification Societies), and the Marine Technology Society (MTS) DP committee have requirements and guidance on the design, setup, and operation of DP vessels used during diving.

DP Equipment Class 2 or 3 is required for vessels undertaking manned diving operations.

The vessel should also meet therequirements of and be operated in accordance with:

- IMO MSC/Circ.645 “Guidelines for vessels with dynamic positioning systems” and IMO MSC/Circ.1580 “
- Guidelines for Vessels and Units with Dynamic Positioning (DP) Systems”
- Oil Companies International Marine Forum (OCIMF) – “Dynamic Positioning Assurance Framework”, First Edition 2016
- IMCA M 117 “The training and experience of key DP personnel”
- IMCA D 010 “Diving Operations from Vessels Operating in Dynamically Positioned Mode”
- DNVGL RP-E306 “Dynamic Positioning Vessel Design Philosophy Guidelines” and RP-E307 “DynamicPositioning Systems Operations Guidance”, (published by MTS DP Committee as “DP Vessel Design Philosophy Guidelines” and “DP Operations Guidance’).

ESCO's Marine and Diving Specialist personnel should have access to and review the vessels, referencing the followingvessel documentation:

- DP Operations Manual
- DP/Diving SIMOPS procedures
- DP FMECA/DP FMEA
- Annual DP Trials and FMEA Proving Trials report.
- DP Capability Plots
- CAMO, TAM, and ASOG (Diving Operations)

Additional details which should be considered when determining DP vessel suitability are:

- Position of propulsion system components and thrusters in relationship to where the diver’s launch and recoverysystem are located.
- Type of diving mode intended (Surface supplied or closed bell)
- Whether operations in open water or near structures and subsea obstructions
- Type of position referencing systems outfitted on the vessel.

IMCA D 010 “Diving Operations from Vessels Operating in Dynamically Positioned Mode” can provide furtherconsiderations for planning diving from DP vessels.

The ESCO Marine and Diving Specialist and vessel operator should jointly perform a scope of work-specific risk assessment to determine if the vessel DP system equipment, configuration, and operating parameters are acceptable for the planned diving operation.

See also IMCA D 035 “The Selection of Vessels of Opportunity for Diving Operations”.

3.2.11.4. **Audit and Assurance (IMCA M204)**

The Offshore Vessel Inspection Database (OVID) produced by the (OCIMF) checklist aims to reduce the number of audits of contracted vessels.

Once an audit is performed in accordance with the guidelines, copies should be made available to ESCO/client, along with statements of any corrective action taken, ongoing work or outstanding issues.

The audit document should contain an extensive set of definitions and abbreviations, an explanation of the inspection process, and a report summary and distribution list.

It should also include a selection of generic inspection sheets and a section dedicated to specialist vessel inspection, each with the following subsections, as below:

- Generic section
    - Previous inspections
    - Vessel particulars
    - Certification, documentation
    - Crew management
    - Bridge, navigation, and communications equipment
    - Safety management
    - Pollution prevention
    - Structural condition
    - Life- saving appliances
    - Fire fighting
    - Mooring
    - Machinery spaces and plant (including ballast systems)
    - General appearance and condition (including accommodation, public rooms, galley)
    - Hazards – slips, trips, and falls
- Specialist Vessel Sections
    - Dynamic Positioning (DP) vessel supplement
    - Diving vessel supplement
    - Remotely Operated Vehicle (ROV) vessel supplement
    - Helicopter supplement

It is the responsibility of ESCO/Charterer to ensure that, where their individual requirements are greater, provision is madefor additional auditing with a contractual obligation for rectification included in the contract.

3.2.11.5. **Diving equipment systems audit**

Any equipment that is to be used on a ESCO worksite should be inspected and verified as ‘fit for purpose’ prior to being used. Guidance for this inspection can be found in IOGP Report 468 - *Diving System Assurance Recommended Practice* and the applicable IMCA DESIGN Audit.

IMCA’s Diving Equipment Systems Inspection Guidance Note (DESIGN) documents should be used; this can be done by ESCO employees or by a third party. Six DESIGN documents are currently available:

- IMCA D 023 – DESIGN for surface orientated (air) diving systems.IMCA D 024 – DESIGN for saturation (bell) diving systems

- IMCA D 037 - DESIGN for surface supplied mixed gas diving systems.IMCA D 040 - DESIGN for mobile/portable surface supplied systems
- IMCA D053 – DESIGN for hyperbaric reception facility (HRF) forming part of hyperbaric evacuation system (HES)
- IMCA D 063 – DESIGN for Hyperbaric Rescue Unit Life Support Packages.

ESCO will verify the accuracy and completeness of any submitted DESIGN document. Additionally, operators may undertake spot, theme, or full audits at any time. All diving systems shall be designed, fabricated, and maintained in class.

3.2.11.6. **FMEA and FMECA Audits (IMCA D039 refers)**

Failure Modes, Effects and Criticality Analysis

The analysis consists two sub-analyses: the failure modes and effects analysis (FMEA), and a second analysis which includes criticality analysis (FMECA), where a risk matrix is used to estimate and rank the criticality of the failure fromits probability and severity.

3.2.11.7. **The FMEA Process**

The FMEA should postulate the effects of component or system failure modes and identify the resultant local and endeffects on equipment. The effects could, in turn, have operational impacts. FMEAs can be performed at the system, subsystem, assembly, subassembly, or part level.
A FMEA should be carried out on all diving systems used in this report, whether Surface Supplied, Saturation, or SubseaHabitats. It should remain with the system as a living document, periodically reviewed and validated to ensure relevance and accuracy from design phase through to operational deployment and throughout its lifecycle.

3.2.11.8. **The FMECA Process**

The FMECA process can be carried out at system, subsystem, or component level. Generally, for diving project activities, due to potential outcomes and project impacts, it is essential that the analysis is conducted at a sufficient level
of detail to establish a high degree of confidence that the worst-case failure effects, and their causes, have been unambiguously identified.
The FMECA is a critical document it should be expected that audits will focus on this document.

3.2.11.9. **ROV Systems Audit**

IMCA R 006 - Standard ROV Audit Document is to be used.

The audit covers:

- ROVs
- Tooling
- Interfacing
- All the support systems and the relevant procedural documentation

The audit proforma is typically passed to the contractor to complete in the first instance. The ESCO auditor should reviewthe findings and focus on any areas requiring further attention.

3.2.11.10. Operational Assurance Audit Follow Up and Close Out

The Project Manager is responsible for ensuring that the findings and recommendations from the Operational Assurance Audit are closed out and actioned within the period indicated on the Audit Report. Feedback regarding close out status is to be given to the QHSE Manager.

3.2.11.11. Re-Audit

In the event of a project exceeding one year, the site will be required to undergo another Operational Assurance Audit.

3.3. Employee Responsibilities

It is only through our employee's awareness and Duty of Care that ESCO can succeed in achieving a Zero Incident work environment.

It is therefore incumbent on employees to be responsible in the following actions:

- Evaluate all activities before undertaking to verify that the operation will be safe and effective (to employees and environment).
- 100% HSE
- Demonstrate responsibility by actively caring for the safety of fellow workers and the public.
- STOP WORK AUTHORITY – Stop any task/job immediately if observing an unsafe act or being in the presenceof unsafe conditions. There will be no retribution for any work stoppage that occurs due to QHSE concerns. It
- Report all injuries, vehicle collisions, spills/environmental releases, near hits, fires, or unsafe conditions to supervision.
- Actively participate in regularly scheduled safety meetings and training classes appropriate to the business unit and job description.
- Wear the required PPE according to the job description and/or task.
- Assist in incident investigations as needed.
- Conduct Job Risk Assessment.
- Discuss any observed unsafe condition, behavior and/or practice with fellow workers and supervisor.
- Understand and comply with all QHSE rules and policies that are applicable to the location and task.
- Follow Works Instructions/Method Statements and/or JRA to safely complete the job.
- Advise supervisor of all prescription medication(s) and over-the -counter medications that may adversely affect the employee's ability to do his or her job safely.
- Learn the location of all emergency equipment on the work site.
- Become familiar with all emergency response signals and plans.

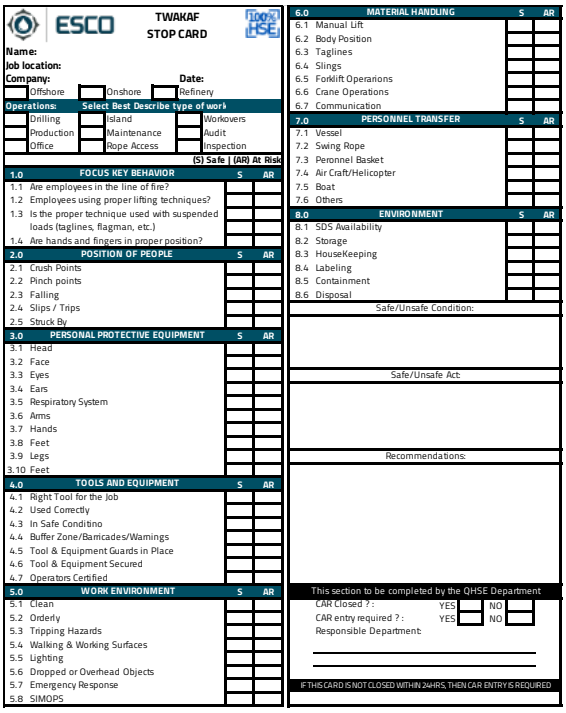
3.3.1. Safety Hazard Observation Cards

In alignment with the STOP WORK AUTHORITY vested in each employee is the responsibility to utilize the Safety Hazard Observation Card (SHOC) system which is in place at all places of work for ESCO Employees. The completion of SHOC cards by all employees is actively encouraged by ESCO Management. SHOC cards (Doc 0783), if unresolved, complete occurrence reporting by means of the ESCO reporting form no. 0214.

3.3.1.1. **What is Stop Work Authority?**

Stop Work Authority is a tool used by the employer to ensure the safety oftheir employees and the quality of their work. It is a means for employers to ensure that work is being done safely, ethically and to the highest standards.

Each and every employee is responsible to utilize the Safety Hazard Observation Card (SHOC) system which is in place at all places of work for ESCO Marine Employees.



ESCO TWAKAF STOP CARD

Name:
Job location:
Company: Date:
☐ Offshore ☐ Onshore ☐ Refinery

Operations: Select Best Describe type of work

☐	Drilling	☐	Island	☐	Workovers
☐	Production	☐	Maintenance	☐	Audit
☐	Office	☐	Rope Access	☐	Inspection

(S) Safe | (AR) At Risk

1.0 FOCUS KEY BEHAVIOR	S	AR
1.1 Are employees in the line of fire?		
1.2 Employees using proper lifting techniques?		
1.3 Is the proper technique used with suspended loads (taglines, flagman, etc.)		
1.4 Are hands and fingers in proper position?		
2.0 POSITION OF PEOPLE	**S**	**AR**
2.1 Crush Points		
2.2 Pinch points		
2.3 Falling		
2.4 Slips / Trips		
2.5 Struck By		
3.0 PERSONAL PROTECTIVE EQUIPMENT	**S**	**AR**
3.1 Head		
3.2 Face		
3.3 Eyes		
3.4 Ears		
3.5 Respiratory System		
3.6 Arms		
3.7 Hands		
3.8 Feet		
3.9 Legs		
3.10 Feet		
4.0 TOOLS AND EQUIPMENT	**S**	**AR**
4.1 Right Tool for the Job		
4.2 Used Correctly		
4.3 In Safe Conditino		
4.4 Buffer Zone/Barricades/Warnings		
4.5 Tool & Equipment Guards in Place		
4.6 Tool & Equipment Secured		
4.7 Operators Certified		
5.0 WORK ENVIRONMENT	**S**	**AR**
5.1 Clean		
5.2 Orderly		
5.3 Tripping Hazards		
5.4 Walking & Working Surfaces		
5.5 Lighting		
5.6 Dropped or Overhead Objects		
5.7 Emergency Response		
5.8 SIMOPS		

6.0 MATERIAL HANDLING	S	AR
6.1 Manual Lift		
6.2 Body Position		
6.3 Taglines		
6.4 Slings		
6.5 Forklift Operations		
6.6 Crane Operations		
6.7 Communication		
7.0 PERSONNEL TRANSFER	**S**	**AR**
7.1 Vessel		
7.2 Swing Rope		
7.3 Peronnel Basket		
7.4 Air Craft/Helicopter		
7.5 Boat		
7.6 Others		
8.0 ENVIRONMENT	**S**	**AR**
8.1 SDS Availability		
8.2 Storage		
8.3 HouseKeeping		
8.4 Labeling		
8.5 Containment		
8.6 Disposal		

Safe/Unsafe Condition:

Safe/Unsafe Act:

Recommendations:

This section to be completed by the QHSE Department
CAR Closed ? : YES ☐ NO ☐
CAR entry required ? : YES ☐ NO ☐
Responsible Department:

IF THIS CARD IS NOT CLOSED WITHIN 24HRS, THEN CAR ENTRY IS REQUIRED

3.3.1.2. **When Should Stop Work Authority be Used?**

Stop Work Authority should be used when the following conditions are present:

There is a known safety hazard or risk

There is a potential for harm to persons or property

There is a lack of compliance with safety regulations

Work is being performed in a manner that is not in accordance with company policy or procedures

3.3.1.3. **Who Has the Authority to Stop Work?**

Any employee can exercise Stop Work Authority if they see any of the conditions above being met. Additionally, supervisors and managers have the authority to stop work if they deem it necessary.

3.3.1.4. **What Should Happen When Stop Work Authority be Used?**

When Stop Work Authority is used, the following steps should be taken:

- Notify the supervisor or manager.
- Secure the area and take steps to protect any personnel or property in the area.
- Document the situation and any corrective action taken.
- Take appropriate corrective action to resolve the situation.

3.3.1.5. **What is the Process for Resolving a Stop Work Authority Situation?**

Once a Stop Work Authority situation has been identified, the following steps should be taken to resolve the situation:

- Identify the root cause of the issue.
- Determine what corrective action needs to be taken.
- Ensure that the corrective action is implemented.
- Monitor the corrective action.
- Document the situation and any corrective action taken.

3.4. Contractor Responsibilities

It is only through our employee's awareness and Duty of Care that ESCO can succeed in achieving a Zero Incident work environment. It is therefore incumbent on employees to be responsible in the following actions:

- Evaluate all activities before undertaking to verify that the operation will be safe and effective (to employees and environment).
- 100% HSE
- STOP WORK AUTHORITY – Stop any task/job immediately if an unsafe act or condition is observed. Therewill be no retribution for any work stoppage that occurs due to QHSE concerns.
- Follow the Training Assurance Program.
- Be familiar with the respective ESCO's and/or QHSE requirements before starting any project on ESCO facilities.
- Be responsible for the actions of employees by requiring them to be trained and to follow the rules that are applicable to the job and location.
- Immediately report all injuries, vehicle collisions, spills/environmental releases, near hits, fires, and unsafe conditions to ESCO Job Representative.
- Hold pre-job safety meetings to discuss the project and anticipate QHSE issues. Additionally, conduct regular safety meetings to review the project's progress and QHSE issues.
- Actively participate in crew pre-job safety meetings and review of JRA, noting hazards specific to working with contractor equipment and employees.
- Provide proof of training or other QHSE documentation upon request.
- Conduct and document incident investigations and implement corrective measures.
- Participate in QHSE reviews in accordance with ESCO QHSE Contractor Management Program.
- Gain approval and/or appropriate training before operating ESCO equipment.

- Verify that equipment is maintained in a safe working condition and properly rigged up prior to the start of any operation.
- Provide Safety Data Sheets (SDS) for all chemicals brought to a ESCO work site to ESCO Supervisor or Person-In-Charge.
- Clean-up work areas upon completion of job.
- Provide evidence of a comprehensive QHSE system, suitable for Contractor's approved scope of services, through Intranet or a similar review and verification service provider of ESCO's choosing. Contractor will maintain current QHSE documentation, training, records, insurance, and an accepted status on ESCO's approved vendor list.

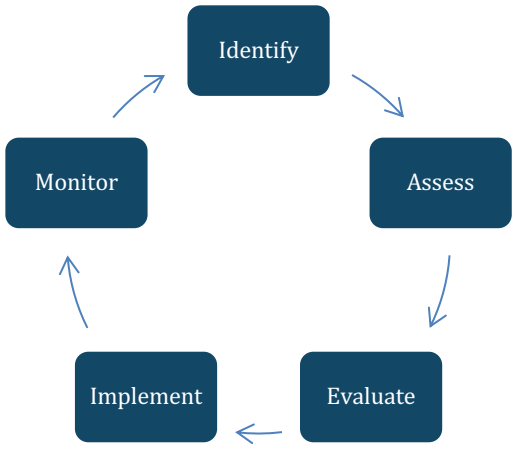
Failure to fulfil this responsibility will result in the Contractor being placed in a rejected status on ESCO's approved vendor list and may result in loss of work and restricted access to ESCO's locations.

3.5. Safety Management Systems

3.5.1. HIRA - Hazard Identification & Risk Assessments

This information provides an overview of ESCO's HIRA process, more detail on HIRA is provided in (Doc No: 0156). Identifying and managing hazards and the potentially adverse effects of activities is a pivotal part of ESCO QHSE Management System. The Hazard Management process is designed to identify, assess, control, and mitigate the consequences of any hazard identified. This process can be applied to current and new activities and involves the assessment of QHSE impacts, or potential impacts, on people and the environment. The Hazard Management process covers the complete Project life cycle from Tender stage, through to execution of work and completion.

The main stages of the Hazard Management process comprise:



- Identifying the hazard or threat
- Assessing the risks to people, assets and equipment and the environment
- Evaluating the control measures, risk reduction and elimination measures to ensure risks are reduced to ALARP.
- Implementing the measures
- Monitoring and reviewing the measures.

3.5.2. **Hierarchy of Controls for Effective Control of Hazards**

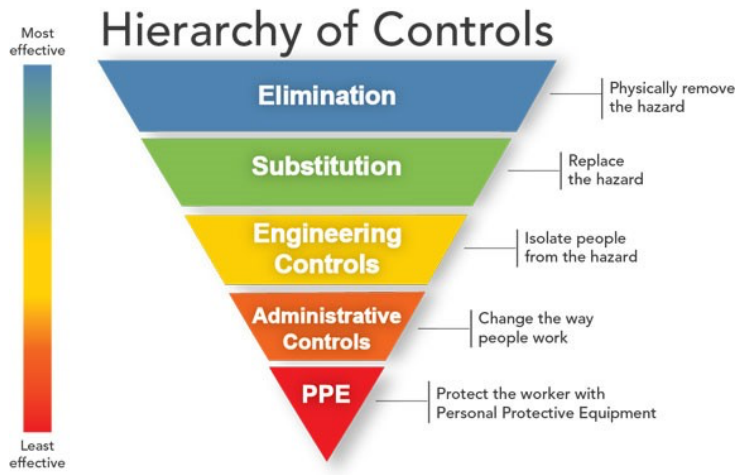


Figure 1: Hierarchy of Controls (NIOSH)

3.5.2.1. **Hazard elimination**

Physically removing the hazard—is the most effective hazard control. For example, if employees must work high above the ground, the hazard can be eliminated by moving the piece they are working on to ground level to eliminate the need to work at heights. Designing out the risk before production is a critical area of focus in all project risk assessments.

https://en.wikipedia.org/wiki/Hierarchy_of_hazard_controls

3.5.2.2. **Substitution**

Substitution, the second most effective hazard control, involves replacing something that produces a hazard (similar to elimination) with something that does not produce a hazard—for example, replacing lead-based paint with titanium white. To be an effective control, the new product must not produce another hazard.

3.5.2.3. **Engineering controls**

The third most effective means of controlling hazards is engineered controls. These do not eliminate hazards, but rather isolate people from hazards. Capital costs of engineered controls tend to be higher than less effective controls in the hierarchy, however they may reduce future costs. For example, a crew might build a work platform rather than purchase, replace, and maintain fall arrest equipment. "Enclosure and isolation" create a physical barrier between personnel and hazards, such as using remotely controlled equipment.

3.5.2.4. **Administrative Controls**

Administrative controls are changes to the way people work. Examples of administrative controls include procedure changes, employee training, and installation of signs and warning labels (such as those in the Workplace Hazardous Materials Information System). Administrative controls do not remove hazards, but limit or prevent people's exposure to the hazards, such as completing disruptive work at night when fewer people are around.

3.5.2.5. **Personal protective equipment**

Personal protective equipment (PPE) includes gloves, uniforms, respirators, hard hats, safety glasses, high-visibility clothing, and safety footwear. PPE is the least effective means of controlling hazards because of the high potential for damage to render PPE ineffective. Additionally, some PPE, such as respirators, increase physiological effort to complete a task and, therefore, may require medical examinations to ensure workers can use the PPE without risking their health.

3.5.3. Role in Prevention-through-Design

The above 'Hierarchy of Controls' is a core component of the prevention of incidents. In order to reduce Hazards further in the QHSE management process ESCO has adopted a key management principle of Prevention-through-Design, this is the concept of applying methods to minimize occupational hazards early in the design process. Prevention through Design emphasizes addressing hazards at the top of the hierarchy of controls (through elimination and substitution) at the earlieststages of project development.

ESCO has adopted the principle of reducing all risks to an ALARP level.

ALARP stands for "as low as reasonably practicable", and is a term often used in the regulation and management of safety- critical and safety-involved systems. The ALARP principle is that the residual risk shall be reduced as far as reasonably practicable. It is equivalent to SFAIRP (So Far as Is Reasonably Practicable).

For a risk to be ALARP, it must be possible to demonstrate that the cost involved in reducing the risk further would be grossly disproportionate to the benefit gained. The ALARP principle arises from the fact that infinite time, effort, and money could be spent in the attempt of reducing a risk to zero. It should not be understood as simply a quantitative measure of benefit against detriment. It is more a best common practice of judgement of the balance of risk and societal benefit.

ESCO has a well-established, robust, and comprehensive risk management process and good historical experience of its effectiveness in reducing risks to ALARP, to ensure safe operations. The diagram below provides an overview of the Risk Management process used in ESCO operations.

3.6. Emergency Preparedness and Emergency Response

ESCO has an approved Emergency Response Manual in place (Doc No: 0307) which identifies potential emergency situations and the actions to be taken to respond to these emergencies. These emergency response procedures are periodically reviewed, updated, and tested.

On a project specific basis, individual Emergency Response Bridging Documents are produced, which provide interface information between ESCO, the Vessel and Client.

3.7. QHSE Corporate Performance

3.7.1. Performance measurement and monitoring

To achieve consistent and progressive improvement in QHSE performance, ESCO maintains reporting systems to ensure benefits from the analysis of its experience.

At the highest level, QHSE performance objectives and targets are set annually by Senior Management. Periodic reviews are held to establish actual performance against the objectives set and to identify opportunities for improvement.

Other activities, which provide more specific QHSE performance measurements and improvement opportunities (Leading & Lagging Indicators) include:

- A pro-active Hazard Observation and Near Miss reporting program.
- Analysis of monthly Health & Safety performance statistics and trends.
- Review of Project De-Brief reports; identify strengths / weaknesses / improvements.
- Vessel and Equipment inspections.
- **P2^{I}** Audits carried out.
- Think **TWICE** training sessions.

Procedures exist within the management system which ensures systematic control of these activities.

3.7.2. Trailing or Lagging Indicators

Trailing or Lagging indicators are a measure of the performance of key process or system against an internal standard. They are aimed to provide evidence of failure in the QHSE system to prevent QHSE incidents.

- Near Miss Incidents
- Malaria or Ebola Cases
- First Aid Incidents
- Spills (E.g., Oil, chemical, drilling fluids)
- Medical Treatment Incidents
- Chemical or light carbon release to atmosphere (Including quantity)
- Restricted work Incidents
- Environmental / Regulatory compliance Incidents and excursions
- Lost Time Incidents
- Fines / Enforcement proceedings
- Fatalities.
- Consent Decrees / Agreed Government orders
- Asset Damage Incidents
- Security Incidents

3.7.3. **Leading Indicators**

Leading indicators are a proactive measure of performance of a key process or system against an internal standard. They aim to uncover problems before incidents or near misses occur and provide a positive approach to improve QHSE performance levels. The following are defined as leading indicators.

- Near Miss Incidents [Number and percent quality]
- Job Safety Analysis (JSA) [Number and Percent quality]
- Observation & Intervention Cards (O&I) [Number and Percent quality]
- Observation and Intervention Behavior [Number and Percent quality]
- Leadership visits [Number and Percent quality]
- Management Walkthroughs [Number and Percent quality]

3.7.3.1. **Number of Leadership Visits**

Leadership visits of Operational Site and Operating Centre Office visits with the specific scope and purpose to encouragepositive workforce QHSE attitudes and behaviors. The purpose of this indicator is to demonstrate leadership involvement and commitment to QHSE in a practical and visible manner. Leadership visits may be scheduled within an extensive travel agenda.

In order to conduct a leadership, visit it is not necessary to have specific QHSE expertise; rather it relies on management acumen and ability to identify areas of improvement. Discussions and exchange with employees at all levels of hierarchy of the Operational Site / Operating Centre should be sought.

Leadership visits are performed by:

- CEO, Directors, Senior Vice-Presidents, or Vice-Presidents.
- Leaders who directly report to the above group.
- Leaders nominated and approved by ESCO.

The outcomes and agreed actions of each leadership visit shall be documented, reported, and followed through to completion. It is strongly recommended that implementation of agreed actions is personally followed through by the leader who conducted the leadership visit.

3.7.3.2. **Number of Management Walkthrough**

The aim of management walkthroughs which are Operational Site visits, is similar to leadership visits, and they should focus on the following main topics:

- Compliance to QHSE procedures and safe working practices.
- Engagement of staff in positive discussions about workplace QHSE and identification of improvements.
- Reinforce positive QHSE work behavior and commitment to QHSE.
- Work to correct negative QHSE behaviors and conditions.

Consequently, subject matter knowledge about QHSE, the work processes and working practices may be required. Outcomes and agreed actions of the management walkthroughs shall be documented, reported and actions shall be followed through to completion.

Senior leaders shall ensure that management walkthroughs are conducted on all Operational Sites / Operating Centers. Tocalculate the frequency/rate performance indicators, hours worked where ESCO has accountability and responsibility for an QHSE incident are to be recorded.

3.8. Safety Training

ESCO will follow the training standard as defined in Doc no: 0150.

3.9. Occurrence Investigation

In the event of an occurrence/incident occurring which needs to be investigated, the QHSE Manger will conduct the investigation. This may require a site visit.

3.9.1. Occurrence/Incident Investigation, Non-conformity, Corrective and Preventive Action

Accidents and injuries are preventable; this is a key principle of safe operations. However, when they do happen, they provide an opportunity for learning and for corrective action to prevent recurrence.

It is ESCO's policy that all accidents, incidents and near misses occurring on our worksites will be reported and appropriately followed up. The extent of the investigation will vary with the nature and severity of the incident. Serious accidents and incidents will be reported immediately and processed in accordance with ESCO standard on Incident Reporting and Investigation (Doc No: 0012). It is also important that all local legislative requirements for reporting and investigation are complied with.

Incident Reporting and Investigation (Doc No: 0012) has been compiled with the aim of ensuring consistency in classification, investigation, and reporting across ESCO. This provides for consistent reporting on incidents and a robust tracking system to ensure follow up and close out of all incidents, accidents and near misses.

3.9.2. Occurrence Investigation

The aim of the investigation is to establish the facts; the immediate and root causes and to make recommendations to prevent the recurrence of that, or any similar, incident.

ESCO utilizes the "Kelvin Top Set" methodology to determine root causes, with ESCO Incident Investigation (Doc No: 0012) providing the relevant guidance.

3.9.3. Minimum Time Periods on Incident Close outs.

ESCO will resource and provide processes that allow for the following minimum incident close out rates:

- 48 hours to put in place corrective action on the incident.
- 7 days to close out the incident report and provide preventative action.

3.9.4. Non-conformity, Corrective and Preventive Action

Non-conformities are raised when there is a clear breach of principals, policies, processes, or procedures. Where a non- conformance has been identified, it will be logged in both "hardcopy" and "electronically" within the LLD reporting database.

The Non-Conformance, Corrective and Preventive Action process is managed via the application of ESCO Control of Non- Conformity standard (Doc No: 0004), which is available and maintained on ESCO Risk management system.

3.10. Recordable Incidents Calculations

ACRONYM	DESCRIPTION	BASIS	NOTES
LTI	Lost Time Injury	A lost-time injury is something that results in a fatality, permanent disability or time lost from work.It could be as little as one day or shift.	
LTIF	Lost Time Injury Frequency	**LTIF:** LTI x 200,000 / Hours Worked LTIF refer to the number of lost-time injuries withina given accounting period, relative to the total number of hours worked in that period.	200,000 is the standard OSHA worked hours base rate. LTI includes any personal injury with a severity level 3 or 4 in the matrix.
Total Recordable	Total Recordable Incidents	In order for an injury or illness to be recordable, it must be work-related. ... A recordable injury or illness under OSHA is one that requires medical treatment beyond first aid, as well as one that causesdeath, days away from work, restricted work or transfer to another job, or loss of consciousness	
TRIR	Total Recordable Incident Rate	**TRIR:** (Facilities + RWC + MTI) x 200,000 / Hours Worked	200,000 is the standard OSHA worked hours base rate. All Level 5, 4, 3, 3 Incidents

3.11. Fast Track Email Notification

Subject:	Notification of Incident
Client:	[Client Name]
Project:	[Project Name]
Date:	[Date of Notification]
Time Exact	[Time of Notification]
Description of Incident:	[Number of personnel to be evacuated. Names of personnel in HSC. Reason for evacuation. Location. Weather Conditions. Saturation holding depth in HSC. Names and numbers of Support Personnel on Nominated Rescue Vessel. ETA of Nominated Rescue Vessel in Port of Safety.]
Status of Injured person:	[Status]
Attachment:	Next of Kin details

4. ESCO Adopted IOGP Life Saving Rules considering ADNOC standards.

The International Association of Oil & Gas Producers (IOGP) Life-Saving Rules (LSR) are amongthe most effective techniques for preventing fatalities, they have proved effective due to their simplicity and relevance.

Each of the nine Rules highlights a key action to prevent fatal injuries during activities that researchhas shown to be high-risk. Aimed at individual workers, every Rule is geared to a specific task.

A key benefit of using the IOGP LSR is standardization or uniformity in application – having everybody with the same understanding of these simple and clear actions aimed at preventing fatalinjuries during higher-risk activities.

ESCO has adopted the IOGP Life-Saving Rules, this provides ESCO personnel to easily align to awidely adopted standard for safety, leading to fewer injuries and fewer fatalities and a safer workplace for all.

4.1. Bypassing Safety Controls

	**Obtain authorization before overriding or disablingsafety controls.**
	• I understand and use safety-critical equipment and procedures which apply to my task.
	• I obtain authorization before:
	  ○ disabling or overriding safety equipment
	  ○ deviating from procedures
	  ○ crossing a barrier

Video Link - https://www.youtube.com/watch?v=wmm_u7l8acE&list=PLt0-qTVCvEp1Dxe7j7SDbbiLrYIkUqYov&index=10&t=0s	
The checklist and guidance information are found in Doc No: 0116.	

4.2. Confined Space

	**Obtain authorization before entering a confined space.** • I confirm energy sources are isolated. • I confirm the atmosphere has been tested and ismonitored. • I check and use my breathing apparatus when required. • I confirm there is an attendant standing by • I confirm a rescue plan is in place. • I obtain authorization to enter
Video link - https://www.youtube.com/watch?v=LhMtWiRCnCg&list=PLt0-qTVCvEp1Dxe7j7SDbbiLrYIkUqYov&index=6&t=0s	

4.3. Driving

	**Follow safe driving rules.** • I always wear a seatbelt. • I do not exceed the speed limit and reduce my speed forroad conditions. • I do not use phones or operate devises while driving. • I am fit, rested and fully alert while driving. • I follow journey management requirements
Video Link - https://www.youtube.com/watch?v=Dfwi7OEn0hQ&list=PLt0-qTVCvEp1Dxe7j7SDbbiLrYIkUqYov&index=9&t=0s	

4.4. Energy Isolation

	**Verify isolation and zero energy before work begins.** • I have identified all energy sources. • I confirm that hazardous energy sources have been isolated, locked and tagged. • I have checked there is zero energy and tested forresidual or stored energy
Video Link – https://www.youtube.com/watch?v=No JFoPXPM&list=PLt0-qTVCvEp1Dxe7j7SDbbiLrYIkUqYov&index=7&t=0s	

4.5. Hot Work

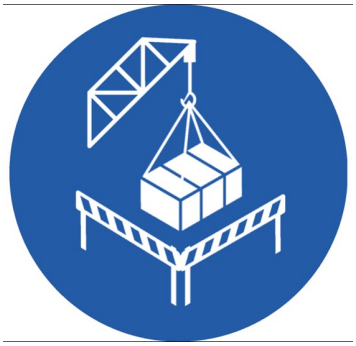
	**Control flammables and ignition sources** • I identify and control ignition sources. • Before starting any hot work: • I confirm flammable material is removed or isolated. • I obtain authorization. • Before starting any hot work in a hazardous area, Iconfirm: • a gas test is completed. • gas will be monitored continually.
Video link - https://www.youtube.com/watch?v=E8V8s76KfDY&list=PLt0-qTVCvEp1Dxe7j7SDbbiLrYIkUqYov&index=3&t=0s	

4.6. Line of Fire

	**Keep yourself and others out of the line of fire.**
	• I position myself to avoid:
	  ○ moving objects
	  ○ vehicles
	  ○ pressure releases
	  ○ dropped objects.
	• I establish and obey barriers and exclusion zones.
	• I take action to secure loose objects and report potential dropped objects

Video Link – https://www.youtube.com/watch?v=klEhJQW6lc4&list=PLt0-qTVCvEp1Dxe7j7SDbbiLrYIkUqYov&index=4&t=0s	

4.7. Safe Mechanical Lifting

	**Plan lifting operations and control the area.** • I confirm that the equipment and load have beeninspected and are fit for purpose. • I only operate equipment that I am qualified to use. • I establish and obey barriers and exclusion zones. • I never walk under a suspended load
Video Link - https://www.youtube.com/watch?v=lRw3aGtBe64&list=PLt0-qTVCvEp1Dxe7j7SDbbiLrYIkUqYov&index=2&t=0s	

4.8. Work Authorization

	**Work with a valid permit when required.** • I have confirmed if a permit is required. • I am authorised to perform the work. • I understand the permit. • I have confirmed that hazards are controlled, and it issafe to start. • I stop and reassess if conditions change
Video Link - https://www.youtube.com/watch?v=-Il1jMO0PpU&list=PLt0-qTVCvEp1Dxe7j7SDbbiLrYIkUqYov&index=8&t=0s	

4.9. Working at Height

	**Protect yourself against a fall when working at height.** • I inspect my fall protection equipment before use. • I secure tools and work materials to prevent droppedobjects. • I tie off 100% to approved anchor points whileoutside a protected area.
Video Link - https://www.youtube.com/watch?v=Z02IoTmRsBI&list=PLt0-qTVCvEp1Dxe7j7SDbbiLrYIkUqYov&index=5&t=0s	

4.10. IOGP Leadership presentations available

Introduction to the Life-Saving Rule slide pack for organizations to adapt to their needs.
https://www.lifesavingrules.org/media/1121/lifesavingrules_anintroduction.pptx
Leading on the Life-Saving Rules slide pack. It should be used to introduce leaders tothe Life-Saving Rules program and what it is expected of them as leaders.
https://www.lifesavingrules.org/media/1120/lifesavingrules_leadershipengagement.pptx
Life Saving Rules Poster
https://www.lifesavingrules.org/media/1123/life-savingrules_a1poster.pdf

5. Quality Rules

This section is intended to provide ESCO employees with a general set of guidelines to reference when ESCO operations arebeing conducted.

To reference specific detailed procedures, refer to the specific document no provided in the paragraphs below.

Contact QHSE or ESCO Site Representative for copies of the relevant documents. During operations, ESCO Site Representative/Supervisor shall implement ESCO QHSE Program and is responsible for coordinating with the contractor'ssupervisor. ESCO Site Representative or Supervisor will verify that the crew and all service employees are familiar with ESCO standards, rules, policies and procedures.

The contractor and his or her supervisors are responsible for implementing the safety requirements of their ESCO QHSE. Any conflict with standards or policies shall be brought to the attention of ESCO Site Representative.

The following general safety rules are the minimum required and are not all inclusive of every activity conducted by ESCO employees/contractors:

The checklist and guidance information are found in Doc No: 0295.

5.1. Short Service Employees

A Short Service Employee is an individual who has less than six months' experience with ESCO or in a new job assignment that presents new potential hazards in the employee's/contractor's workplace. ESCO requires that all individuals identified as new and/or new to a position are assisted whilst performing his or her job duties and/or roles and working on a ESCO facility or location. This applies to any ESCO and/or Contractor/vendor employee whose primary assignment is to Operations. Please refer to ESCO's Short Service Employee program for additional information.

The checklist and guidance information are found in Doc No: 0296.

The personnel are identified as:

- Green Hard Hat – Short Service or new site personnel
- Green Hard Hat – Some experience but not first time on site
- White Hard Hat – Fully experienced

5.2. Drug, Alcohol Policy

It is the working individual's responsibility to be familiar and comply with the Drug, Alcohol Policy specific to the individual's respective business units. These policies are available through the Human Resources Department and via ESCO Intranet. It is the responsibility of individuals who work on ESCO premises or operate or control ESCO equipment to be familiar and comply with the contractor's drug and alcohol policies, which may be obtained from the contractor. Working individuals of contractors are also subject to ESCO's drug and alcohol testing policies while present on ESCO premises or while operating or controlling ESCO equipment.

The checklist and guidance information are found in Doc No: 0020.

5.3. Personal Protective Equipment

This Safe System of Work sets out the responsibilities and requirements for the issue and use of personal protective equipment, including the standards and specifications that personal protective equipment must meet. It contains guidelines on:

- Different Types of PPE: whole body, hand, head, foot, eye and face, hearing
- Fall-Arrest Equipment/Safety Harnesses
- Lifejackets and Buoyant Work vests
- Respiratory Equipment.

The rules identified will be for all employees and contractors. Loaner equipment may be provided for visitors at the location. ESCO onsite job representative should be consulted in advance to determine availability.

The checklist and guidance information are found in Doc No: 0129.

5.4. Manual Handling or Back Lifting Safety

When lifting or moving loads, employee shall assess the weight, bulkiness of the item and the route of travel. Proper lifting techniques should be used. When the load is too heavy for one person to lift, the employee shall ask for assistance or use a mechanical lifting device. ESCO has provided a documented set of guidelines and procedures for proper lifting techniques for employees to utilize.

The checklist and guidance information are found in Doc No: 0294

5.5. Lifting Equipment and Lifting Operations

This Safe System of Work presents ESCO guidelines applicable to the safe use of lifting equipment on ESCO managed or owned property in its various sites and locations, including offshore installations in associated territorial waters.

It covers the following items:

- Lifting Equipment - Positioning and Installation, Strength and Stability, Markings.
- Control of Lifting Operations.
- Certification, Examinations, and Inspections.
- Portable Lifting Equipment.

Employees should utilize these guidelines for proper use of lifting equipment and safe lifting operations.

The checklist and guidance information are found in Doc No: 0143

5.6. Compressed Gas Cylinders

This Safe System of Work specifies the requirements necessary for the safe handling, use, storage, and transportation of compressed gas cylinders.

It includes the following:

- Cylinder Storage.
- Cylinders' Exposure to Fire.
- Cylinder Handling.
- Cylinder Use.
- Cylinder Vale removal.

All compressed gas cylinders shall be handled, used, and stored in accordance with the QHSE Handbook, country requirements and local regulations. Employees should utilize these requirements for proper handling of compressed gas cylinders.

The checklist and guidance information are found in Doc No: 0112

5.7. Fire Prevention, Detection and Protection

This Safe System of Work provides the information necessary for ensuring the safety of personnel, buildings, installations, and plant with regard to fire prevention, detection, and protection.

It gives guidelines on:

- Fire Prevention.
- Fire Detection.
- Fire Protection.
- Training and Drills.

The checklist and guidance information are found in Doc No: 0115.

5.8. Hand Tool and Power Tool Safety

This Safe System of Work provides the information necessary for ensuring the safety of personnel, buildings, installations, and plant with regard to hand tools and power tool safety.

It gives guidelines on:

- Condition of tools before use.
- Safe Operating Practice.
- Personal safety with Tools.

The checklist and guidance information are found in Doc No: 0145.

5.9. Job Safety Analysis / Job Risk Assessment

JSA is a way of studying a job at the specific site, in order to identify the hazards or potential accidents associated with each step of the job and to develop solutions that will eliminate, nullify, or prevent such hazards. A JSA can help identifyand eliminate potential accident causes. It is the responsibility of operations to develop and maintain JSA lists.

The checklist and guidance information are found in Doc No: 0138.

5.10. Change Management

- Do not make any technical or organization changes without prior authorization.
- The risk assessment must be available and the identified mitigation measures must be implemented.
- Workers must be given appropriate training.
- Relevant documentation must be updated.

5.11. Simultaneous Operations or Co-activities / Dual ops

- Do not perform any simultaneous operation or co-activities without prior inspection.
- Everyone involved must know how his or her role and the coordinator must be vested with the appropriateauthority.
- Specific coordination meetings must be held regularly.
- Supervision must be increased.

5.12. Protective Equipment

- Do not access installation or perform work without wearing general or task specific PPE.
- The rules concerning PPE must be clearly defined and disseminated.
- Collective protective equipment must be in good condition, especially protective devices for machinery, gratings, and safety rails.
- Carefully inspect PPE.
- Check for the necessity of RPE.
- Check for the necessity of any specialist protection equipment.

5.13. Body Mechanics and Tools

- Do not carry out work if you do not have the right tools for the job or they are not suitable to the workingenvironment.
- Two people or specialized equipment machinery may be needed to perform work depending on the weight, size,or bulk of the load.
- Adapt your body mechanics to the tool and beware of repetitive motions.
- Follow the appropriate operating procedures for the tools.

5.14. Excavation Work

- Do not perform excavation work without a valid work permit comprising a map of all underground hazards.
- Take precautions to prevent ground movement. For example, machinery must be positioned at a set distance from the excavation and trench walls must be stabilized.
- Where necessary, take precautions for the work in the confined space.
- Stay alert while working to safeguard against unexpected hazards.

5.15. Sand Blasting

This Safe System of Work provides the information necessary for ensuring the safety of personnel, buildings, installations, and plant with regard to sand blasting safety.

It gives guidelines on:

- Sand Blasting practice
- Safe Operating

The checklist and guidance information are found in Doc No: 0293

5.16. Weather Conditions

This Safe System of Work provides the information necessary for ensuring the safety of personnel, buildings, installations, and plant with regard to weather conditions.

It gives guidelines on:

- Severe weather.
- Hot weather.
- Symptoms of heat or cold stress.
- Cold weather.

The checklist and guidance information are found in Doc No: 0036.

5.17. Heat Stress Management

This Safe System of Work contains information necessary to enable contractors and ESCO personnel to establish, operate and maintain effective program to protect the health of employees, contractors and others from exposure to heat stress arising from operations.

The following guidelines are available in this procedure:

- Heat Disorders and Health Effects.
- Heat Stress Causes.
- Prevention and Control of Heat Stress.
- Precautions for Working in Hot Conditions.

The checklist and guidance information are found in Doc No: 0119.

5.18. Office Safety

This Safe System of Work provides the information necessary for ensuring the safety of personnel, buildings, installations, and plant with regard to office safety.

It gives guidelines on:

- General Office safety
- Site specific safety considerations

The checklist and guidance information are found in Doc No: 0292

5.19. Workstation Ergonomics

This Safe System of Work provides the information necessary for ensuring the safety of personnel, buildings, installations, and plant with regard to workplace ergonomics.

It gives guidelines on:

- Workstation setup
- Rest Intervals

The checklist and guidance information are found in Doc No: 0291

5.20. Confined Space Entry

This Safe System of Work provides the information necessary for ensuring the safety of personnel, buildings, installations, and plant with regard to confined space entry.

It gives guidelines on:

- Preparation to enter confined space.
- Entry of confined space
- Restoration of a confined space
-

Examples of confined spaces may include, but are not limited to, tanks, vessels, underground meter boxes and valve boxes. Excavations greater than 4 ft. deep may meet the definition of a confined space if they are to be entered by employees. These excavations shall be entered in accordance with the Excavating and Trenching Safety Standard.

The checklist and guidance information are found in Doc No: 0093.

5.21. Electrical Safety

This Safe System of Work provides the information necessary for ensuring the safety of personnel, buildings, installations, and plant with regard to electrical safety.

It gives guidelines on:

- Basic electrical safety practices to help prevent injuries.
- Comply with regulatory standards applicable to electrical systems.

Safety programs used by contractors must meet or exceed all applicable guidelines of ESCO's established QHSE policies/procedures for electrical safety.
Specific attention to subsea lighting and electrical supplies must be complied with.

The checklist and guidance information are found in Doc No: 0097.

5.22. Energy Isolation – Lock Out / Tag Out (LOTO)

This Safe System of Work provides the guidelines and information necessary for the safe implementation of lockouts andtag outs on machinery and equipment during maintenance and repair work.

This document includes information on:

- Safe Lockout of Equipment
- Lockout Tags (Tag outs)
- Issue and Use of Personal Padlocks
- Safe Removal of Lockouts and Return of Isolated Equipment to Service.

This standard establishes minimum requirements for controlling energy sources during the service, repair or maintenance of machinery and equipment. These requirements will aid in preventing injury to personnel, damage to property and damage to the environment due to the unexpected energizing, start-up, or release of stored energy. Sources of stored energy include electrical, mechanical (pumping units, mud pumps), hydraulic, pneumatic, compressed natural gas lines, natural gas flow lines and any other source of stored energy.

The checklist and guidance information are found in Doc No: 0094.

5.23. Excavating and Trenching

This Safe System of Work sets out the precautions and conditions considered necessary for the safety of all excavation works carried out on ESCO owned or managed sites.

It covers the following fields:

- Site Safety
- Pre-Excavation Requirements and Procedure
- Excavation Procedure
- Site Reinstatement

This standard applies to all excavations 1.5 m (5 ft.) in depth or more and intended for worker occupancy. In addition to the following steps, a Confined Space Entry Permit may be required for personnel entry into such excavations that have the potential for hazards (i.e., atmospheres, cave-ins) that cannot be controlled, or serious safety hazards that cannot be eliminated.

The checklist and guidance information are found in Doc No: 0114.

5.24. Working at Heights / Fall Protection

This Safe System of Work provides the guidelines and precautions that must be adhered to in order to reduce the risks involved with personnel working at heights to as low as reasonably practicable.

Areas covered by this procedure are as follows:

- Working Platforms
- Fall Arrest Equipment
- Movement and Working at Height.

The checklist and guidance information are found in Doc No: 0142.

5.25. Security of Equipment at Heights (DROPS)

This Safe System of Work provides the guidelines and precautions that must be adhered to in order to reduce the risks involved with equipment that is stored, used, fixed, stacked, or taken aloft. All equipment has the potential to become a dropped object. Ensure the appropriate controls are in place to prevent these items becoming dropped objects and always eliminate the risk to personnel (100% HSE) by ensuring barriers and No-Go Zones are employed.

Areas covered by this procedure are as follows:

- Before Starting Any Task
- Lifting / Rigging or Slinging
- Tools and Equipment Checklist

The checklist and guidance information are found in Doc No: 0528.

5.26. Scaffolds and Ladders

This Safe System of Work contains the guidelines necessary for the safe construction, use, dismantling and control of scaffolding and use of ladders.

It covers the following main points:

- Inspections and Scaffolding tags
- Scaffolding Design Requirements – Materials, Construction and Rolling Scaffolds
- Scaffolding Use
- Ladders

The checklist and guidance information are found in Doc No: 0110.

5.27. Hot Work

This Safe System of Work contains the guidelines necessary for the safe construction and control of hot work.

It covers the following main points:

- Applications of a Hot Work Permit
- Operations during Hot work

The checklist and guidance information are found in Doc No: 0137.

5.28. Cutting and Welding

This Safe System of Work provides the information necessary to ensure that welding, burning, and associated activities are carried out in a safe and efficient manner, without harm to personnel or damage to equipment and the environment.

It includes the following areas:

- Gas Welding and Burning Equipment
- Electric Arc Welding and Burning Equipment
- Welding and Burning – Hazards and Precautions

The checklist and guidance information are found in Doc No: 0117.

5.29. Tagging and Flagging

This Safe System of Work contains the guidelines necessary for the Tagging and Flagging of hazards in the work environment.

It covers the following main points:

- What are acceptable signs and Wording to be used?
- What are Hazards Situations to TAG and FLAG

The checklist and guidance information are found in Doc No: 0290

5.30. Pressure and Leak Testing

This Safe System of Work contains guidelines for assessing the risks and for establishing the precautions to be taken when carrying out pressure and leak testing.

This procedure covers the following main fields:

- Types of Pressure and Leak Testing
- Test Medium for Pressure (Strength) Testing – Hydraulic and Pneumatic Guidelines.

The checklist and guidance information are found in Doc No: 0111.

5.31. Machine Guards - Barriers

This Safe System of Work contains information on the conditions and situations where machine guards must be in place and used, the reasons for installing machine guards and the conditions that must exist before they may be removed, and the type of guards and protective devices available and the considerations governing their choice and design.

It includes the following areas:

- Risks from unguarded and poorly guarded/barrier equipment
- Machine guard/barrier requirements
- Selection and use of guards/barrier.

The checklist and guidance information are found in Doc No: 0116.

5.32. Gas Detection Equipment

This Safe System of Work provides the guidelines and procedures necessary to ensure a safe working environment through the controlled and systematic monitoring for combustible gas, regular maintenance of gas monitoring equipment, and use of suitably trained and authorized Gas Testers.

It covers the following points:

- Gas Detectors (Type and Use)
- Fixed Gas Detection System
- Portable Gas Detectors

The checklist and guidance information are found in Doc No: 0122.

5.33. Personnel Transfer & Man Baskets

The purpose of this Safe System of Work is to provide information and guidance on the safe use of man baskets for transferring personnel between vessels and structures.

It covers the following areas:

- Man-Basket Construction
- Inspection and Maintenance of Man Baskets
- Risk Assessment and Maintenance
- Man-Basket Operating Guidelines.

The checklist and guidance information are found in Doc No: 0113.

5.34. Wire/Rope Lines Under Tension

The purpose of this Safe System of Work is to provide information and guidance on the potential safety risks when working around wire or rope lines under tension.

It covers the following areas:

- Types of Lines under tension
- What are Safe Zones?
- Precautions to put in place.

The checklist and guidance information are found in Doc No: 0289.

5.35. Work-Zone Safety (Including Quay side and Over Water)

Employees in field operations are sometimes required to set up work zones near public roads or on quay sides. Drivers are to position vehicles as far off the road as possible before setting up the work zone.

These work zones shall be set up in accordance with the appropriate local regulations. These precautions typically include setting up cones and warning signs, proper communications systems and flagging signals, reflective worker’s vests, and strobe lights on vehicles.

The checklist and guidance information are found in Doc No: 0123.

5.36. Vehicle and Motorized Equipment

Workers who operate motorized equipment on behalf of ESCO are responsible for the safe operation of that equipment. Motorized equipment can include forklifts, cranes, backhoes, bulldozers, etc. ESCO has established the following minimum requirements for the operation of motorized equipment.

The guidance information is found in Doc No: 0527.

5.36.1. Vehicle Safety

ESCO and its subsidiaries have established the following policy to govern the safe and responsible operation of motor vehicles. It applies to vehicles owned, controlled, or leased by ESCO ("ESCO vehicles") and except where noted, to personal vehicles or rental cars while being used for ESCO business.

Compliance with this policy is a condition of employment; violation of this policy can result in disciplinary action up to and including termination. Supervisors will provide drivers ESCO Driving Standards and additional policies and programs as applicable. Drivers must obey all traffic laws and regulations and are expected to exercise due care and good judgment. In the event of a conflict between laws and this policy, laws take precedence over ESCO policy, procedure, or process.

The checklist and guidance information are found in Doc No: 0135.

5.36.2. Forklifts and Excavators

Although forklifts are indispensable tools for moving heavy objects, their operation and proper maintenance require special precautions and training. The use of forklifts is restricted to trained employees that have been authorized by their supervisor to operate the forklift.
Forklift operators must be certified through training and have a skills evaluation test at least every three years. Refresher training is also required whenever and incident occurs. Where loads are being carried that limit the visibility of the driver,a handler must be provided to direct operations.

The checklist and guidance information are found in Doc No: 0136.

5.36.3. Fuel Supply and Transfer

The checklist and guidance information are found in Doc No: 0297.

6. Health Rules [Occupational/Industrial Hygiene]

Occupational/Industrial Hygiene is the practice of identifying of hazardous agents; chemical, physical, and biological; in the workplace that could cause disease or discomfort, evaluating the extent of the risk due to exposure to these hazardous agents, and the control of those risks to prevent ill-health in the long or short term. The control of substances hazardous to health (COSHH) is a fundamental part of the company's safety requirements.

6.1. Hazard Communication

This Safe System of Work provides the necessary information for ensuring that all industrial products are correctly and consistently marked across all sites. This level of marking allows communication that personnel and the environment are adequately protected from related hazards.

It covers the following fields:

- Marking Criteria
- Hazard Communication

The checklist and guidance information are found in Doc No: 0014.

6.2. Asbestos

This Safe System of Work provides the necessary information for ensuring that asbestos is dealt with correctly and consistently across all sites and that personnel and the environment are adequately protected from asbestos related hazards.

It covers the following fields:

- Asbestos Hygiene Standards and Air Monitoring
- Managing Asbestos
- Working with Asbestos
- Storage and Disposal of Asbestos Waste.

ESCO has established an Asbestos Management Program (available on ESCO Intranet) to control potential exposures to asbestos-containing materials (ACMs) in its facilities. Employees performing maintenance activities that can potentially disturb ACM must meet the minimum requirements set forth in the Asbestos Management Policy. Removal activities may also require notification of proper regulatory agencies.

The checklist and guidance information are found in Doc No: 0120.

6.3. Benzene

This Safe System of Work provides the necessary information for ensuring that Benzene is dealt with correctly and consistently across all sites and that personnel and the environment are adequately protected from Benzene related hazards.

It covers the following fields:

- Detection of Benzene (Natural gas, crude oils, and gasoline)
- Exposure monitoring,
- Engineering controls
- PPE

The checklist and guidance information are found in Doc No: 0134.

6.4. Noise Risk Management

This Safe System of Work provides the guidelines necessary for the safe management, control, and reduction of noise levels in the workplace so that the risk of noise induced hearing damage incurred by personnel is reduced to a level that isas low as reasonably practicable.

It covers the following areas:

- Assessment of Noise Risk
- Control of Noise Risk
- Monitoring of Nose Risk

ESCO has established a Noise Risk Management to protect employees against noise-induced hearing loss. Employees whoare exposed or potentially exposed to a time-weighted average (TWA) of 85 decibels (dB) or greater over an 8-hour period will be included in the HCP. Audiometric testing will be conducted annually for all employees in the HCP. These employees will undergo a baseline audiogram to establish their level of hearing and for comparison with subsequent audiograms. All employees in the HCP will be trained annually on the effects of noise on hearing, the purpose, types and use of hearing protectors, the purpose of audiometric testing, and an explanation of the test procedures and their results. All ESCO facilities shall be periodically assessed for continuous high-noise levels (85 dB or greater).

Warning signs shall be posted in areas identified as high-noise level areas. Employees are required to wear the provided hearing protection in high-noise level areas and during unusual operations. Extremely loud jobs such as blowing down lines or venting of air pressure may require the use of dual protection (ear plugs and earmuffs).

The checklist and guidance information are found in Doc No: 0127.

6.5. Hydrogen Sulphide

This Safe System of Work contains the information and guidelines necessary to assist in reducing the risks encountered when working with Hydrogen Sulphide to as low as reasonably practicable.

It contains the following information on:

- Hydrogen Sulphide Description
- Hydrogen Sulphide Detection
- Hydrogen Sulphide Precautions
- Hydrogen Sulphide First Aid

Hydrogen sulphide (H2S) is a chemical asphyxiant and irritant gas that can cause loss of consciousness or death at high concentrations and may be present in some ESCO operations.

The checklist and guidance information are found in Doc No: 0128.

6.6. Lead

This Safe System of Work contains the information and guidelines necessary to assist in reducing the risks encountered when working with Lead to as low as reasonably practicable.

It contains the following information on:

- Potential exposures to lead-containing products in its facilities.
- Employees performing maintenance activities that can potentially disturb lead.

Products such as paints or coatings must meet the minimum requirements set forth in the Lead Management Program. Anaction level of 30 cubic micrograms per cubic meter of air as an 8-hour TWA has been established for lead.

The checklist and guidance information are found in Doc No: 0132.

6.7. Naturally Occurring Radioactive Materials

This Safe System of Work contains the information and guidelines necessary to assist in reducing the risks encountered when working with Naturally Occurring Radioactive Materials (NORM) to as low as reasonably practicable.

It contains the following information on:

- Examples of NORM
- Levels that are acceptable
- Radiation Protection

Naturally occurring radioactive material (NORM) occurs in nature and concentration levels can be enhanced through the production of both oil and gas. NORM is primarily brought to the surface through “Piggy Backing” of larger compounds or with produced water. Dramatic changes in pressure, temperature and turbulence causes particulates to precipitate out and to form a scale. This scale is usually deposited into equipment such as

produced water tanks, separators, coalescers, dehydrators, flow lines, tubing, pumps, filters, etc. and is usually located at bends, turns, changes in pipe diameter and at the bottom of the vessels.

ESCO NORM Management Program shall be followed by all ESCO employees to verify that facilities are monitored to preclude employee exposure to NORM at elevated levels. Minimum requirements for NORM control measures are set forth in the NORM Management Program.

If the presence of NORM is suspected, ESCO employees will reference the NORM Management Program. The program requires confirmatory radiation surveys on the affected equipment in addition to recurrent periodic surveys of ESCO facilities. If survey results show elevated radiation levels as described by the NORM Management Program, then the equipment and/or material shall be treated as NORM-contaminated and special labelling, storage and disposal proceduresshall apply. All safe work practices and employee protection protocols shall be designated by individual Worker Protection Plans based on the activity and the specific radiation levels of a given facility. The Worker Protection Plan shall also specify site posting requirements, employee dosimetry, additional survey requirements and disposal of NORM-contaminated materials to licensed waste facilities. The Worker Protection Plan shall be submitted to the respective local authority's Department of Health for review prior to employees being exposed to NORM.

The checklist and guidance information are found in Doc No: 0121.

6.8. Silica

This Safe System of Work contains the information and guidelines necessary to assist in reducing the risks encountered when working with Silica to as low as reasonably practicable.

It contains the following information on:

- Examples of Silica exposure
- Control of Silica Exposure

Prolonged exposure to respirable silica through inhalation can cause silicosis, which is a debilitating, life-threatening disease. It is ESCO's policy to control employee silica exposure through engineering controls when feasible. Types of controls that may be used depending on the circumstances are vacuum systems, filters, skirting, misting systems and enclosed systems. Exposure zones will be set up to restrict employee access to these areas. The minimum requirement is that employees inside these zones will wear an approved respirator with a P100 air-purifying cartridge. Periodic monitoring is conducted to evaluate silica exposure of employees working in specialized operations.

The checklist and guidance information are found in Doc No: 0133.

7. Environmental Rules

The Environmental Program provides policy, guidance, and training to help maintain compliance with environmental laws and regulations, minimize environmental risk and liability, and promote environmental best management practices in support of ESCO's policy.

7.1. Air

This Safe System of Work contains the information and guidelines necessary to assist in reducing the risks of contamination of air and to reduce this to as low as reasonably practicable.

It contains the following information on:

- Examples of air contamination / pollutant
- Intake of clean air for compressor air facilities

Various countries laws regulate construction and operational aspects of many of ESCO's facilities, including compressor stations, gas processing plants and other emission sources. Many stationary sources of air pollution cannot legally operate until anair permit is obtained and met. A "stationary source" is any non-mobile equipment or facility that emits any air pollutant. Common stationary sources in the natural gas industry include temporary or permanent compressor engines, generators, tanks, dehydrator pumps, fire tubes, reboilers or associated equipment, boilers and vaporizers. Stationary sources may besubject to different requirements depending on the amount and type of emission sources and the quality of the air near thesource.

The checklist and guidance information are found in Doc No: 0298.

7.2. Water

This Safe System of Work outlines the standards required for domestic and potable water quality, the actions required on non-conformance with set regulatory compliance, and recommendations to minimize risk of potable water system contamination.

The following areas are covered in this procedure:

- Water Quality Criteria
- Water Quality Monitoring
- Maintenance and Monitoring
- Legionella Disease

Various countries laws regulate companies to control and monitor water pollutants. For the E&P industry those pollutantscan include storm water runoff, hydrocarbon spills and salt/brine water. In addition, discharge of dredge or fill material into "country waterways" could be regulated under the regional country laws. ESCO has established Storm-water PollutionPrevention Plans, Reasonable and Prudent Practices for Stabilization and Spill Prevention Control and Countermeasure plans.

The checklist and guidance information are found in Doc No: 0118.

7.3. Waste Management

This Safe System of Work outlines the standards required for waste management, the actions required on non-conformance with set regulatory compliance, and recommendations to minimize risk of contamination.

The following areas are covered in this procedure:

- What is waste?
- Approved waste disposal methods via Tadweer or FANR
- Dredging waste

ESCO engages in responsible waste management practices in order to remain in regulatory compliance and embody good stewardship. Further process information can be found in the Waste Management Program documents.

The checklist and guidance information are found in Doc No: 0126.

7.4. Weed and Pest Control

This Safe System of Work outlines the standards required for weed and pest control management, the actions required and recommendations to minimize risk of contamination.

The following areas are covered in this procedure:

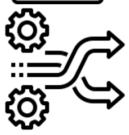
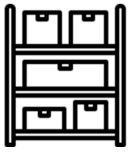
- Selection of Herbicide and Pesticide
- Safe use of product

The checklist and guidance information are found in Doc No: 0299.

8. The non-negotiable rules

Think TWICE (Think What I Could Affect**) -** ESCO Safety Management Process designed to improve ESCO culture across the business in all things. To promote a culture of planning, checking, personal accountability and changing for the better.

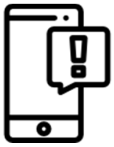
9. Quality Rules

1	**Honest & Transparent** Expect and demonstrate honest and transparency during the Work.	
2	**Competent, Qualified & Authorized** Only competent, qualified, and authorized personnel perform the Work.	
3	**Plan & Execute** Plan the Work, Resources and Schedule, Execute the approved Plan.	
4	**Use Approved Documentation** Only use the latest, approved revision of the documentation required for the Work.	
5	**In-Process Verification** Conduct in-process conformity checks of critical work.	
6	**Management of Change (MOC)** Always use MoC when making a change.	
7	**Testing & Completions** Equipment and systems are mechanically complete, commissioned and tested.	
8	**Welding Integrity** Welds are designed and performed defect free.	
9	**Electrical Integrity** Electrical systems and components are designed and installed compliant.	
10	**Underwater Integrity** Subsea work scopes are designed, managed, and delivered incident free.	
11	**Housekeeping** Work areas are maintained clean. Everything has a place and is in place.	
12	**Preservation** Components of the Work are appropriately preserved for the product life cycle.	

10. Life Saving Rules

1	**Bypassing Safety Controls** Obtain authorization before overriding or disabling safety controls.	
2	**Confined space** Obtain authorization before entering a confined space.	
3	**Driving** Follow safe driving rules.	
4	**Energy Isolation** Verify isolation and zero energy before work begins.	
5	**Hot Work** Control flammables and ignition sources.	
6	**Line of Fire** Keep yourself and others out of the line of fire.	
7	**Safe Mechanical Lifting** Plan lifting operation and control the area.	
8	**Work Authorization** Work with a valid permit when required.	
9	**Working at height** Protect yourself against a fall when working at height.	

11. Cyber Security Rules

1	**Think before you click.** Don't click any links or open attachments in unsolicited emails from unknown senders.	
2	**Protect your password.** Create strong passwords. At least 16 Characters long with capitals, numbers and special characters.	
3	**Use network storage.** Do not keep any information on your laptop. Store files on SharePoint only.	
4	**Secure your devices.** Press 'Windows Key" "L" to lock your screen before leaving your desk. Shutdown your computer and store it securely, before leaving the office.	
5	**Don't connect to unauthorized devices.** Never plug a unauthorized device into your computer or mobile device, except if approved by group IT security	
6	**If you suspect it, report it.** Small issues can have huge impacts. Be vigilant and report any suspicious or unusual computer behavior to the local IT team.	
7	**Only use secured WIFI** Avoid connecting to free public Wi-Fi for corporate purposes and always use a VPN service.	
8	**Cyber Security is a Shared responsibility.** To Keep ESCO Cyber secure, everyone must act securely when online.