6500m HOV Project
Stage 1: A-4500 HOV

Quality Management Plan

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A-4500 HOV Project

Quality Management Plan
1.0 Introduction

This document describes the quality management system that will be employed during the construction phase of the A-4500 HOV Project. This plan will be shared with all personnel to form an understanding of the integrated quality management system. All personnel will use this Quality Management Plan as a reference and as guidance for strategic, enterprise-level quality management and governance.

1.1 Scope and Document Organization

The enterprise-level quality assurance activities are summarized in Section 4. Quality assurance, control and management activities are directed by the included policies and procedures. This umbrella of best practices provides consistent and objective quality assurance actions. Policies and procedures are maintained by project personnel.

This document is organized into the following four sections:

1. Introduction - provides the scope, document organization and change control procedure for this document.
2. Related Documentation - cites other documents that provide input and reference for this plan.
3. Quality Management Organization - describes the goals and objectives, roles and responsibilities, training, communication and governance of the Quality Management Organization.
4. Quality Assurance Activities - describes the activities of the Quality Management Organization which include planning, conducting evaluations, developing evaluation criteria, keeping records, defining acceptance criteria and conducting audits.

1.2 Change Control

Once reviewed and approved by the Project Management Team, this document will be controlled via the A-4500 HOV Configuration Management Plan. It will be revision-controlled and will become a part of the A-4500 HOV document library via the Document Management System (DMS). The Quality Manager will follow procedures defined in the Configuration Management Plan (CMP) for making changes to this document. The document revision history maintained in the DMS is the repository for the document, and printed hard copies will be controlled.
2.0 Reference Document


3.0 Quality Management Organization

3.1 Overview

This section describes the Quality Management Organization and its relationship to the overall project management organization, the contractors, and their subcontractors that will perform work on the A-4500 HOV Project. The section includes the goals, objectives, and the roles and responsibilities to accomplish quality assurance tasks.

3.2 Goals and Objectives

The A-4500 HOV Project management has defined goals and measurable objectives. The main goal of the Quality Management Organization is to ensure that the quality of hardware, instruments, sensors, and services to be provided for the A-4500 HOV Project are of superior quality. The quality of the components for the project will be measured at the project level by implementation of a cost efficient quality system. Quality measurements and metrics will be collected by the Quality Management Organization to make effective decisions to meet the goals of the project.

The overarching goals of the Quality Management Organization are to ensure that 1) the project is successful, and 2) the products and services provided by vendors are of highest quality.

Quality functions are shared by the entire A-4500 HOV Project team, allowing for a seamless approach and the institutionalization of quality into the project. The responsibility for quality lies with every individual involved in the project. Quality management personnel are expected to maintain a high level of professionalism and set an example of unassailable ethics, of objectivity, and champion quality workmanship.

The integrated approach to quality consists of three principal elements:

- Quality Assurance (systematic approach to quality and error prevention)
- Quality Control (the assessment system)
- Continuous Improvement.

**Quality Assurance** is a systematic approach to the prevention of errors. The discovery and prevention of defects early in the development lifecycle offers the project a significant return on
investment. Quality assurance focuses on that preventive mission with auditing and other quality management functions. The goal of quality assurance is to provide management with the data necessary to be informed about product quality and project status. It is the Quality Management Organization's responsibility to address any issue and to provide the necessary resources to resolve quality problems. Tasks within quality assurance include: the generation of quality and compliance-related documentation, review of all quality plans, specifications and records; audit of process, procedures, and security mechanisms; monitoring of implementation and required corrective actions; facilitation of design reviews and serving as liaison for issues related to quality.

**Quality Control** is the testing and assessment system. Quality control provides project management with a realistic, fact-based assessment of components during all phases of the project life cycle. Quality control verifies, validates and documents the quality of systems and their requirements. Quality control includes security testing when required.

**Continuous Improvement** is used to help align objectives and achieve established goals through a disciplined, fact-based approach to problem solving. The continuous improvement system is comprehensive and fully integrated into all phases of procurement, inventory and delivery.

### 3.3 Roles and Responsibilities

The Quality Manager (QM), reporting to the Project Manager, has primary responsibility for all activities associated with quality. The QM ensures that quality management program performance is consistent with the overall organization. In support of this goal, the Quality Management Organization, comprised of team leads and project management personnel, assist the QM with quality management (Figure 1).
3.4 Quality Management Training

Each Quality Management Organization member is expected to have fundamental knowledge of quality audits through prior experience or training. General training and qualification will be administered via the WHOI Training Management System; specific functional areas will conduct area-specific training as deemed necessary by team leaders.

3.5 Communication

The Quality Management Organization will maintain open communications and a close working relationship with WHOI and National Science Foundation staff. This relationship will allow coordination of work activity and schedule to maximize the value of quality assurance on the A-4500 HOV Project. This is facilitated by frequent working level interactions, including periodic status and coordination meetings to review progress toward goals.
3.6 Governance Model

Independent evaluations of project quality management will be performed in accordance with a published audit schedule. Areas of noncompliance will be documented in deficiency reports, and all areas of noncompliance will require documented resolution. To ensure accountability of the results, audit reports will be distributed to the appropriate oversight groups.

The Project Manager has the responsibility for determining qualifications and assigning external individuals and/or groups to conduct audits. Auditors will be trained to meet the requirement for conducting internal quality system audits in accordance with Quality Management/System review procedures. Specific qualifications include:

- Knowledge of the quality audit process
- Technical knowledge of the processes to be audited, and the
- Ability to communicate effectively.

In addition to the internal evaluations, there may be additional audits conducted throughout the year that support independent evaluations. The following audits are likely:

- Audits of select suppliers
- Audits of major subcontractors.

4.0 Quality Assurance Activities

4.1 Overview

This section addresses the activities that are performed by the Quality Management Organization. The Quality Management Organization performs the following activities in accordance with documented procedures for:

- Quality assurance planning
- Quality assurance evaluations
- Quality assurance audits.

4.1.1 Planning

Quality assurance planning activities are performed in accordance with NSF guidelines and applicable procedures. The objective of the planning effort is to identify the resources, activities and schedule of the Quality Management Organization.
4.1.2 Evaluations

The Quality Management Organization will perform quality assurance evaluations to provide oversight committees and program managers with proof of the use of and adherence to standards, processes, and program instructions required for use in the program.

Quality evaluations will be performed at all process steps in the project:
- Design – does it meet criteria and conform to specifications?
- Work processes – do they conform to applicable, accepted practices; are all technicians properly trained to do the work?
- Procurement – are purchase specifications applicable, available, and are they adhered to?
- Inspection and acceptance testing – do these activities follow applicable standards?

There are typically two types of evaluations performed on contracted services or products: audits and product evaluations. An audit is an objective examination of documented processes to verify that contractual and supplier quality requirements are being met. A product evaluation is an objective examination of the work product itself to verify it is in agreement with company and contractual specifications.

4.2 Evaluation Criteria

The Quality Management Organization may evaluate quality criteria based on item design drawings, a technical data package, on existing plans and procedures, corresponding program instructions, and work instructions. Quality assurance staff will follow documented procedures to develop consistent and objective criteria for quality evaluations to maintain acceptable levels of quality.

4.3 Records

All quality assurance records, such as audit and product evaluation reports, are maintained in the project document library, specifically the A-4500 HOV DMS. Additionally, copies of the audit and work product evaluation reports, discrepancy reports, and supporting data are located in the DMS.

4.4 Acceptance

The act of acceptance constitutes acknowledgment by an authorized A-4500 HOV Project representative, the Quality Manager or Quality Management Organization representative, that the equipment/materials and supplies and/or services offered to the project by vendors or subcontractors conform to applicable contract quality, quantity, performance and specification
requirements, and are subject to and conform to any other terms and conditions of the contract. Acceptance may take place before delivery, at the time of delivery, or after delivery depending on the provisions of the terms and conditions of the contract. Equipment/materials and supplies and/or services shall ordinarily not be accepted before completion of all quality assurance actions. Acceptance shall be evidenced by execution of an acceptance incoming inspection signed by a duly authorized representative from the Quality Management Organization.

The Quality Management Organization has the right to inspect and test all equipment/supplies/materials furnished and/or services provided to the project, to the extent practicable at all times and places, including the period of performance, and in any event before acceptance as defined above. The QM or Quality Management Organization may also inspect the plant or plants of the contractor or any subcontractor/subawardee engaged in contract/subaward performance. The Quality Management Organization shall perform inspections and tests in a manner that will not unduly delay the work. Complete records of all inspection work performed by the contractor/subawardee shall be maintained and made available to project management during contract/subaward performance and for as long afterwards as the contract/subaward requires.

Inspections and tests carried out by the Quality Management Organization prior to acceptance are for the sole benefit of the project and do not:

1. Relieve the contractor/subawardee of responsibility for providing adequate quality control measures;
2. Relieve the contractor/subawardee of responsibility for damage to or loss of the material before acceptance;
3. Constitute or imply acceptance;
4. Affect the continuing rights of the project after acceptance of the completed equipment/materials & supplies and/or services.

### 4.5 Quality Plan and Procedures Audits

#### 4.5.1 Internal Audits

Internal audits of the Quality Management Plan, procedures and processes will be conducted on an ongoing basis. The Quality Management Organization is responsible for ensuring that audits are conducted as scheduled. Based on audit results, the frequency and scope may be reduced or increased. Audits are conducted by trained, quality assurance staff or other trained personnel as appropriate.
4.5.2 Independent Assessments

External audits of the Project's practices and procedures, including Quality Management, will be conducted on an annual basis (or more frequently as required) by the Project's certifying agency.

4.5.3 Corrective and Preventive Action

The Quality Management Organization is responsible for the tracking and status reporting of corrective and preventive actions that result from internal audits, process audits and product evaluations. The Quality Management Organization and QM report on quality activities (quality training, scheduled audits, and corrective action status) to program and executive management.

4.5.4 Quality Awareness Training

The Quality Management Organization will conduct quality awareness training on a periodic basis to provide an overview of the Quality Management Organization and Quality Management Plan. The training also explains the purpose of the internal audits, the benefits of adherence to quality plans and procedures, and how each employee has a role in the quality system.

5.0 Exceptional Quality Assurance Activities

The A-4500 HOV Project will be executed by WHOI personnel, all members of the team currently responsible for Alvin submersible operations. This group administers and strictly adheres to a Quality Program for Alvin that is directly responsible for over 45 years of safe, successful deep submergence operations.

No quality management planning, evaluations or audits have exceptional conditions outside the scope of the quality assurance activities described in the Alvin Quality Program Manual and the generic conditions described above.