



QHSE-MS in Geophysical Parties of ONGC

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Summary

The Seismic survey is a basic requirement in oil exploration industry and has been extended as an exploration tool almost all over the globe. Such surveys for oil exploration require enormous use of explosives and detonators and operate from camps, which are often established in remote areas. This paper deals with the Quality, Health, Safety & Environmental Management System adopted in Geophysical Parties. Due emphasis has been laid on scientific planning & meticulous implementation of QHSE-MS in Geophysical Parties. The salient features and advantages of adopting ISO standards have also been discussed.

Introduction

To realize the ONGC's VISION and MISSION a need was felt to reorient the existing Quality, Occupational Health, Safety and Environment management systems in line with the international benchmark systems. CMD, ONGC desired that all installations including Field Parties should have ISO certification by March, 2005.

Accordingly, it was felt that Geophysical Field Parties of Geophysical Services will meet the following requirements as per various international standards:

- ISO 9001: 2000 Quality Management System
- OHSAS 18001:1999 Occupational Health Safety Assessment Series
- ISO 14001: 1996 Environment Management System

Therefore, a QHSE management system was developed to improve upon the quality of seismic data acquired, occupational health & safety and environmental performance, in Geophysical field parties of Geophysical Services. Thus, systems and procedures to achieve Quality 2D & 3D Seismic Data acquisition, VSP Data acquisition to meet ONGC's and External Customer Requirements were either re-designed or developed.

The International Organization for Standardization (ISO)

ISO was formed in 1946 in Geneva Switzerland with an intention to promote the development of international standards and related activities so as to foster the increased trade of products and services between countries. ISO was initially focused on the increasing technological complexities

in engineering and defense industries where consequences of failure were relatively very high. Today the ISO standards have been mandated by many governments and organizations around the world. The objectives of ISO were to harmonize standards at international level, ensure consistency of output, and make organizations more competitive by reducing wastage at various levels / places in the company.

The multi-fold benefits of adopting ISO standards are as follows

i. To Customers

- Quality service, increased confidence in service
- Less number of non-compliance's, improved supply / consistent Quality
- Help in Planning activity, competitive pricing / Lead time reduction

ii. To Company

- Reduced number of defects, increased customer satisfaction
- Consistency in output, assured customer / market share
- Reduction in costs due to reduction of defective products
- Involvement of personnel and consequent higher productivity

iii. To Employees

- Defined directions, improved performance
- Better and improved relation, higher motivation level
- Job satisfaction, involvement
- Sense of pride of working in an ISO 9000 certified company.

Integrated Quality, Health, Safety & Environment Management System (QHSE-MS)

In order to develop an effective QHSE-MS policy, it was felt that reasonable degree of QHSE-MS literacy was required. A **training course on integrated QHSE** management was carried for Management Representatives (MR's) of all parties. Also, the developing of a QHSE-MS policy is a continuing process, which sees that the policy become refined with changing time and demands. The QHSE policy plays a pivotal role in the QHSE-MS, being the document that sets out the basic intentions and principles that will guide the organization's QHSE performance.

The QHSE policy, in other words, is the basic direction that the QHSE-MS is intended to deliver. Hence, the policy made was pragmatic while at the same time making significant commitments. QHSE integrated management manual, procedures & formats were designed as per requirements of Geophysical Services & were exclusively applicable to Geophysical Field Parties. The modifications included developing relevant QMS, fine tuning of health aspects, identification of safety hazards & developing suitable environment management programmes.

The salient features of QHSE manual preparation included:

- ✓ Development of management manual
- ✓ Well-defined structure, authority and responsibility
- ✓ Safety procedure manual includes specialized work rules
- ✓ Environment operation manual based on nature of party's work
- ✓ Standardization of formats for documentation etc.

Four tier system of QHSE documentation was followed which is shown in following schematic diagram.

QHSE policy of Geophysical Party was formulated / evolved through initial status review of Quality, Occupational health, Safety and Environment Management & comprised of following key areas namely:

- Legislative, regulatory and other requirements
- Identification of equipment and services supporting quality of final product (s) and services.
- Identification of significant OH&S risks and Environmental aspects
- Examination of all existing environmental & occupational health and safety management practices

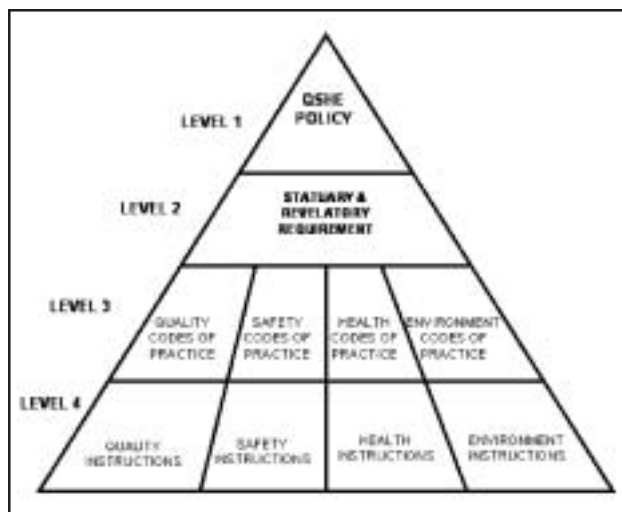


Fig. 1 : Four tier system of QHSE documentation

and procedures.

- Evaluation and feedback from the investigation of previous incidents and accidents.
- Alignment of HSE policy in line with Corporate HSE policy of ONGC, etc.

Quality, Occupational Health, Safety and Environmental Policy of Geophysical Party (GP) demonstrates its commitment

- To enhance customer satisfaction by providing quality seismic data at par with international standards.
- To maintain highest standards of occupational health, safety and environment protection.
- To ensure safe operations, prevent loss of property and damage to the environment.
- To protect employees, contractual persons and persons living in adjacent areas of the Geophysical Party from the foreseeable work hazards.
- To be always alert and equipped to respond to emergencies and disasters by having an updated emergency response plan and disaster management plan.
- To equip employees and contractors with the awareness, information, instructions, and supervision skills needed for safe working, quality of operation and environmental management.
- For continual improvement of its “Quality”, and “Occupational health”, “Safety” and “Environment” (OH&S) management system by reviewing periodically its policy and objectives and adhering to applicable legislative and regulatory requirements.



Objectives

In order to meet the QHSE policy desired objectives were set. An objective is a goal that may be long-term or short term, organization-wide or specific to a part of the organization, a certain activity or process, or certain employees. Each objective was broken down into separate goals. The various objective requirements were met like the proper documentation, clarity of roles and structure etc. These were addressed keeping both broad corporate QHSE issues and other QHSE issues that are specific to individual functions and levels within the party. In addition, suitable indicators were designed to monitor success & defined for each objective. Objectives were quantified where ever possible.

The views of interested parties were also understood through various means. The performance measurement and monitoring requirements too were fulfilled. Key performance parameters were identified, which included risk control effectiveness; management of failures; effectiveness of awareness, training, communication and consultation programmes etc.

Operational controls or other ISO requirements were established for suppliers / contractors as well & monitoring of their performance is routine affair.

Quality Management System (QMS)

Quality as per ISO 9000:2000, Quality management systems – fundamentals and vocabulary is **“Degree to which a set of inherent characteristics fulfils requirements”**. **Quality** is degree of excellence or characteristics by which customers or stakeholders judge an organization, product or service or can be defined as degree to which a product or service meets or exceeds a customer’s requirements and expectations.

The following **Quality Management Principles** were taken care of

1. Customer Focus
2. Leadership
3. Involvement of People
4. Process Approach
5. System Approach
6. Continual Improvement
7. Factual Approach to Decision Making
8. Mutually Beneficial Supplier Relationship

For effective planning & implementation of QHSE-MS, the Chief of Geophysical Services constituted a **Steering Committee** in the Geophysical services. The Steering Committee for better QHSE Management consists of:

- Chief, Geophysical Services - CGS (Head steering committee)
- Head, Geophysical Services - HGS
- Seismic Acquisition Operation Manager - SAOM
- Regional Coordinator - QHSE
- Party Chief of Geophysical Party
- Management Representative(s) - MR’s of Geophysical Party
- Safety officer(s) of Geophysical Party
- Quality officer(s) of Geophysical Party

CGS acts as chairperson of the Steering Committee and MR as Member Secretary.

QMS planning included:

- Action plan for achievement of quality objectives
- Objectives required for achievement of desired product i.e. seismic data
- planning for resources, training, customer satisfaction, monitoring and measurement of product

Further, the following **processes** were identified for planning for the QHSE Management system:

- Achieving physical targets and maintenance of work standards for meeting the quality of the seismic data (product).
- Modeling (wherever required) and designing of suitable 2D / 3D Geometry for seismic data acquisition, to carry out field experimentation for adopting acquisition parameters and to carry out the seismic data acquisition for fulfilling the assigned objectives.
- To optimize recording (Seismograph) parameters.
- OEM recommended tests for equipments.
- Maintenance of the survey equipments, seismic equipments, communication systems, for carrying out production work. The equipments include Ground electronics, Seismograph; shooting systems, survey systems etc.
- Generation of Near Surface Model through advance up-hole studies conducted at regular intervals conforming to the topography and identification of suitable layers for placement of charge.
- Data Quality Analysis: The field monitor records are studied for quality of data at the target zone. In addition frequency spectra of raw data are done to ensure proper

resolution at the target level. **The data not meeting specification is rejected.**

- In field QC Processing: The seismic data is conditioned and brute stack sections generated to understand the overall quality of the sub surface imaging, and especially at the target zone and take mid course corrections, if required.
- Recovery planning, foldage study and execution of the data acquisition in obstacle zones are carried out, in order to avoid any data gaps.
- QC norms as per the manual laid down in **Quality Manual** are followed strictly.
- Developing the skills and competency of the persons involved in data acquisition operations. The crew is trained to carry out the data acquisition adhering to QHSE norms.
- Fixing responsibility and authority to persons for implementation of the QHSEMS.
- Maintaining the documentation required to demonstrate compliance of QMS.
- Reviewing the achievements against stated policies and objectives.

Occupational Health Management System

OH&S Management System OHSAS 18001 is a part of the overall management system that facilitates the management of the OH&S risks associated with the business of the organization. This includes the organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the organization's OH&S policy.” **OHSAS 18001** is not a legal requirement but a voluntary program.

OHSAS 18001 require that the organization commit to compliance with applicable legal requirements. The purpose of OH&S management is to maintain performance regarding OH&S issues of importance to the organization, and to **improve** the level of predominance where desired. According to OHSAS 18001, **continual improvement** is the “process of enhancing the OH&S management system, to achieve improvements in overall occupational health and safety performances, in line with the organization's OH&S policy.”

It was felt that there would be substantial improvement in overall OH&S worker protection if all Geophysical parties were OHSAS 18001 certified, and were committed to regulatory compliance and continual improvement. Thus, various underlying principles of the

OHSAS 18001 specifications were followed like the formulation of OH&S policy that provides a foundation for the OHSAS--MS. Incorporation of OH&S planning into all appropriate activities were considered, concrete OH&S objectives with means for achieving the specific tasks defined, with clear assignment of responsibilities and authorities, and also adequate provision of both human and financial resources were made. Expectations are dearly communicated throughout the party, with responsibility and accountability backed up by development of competence & on ongoing evaluation.

The extent of the application of the scope was dependent on factors like the OH&S Policy of the organization, the nature of its activities and the risks and complexity of the operations. The purpose was to ensure that the employees know the external / internal OH&S performance criteria that are required to be meet. These requirements also helped in determining the hazards / risks in the Geophysical surveys. **OH & S** planning included:

- Identification of hazards
- Risk analysis and control of risk
- Action plan for identification of objectives
- Target which is quantifiable

Legal and other requirements

Legal requirements were identified from all jurisdictions, relating to the geophysical parties. Further, these legal requirements included any information specific to the field parties that may be contained in operating permits, licenses or other authorizations required by law. Similarly, the tracks of other requirements regarding the OH&S policy were made. It was ensured that those who need the information regarding legal and other requirements have access. This could include anyone whose work could affect compliance - including those in management positions & down the line to workers. This access was provided effectively through written job descriptions and work procedures or instructions.

Safety Management System (SMS)

An effective system was developed for Accidents, Incidents, Non-conformances and Corrective and Preventive Actions. The purpose of the Accidents, Incidents, Non-conformances and Corrective and Preventive Action requirements is to ensure that accidents, incidents and actual potential departures from the QHSE-MS specifications are responded to and prevented from re-occurring.



Various **Procedures** were established for assigning responsibilities and authorities for:

- handling and investigating of accidents, incidents & non-conformances
- taking action to mitigate any resulting impacts
- initiating and completing corrective action and preventive action
- confirming the effectiveness of corrective and preventive actions

All corrective and preventive actions were reviewed through the risk assessment process prior to implementation. Documented procedures are updated resulting from corrective and preventive actions. Once an accident, incident or non-conformance has been identified, the organization immediate, short-term actions as may be required to address the situation are undertaken to investigate the situation & to determine as to how it arose so that it can be prevented from happening again in future.

Workers' Participation in Safety Management was ensured through a Safety Committee consisting of representatives of workers and management to promote co-operation between the workers and the management in maintaining proper safety and health at work and to review periodically the measures under taken.

First-Aid kits & appliances were provided and maintained in every party, and are readily accessible. First-aid boxes equipped with the prescribed contents were provided at least one each with every crew. Personal protective equipments and other safety kits were made available as per need.

Environmental management system

ISO 14001, again a voluntary standard was adopted by Geophysical Parties of ONGC for improving its performance on environmental fronts. **Environment** can be defined as surroundings in which an organization operates including Air, Water, Land, Natural Resources and their interaction with human beings and other living creatures including plants. Surroundings extend from within the company to the global system. **Pollution** is the presence of solid, liquid and gaseous substance in such a concentration which may be harmful to the environment. Such substances are called pollutants.

Environmental effects of human activities are umpteen like loss of bio- diversity (species depletion and

extinction), Land contamination (land filling, illegal dumping of toxic and waste, industrial spillage's and disused land), Atmospheric effects (global warming, stratospheric ozone depletion, acid rain and poor air quality), Water pollution (sewage, chemical or other waste contamination of rivers, lakes groundwater and oceans) etc.

An aspect is an element of an organization's activities, or services that can interact with the environment. **An aspect is significant** if law, local regulations, or codes of practice exist or if evidence of public pressure exists or if the scale of the aspect is high & the aspects are likely to result in an emergency. **An impact** can be termed as any change to the environment, good or bad, wholly or partly resulting from an organization's activities, products or services"

The need for urgent attention to environmental issues arise due to several reasons viz. increasing complexity of environmental issues, increasing financial liabilities, proliferation of laws and regulations, increasing public awareness, Customer / consumer demand, Competitive pressures/ opportunities, Increasing insurance premiums etc. Also there is pressure for an effective Environmental Management system (EMS) because of varied reasons like compatibility with all risks, wastes reduction savings etc.

Environmental planning included:

- identification of environmental aspects of all the activities, products and services
- Control of significant aspects

Basically **EMS** is a system designed and implemented to control significant environmental aspects, achieve regulatory compliance, and continual improvement. Structured and systematic approach was followed for control of environmental aspects & for improvement of environmental performance. **Thus an appropriate Environmental policy which is in line / in the direction**

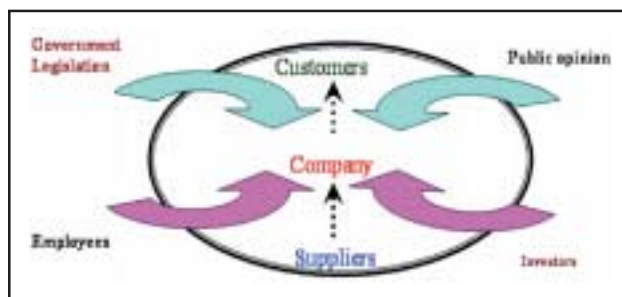


Fig. 2: Showing interaction of various agencies

of ONGC’s policy was approved by top management of Geophysical Services. The policy was committed for continual Improvement & included compliance to legislation. For achieving the policy objectives & targets were set and were also publicly available & communicated.

The Strategy adopted was to modify roles and responsibilities to enhance effectiveness of environmental management system. Various procedures were modified or formalized. Environmental awareness was created & re-built. Proper systems for implementing, monitoring, inspection, record-keeping and reporting were redefined /developed.

Hazard & Operability Studies (HAZOP) was carried to identify potential hazards and operability problems. A team was selected which focused the studied & identified Hazards and operability problems & recorded the results. Meetings were held and deliberations were made to find **significant aspects** regarding waste management releases to water emissions to air contamination of land use of raw materials and natural resources other local or environmental issues.

The direct benefits of implementing EMS were large & includes reduction / proper disposal of waste(s), Improved regulatory compliance and liability management, Improved public image to get an edge over the competition, fulfill a potential customer-driven requirement to operate in the international market, better and safe housekeeping etc. **The in - direct benefits** are also manifold like improved staff morale, better community / customer relations, enhanced corporate image, enhanced marketing capabilities and so on.

The ‘PLAN-DO-CHECK-ADJUST’ (PDCA) or ‘PLAN-DO-CHECK ACT’ cycle:

This is based on the principle of continual improvement. The PDCA cycle is originated in the Quality Management field along with Total Quality Management (TQM). **Planning** includes developing the overall context of the QHSE-MS. General planning is comprised of setting out the QHSE-MS scope, and developing the QHSE-MS policy. Specific planning involves developing the particular intentions of the QHSE-MS. The planning activities are updated on an ongoing basis as part of the PDCA cycle of continual improvement, and the planning process is applied whenever changes occur.

The **‘Do’** part of the PDCA requires developing / enhancing certain aspects of management functions. These

elements are essentially the day-to-day operations of QHSE management within the organization. The **‘Check’** elements of the PDCA cycle assess the level of performance of the QHSE-MS. The ‘Checking and Corrective Action’ activities investigate and report on how well the organization is doing and what it is going to do. The ongoing relevance and continual improvement is a function of the Management Review, which is the **‘Adjust’** part of the PDCA cycle.

Record keeping

The ISO requirements pertaining to records were fulfilled. Records provide part of the evidence used by auditors to determine conformance with the audit criteria, and can be used to provide information for the management review. Adequate records are developed and made available to allow auditors to be able to determine conformance. Records for e.g. includes training records; inspection reports; QHSE-MS audit reports; accident/incident reports; accident/incident follow-up reports; QHSE meeting reports; medical test reports; Personal Protective Equipment (PPE) issues and PPE maintenance records; reports of emergency response drills; management reviews; hazard identification, risk assessment and risk control records etc.

Whatever records are needed to demonstrate that the organization is implementing and maintaining its QHSE-MS procedures, programmes and policy, are kept and displayed. Not only records are maintained, they are retained for a specified time. It was determined as to how long records are needed to be kept, and this retention time is well documented. Additional consideration was given to the authority for disposal of records, the confidentiality of the records, legal and other requirements on the retention of records and issues regarding the use of electronic records.

Audit

Auditing is the primary focus for QHSEMS for effective implementation & continual improvement. Having adopted the integrated approach for QHSE the standard auditing approach was followed. Four stages in performing a QHSE-MS audit were followed. The **Stages in Audit planning undertaken were:**

- **Initiation of audit**
 - Objectives and scope
 - Preliminary document review
 - Requirements for an audit
- **Preparation for audit**
 - Audit plan



- Audit team assignments
- Working documents
- **Conducting the On-Site Audit Activities**
 - Opening meeting
 - Evidence collection
 - Audit findings
 - Closing meeting
- **Audit Reporting and Completion**
 - Audit conclusion
 - Audit report
 - Document control
 - Audit completion

Internal audit (IA) followed by Pre-assessment External Audit were done in first phase. Subsequent IA was carried out followed by Certification Audit. A report was prepared to document the execution, findings and conclusion of the audit.

Management review

The Management Review is carried as per documented agenda and all members of Steering committee attend the same at pre-defined intervals. The senior level management reviews the functioning of the QHSE -MS and the acceptability of the resulting QHSE performance, and re-adjusts the QHSE -MS if necessary. Also the continuing suitability, adequacy and effectiveness of all elements of the QHSE -MS are subject to this review, which is one of the main drivers of continual improvement.

While the 'Checking And Corrective Action' investigate how well the organization is doing & what it says it is going to do, the '**Management Review**' determines whether the planned and implemented QHSE-MS activities are effective or not, and what might need to be changed.

The Management Review brings the QHSE-MS through a full circle of the PDCA cycle. The Management Review may conclude that re-assessment and change of some of the elements of the QHSE -MS may be needed to adapt the QHSE -MS to changing times.

Conclusions

Implementing a QHSE - MS is not a 'task' that ends with certification / registration to the ISO / OHSAS 18001 specifications. The PDCA cycle is not to 'start' with planning and 'end' with management review. All of the QHSE -MS elements are parts of a continuing cycle that, which represent an ongoing & continual improvement towards QHSE-MS and QHSE performance. **For continual improvement in QHSE** it is essential that all persons involved in Geophysical activities have a clear understanding of their roles and responsibilities as outlined in QHSE -MS.

To change attitudes, thought processes & behavior of employees the emphasis on training & communication is also equally important. Suitable reward and recognition systems are to be followed. The other benefits of QHSE -MS are proper management of resources, raw materials or wastes, reduction / avoiding revenue expenditure, civil litigation and improvement of corporate image.

In all cases, success is dependent on senior management leadership and visible commitment to QHSE performance being amongst the organization's highest priorities.

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