Regulatory Requirements

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Aim of Presentation

- Objectives/Intent of Petroleum & OHS Legislation
- Serious vs less serious incidents
- Lagging vs leading indicators
- Reporting requirements
- Role of the regulator
- Discussion
Petroleum and Geothermal Energy Act 2000

Objectives

Letter of the Law

Minimise environmental and Safety risks from activities involved in:

• Exploration for, and recovery and processing… of petroleum and other resources to which this act applies; and

• The construction or operation of transmission pipelines for transporting petroleum and other substances to which this act applies

Prudent supply of Natural Gas
OH&S Act Objectives

Letter of the Law

• To secure the health, safety and welfare of persons at work;

• To eliminate risks to the health, safety and welfare of persons at work;

• To protect the public against risks to health or safety arising out of:
  (i) the activities of persons at work; or
  (ii) the use or operation of various types of plant
Spectrum of Incidents

Varanus Island  Gulf of Mexico

Security of Gas Supply  Environment

Small Gas Release  Small leak

From Tweedale 2003
Ultimate Aim
Intent of the law

No serious/high severity incidents
Safety/Reliability Stop the bang
Stop the environmental disaster
Ultimate Aim

Delivered through Objective/Risk-based legislation:

• Major focus –
  • outcomes to be achieved ("what" to achieve)
  • risk-based approvals/surveillance “case by case” basis
  • licensees/permit holders demonstrate can/do achieve outcomes
  • prevention (achieve outcomes) rather than cure

• Less focus –
  • “how” to achieve
  • prescriptive regulatory requirements or “one-size-fits all”
Reporting Provisions under Petroleum & Geothermal Energy Act 2000
Objective of Reporting

Provide evidence that we are meeting this ultimate aim through:

- Demonstrating all relevant risks in particular MAEs are managed to ALARP
- Equipment, facilities and management systems are fit for purpose
- Incidents are detected, responded to and preventative measures implemented
- Demonstrate continuous improvement/learning
The Concept of ALARP

Regard must be had to the following matters in determining what is reasonably practicable in relation to ensuring effective EHS Management:

a) the likelihood of the hazard or risk concerned eventuating;
b) the degree of harm that would result if the hazard or risk eventuated;
c) what the person concerned knows, or ought reasonably to know, about the hazard or risk and any ways of eliminating or reducing the hazard or risk;
d) the availability and suitability of ways to eliminate or reduce the hazard or risk;
e) the cost of eliminating or reducing the hazard or risk.
Measuring avoidance of high severity incidents
Preventative vs Mitigation

Hazards

Preventative Controls

Incident

Mitigation Controls

Outcomes

Threats

Loss Potential
Swiss Cheese Model of Defence

Hazard

Ideal

Reality

Incident
Two Categories of Measures

• Lagging KPI (mitigative - reactive)
• Leading KPI (preventative - proactive)
Lagging KPIs (too late)

Examples

- Oil Spill: 37 (21%)
- Other Spill: 11 (6%)
- Other: 8 (4%)
- Pipeline Encroach: 4 (2%)
- Gas Release: 5 (3%)
- Security of Supply: 23 (13%)
- OHS&W: 92 (51%)
Lagging KPIs OK if you are at the low severity incident end
Leading Indicators

More about being proactive to ensure we avoid the big bang rather than react to it
Swiss Cheese Hazard Model

Management System

- Process hazard analysis
- Management of change
- Design Basis
- Design & Construction
- Pre Start-up Review
- Operating Procedures & Safety Practices
- Maintenance
- Integrity Management
- Ignition Control
- Critical Protection Systems
- Training and competence
- Risk assessments

MAJOR INCIDENT

SAFE OPERATION

Courtesy Santos
Regulatory preference for leading indicators
Leading KPIs

Indicators of effectiveness of Safety Management System:

- Maintenance of mechanical Integrity
- Action items follow-up
- Management of Change
- Training and competency
- Near misses (incident and procedural)

AIM: Early detection of deterioration of key barriers before loss of containment incident occurs
Leading KPIs

Mechanical Integrity:

- **Focus on safety critical items**
  - Include pressure vessels, relief and vent devices, control systems, interlocks and emergency shutdown systems
  - Number of inspections of critical items of plant and equipment completed on time
  - Length of time plant operating with safety critical items in failed state
**Leading KPIs**

**Action Items Follow Up:**

- **Focus on due or extended PSM action items:**
  - Audit action items
  - JHA/PHA action items
  - Incident investigation action items
  - Regulatory compliance action items
**Leading KPIs**

- **Management of Change:**
  - Extent to which site’s MOC procedure is being followed
  - How well site recognises changes that require MOC procedure

- **Training and Competency:**
  - Competency assessment indicator, qualifications vs experience
  - Deviation of critical tasks to PSM work procedures/instructions
Leading KPIs

• Incident Near Misses without major event
  • Creation of demand with successful Pressure Relief Device (PRD)/Safety Instrumented System (SIS)
  • Creation of demand with failure of Pressure Relief Device (PRD)/Safety Instrumented System (SIS)
  • Excursion of parameters such as P, T, corrosion and Flow limits
  • Operating outside equipment design parameters
  • Detected cracks or pin holes or corrosion with/without releases
  • Utility failures eg power, steam, water and air
Leading KPIs

• Procedural Near Misses without major incident
  • PTW breaches
  • Inadequate critical drawing availability and up to date
  • Inadequate critical procedure dossier
  • MOC and maintenance procedure breaches
  • Deactivation of safety equipment eg gas detectors
  • Incorrect installation of equipment
**Key Risk Management Provisions**

- **Risk Assessment**
  - Demonstration of ALARP
  - Ongoing review of risks and controls (preventative and mitigative)

- **Management System**
  - Operating procedures and controls (Incl JHA, PTW etc)
  - Training and induction
  - Change management
  - Incident management
  - Audit and Review
Risk Assessment (EIR)

For regulated activities licensee must address:

- Potential and actual hazardous events
- Frequency and likelihood of such events
- Potential and actual consequences of these events
- Mitigation/control measures
- Level of risk – in light of control measures adopted
  - Establishes whether risk is ALARP or not
- Stakeholder consultation
Risk Assessment What Type?

- Unacceptable region
- Tolerable region
- Broadly acceptable region

Increasing risk

- Quantitative risk analysis
- Semi-quantitative risk analysis
- Qualitative risk analysis
Risk Assessment

Ongoing review of risks and controls:

• Fitness for Purpose Assessment for all facilities at least every 5 years (Regulation 30)
  • See PIRSA environmental register for copies of all FFP reports submitted
Risk Assessment

Fitness-for-Purpose (FFP) Assessment must address:

- Facility physical condition
- Effectiveness of Management Systems
- Revise potential risks
- Ensure new and existing risks are ALARP
- Adequacy and reliability of utilities
- Limitations of available information and sensitivity of assumptions
Management System

Licensees must demonstrate appropriate management systems are in place (Regulation 16):

• Policies, procedures & work practices with respect to achieving SEO compliance
• Training/induction/supervision practices and procedures
• Risk management (eg JHA, PTW systems)
• Monitoring, auditing, reviewing and improving performance (eg incident and change management)
• High/Low Regulatory supervision
A tool for the self-assessment of
HEALTH, SAFETY AND ENVIRONMENT MANAGEMENT SYSTEMS

Assessing the Health, Safety and Environment Management System

Results (levels achieved)

1. Commitment and Leadership
   1.1 Commitment 1
   1.2 Leadership 2

2. Policies and Objectives
   2.1 Policies 3
   2.2 Objectives 4

3. Organization, Resources and Documentation
   3.1 Organizational Responsibilities 5
   3.2 Training and Competence 6
   3.3 Sub-contractor Management 7
   3.4 Communication 8
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4. Risk Evaluation and Management
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   4.2 Risk Evaluation 11
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5. Planning
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   5.2 Asset Integrity 15
   5.3 Procedures and Work Procedures 16
   5.4 Management of Change 17
   5.6 Emergency Response 18

6. Implementation, Recording and Monitoring
   6.1 Inspections 19
   6.2 Records 20
   6.3 Performance Monitoring 21
   6.4 Non-compliance and Corrective Action 22
   6.5 Incident Reporting and Follow-up 23

7. Audit and Review
   7.1 Audits 24
   7.2 Reviews 25
4 Risk Evaluation and Management

To continually evaluate the HSE risks to the workforce, customers and the environment. Continuously evaluate processes and activities for hazards, assess potentials, record and control the subsequent risk to a tolerable level.

<table>
<thead>
<tr>
<th>Assessment Criteria</th>
<th>4.1 Identification of Hazards and Effects</th>
<th>4.2 Risk Evaluation</th>
<th>4.3 Recording of Hazards and Effects</th>
<th>4.4 Risk Reduction Measures – Recovery</th>
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<tbody>
<tr>
<td><strong>LEVEL 4</strong></td>
<td>□ All HSE definitions known and well understood at all levels. A process exists for updating the hazards and effects inventory due to changes to the operation or learning from inspections or incident analysis. Appropriate personal at all levels involved in process.</td>
<td>□ Screening techniques used to assess the risk (likelihood and consequence) of each hazard and effect associated for people, the environment and assets. Assessments kept up to date and modified when changes occur.</td>
<td>□ Results of evaluation recorded together with data sources and assumptions used. Records used by operating personnel to develop procedures and work instructions. Hazard records reviewed by involved personnel as a hazard communication tool. Statutory requirements and codes applicable to HSE are documented.</td>
<td>□ Integral part of operation. Risk associated with all relevant hazards minimized through systematic application of effective prevention and mitigation measures. All personal protective equipment (PPE) issues addressed, work instructions and rules clearly defined and always respected. Permit To Work (PTW) system applied systematically and effectively. Control and mitigation improved as the result of drills and exercises from within and outside the company.</td>
</tr>
<tr>
<td><strong>LEVEL 3</strong></td>
<td>□ Basic HSE definitions known and understood at all levels. Appropriate techniques used on all operations. A comprehensive inventory of HSE hazards and effects has been documented for all units in the company.</td>
<td>□ Assessments compiled and reviewed by involved persons in bottom-up approach. All major hazards identified. Risk or significance of these have been classified using the risk matrix or equivalent.</td>
<td>□ Records compiled and used by involved personnel at all levels. Major hazards and risks recorded.</td>
<td>□ Risk associated with major hazards minimized through proactive application of prevention and mitigation measures that meet local requirements. Requirements understood by all. PPE rules clearly defined with few violations. PTW in place for critical operations. Personnel familiar with their roles in control and recovery procedures.</td>
</tr>
<tr>
<td><strong>LEVEL 2</strong></td>
<td>□ Basic HSE definitions known and understood by management. Techniques for hazards and effects identification are documented but mostly a top down process.</td>
<td>□ Standard techniques known. Not all major risks evaluated. Mostly top-down process.</td>
<td>□ Structure defined and some data captured. Not recognized and consistently used in the organization.</td>
<td>□ Generic prevention and mitigation measures applied for major risks. Controlled supply of PPE, some calendar to be completed, some training given. Good respect for PPE rules. PTW system known application inconsistent. Procedures exist for drills but few exercises conducted.</td>
</tr>
<tr>
<td><strong>LEVEL 1</strong></td>
<td>□ Basic HSE definitions hardly known. Techniques for hazards and effects identification not documented.</td>
<td>□ Haphazard assessment of risk mostly in reactive mode. No systematic assessment of risk.</td>
<td>□ Poor knowledge of regulatory requirements. No structured process for recording.</td>
<td>□ Haphazard application of generic prevention and mitigation measures. Nominal supply of Personal Protective Equipment (PPE) with no formal assessment of requirements and little follow-up on compliance. Permit To Work (PTW) system not known or used. Drills sporadic, incomplete records.</td>
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5 Planning

HSE considerations shall be integral to all aspects of business planning or changes in the design, development, and delivery of our products and services.

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<th>5.2 Asset Integrity</th>
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<th>5.5 Emergency Response</th>
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<td>LEVEL 4 Division/site recognised as also being the particular aspect of the management system</td>
<td>- Plans in place to address all assessed health, safety, environmental and security risks. HSE plans written, communicated as appropriate and reviewed on a regular basis. HSE requirements systematically included in early stage of operational plans. Targets are published annually.</td>
<td>- All HSE issues related to facilities and equipment clearly identified, understood and communicated to concerned parties. Modifications to equipment controlled. Effective bottom-up process in place to operate design and maintenance programs.</td>
<td>- All critical activities identified, documented and reviewed to ensure HSE implications. Full understanding of potential impact of simultaneous operations and control in place. All operations conducted to reduce risks at all times. HSE risks clearly communicated to all staff involved in operation. Operations personnel initiate documentation resolution.</td>
<td>- Analysis and documentation of HSE impacts due to changes in legislation, personnel, equipment, processes, procedures or acquisitions are an integral part of all change control procedures. Analysis and documentation completed for both explaining the change and the impact of the implemented change. Amendments made to HEMAS are then disseminated to all staff involved.</td>
<td>- All Emergency Response Plans (ERPs) in place. Drills held and plans tested on regular basis. Improvements are incorporated and checked. Minutes available from debriefings.</td>
</tr>
<tr>
<td>LEVEL 3 This particular aspect of the management system is being addressed systematically. Rating the respective targets, integration with other activities initiated</td>
<td>- Most health, safety, environment and security issues addressed in plans. Most employees aware of appropriate plans. HSE requirements systematically included in most operational plans. Effective and systematic pre-job meetings.</td>
<td>- Effective management programs in place, focused on HSE critical requirements. HSE integral part of equipment and development, facilities, equipment and products used at purpose and comply with their design specifications.</td>
<td>- HSE implications of most critical processes understood and controlled. Work practices consider most HSE risks. Good communication of HSE risks to staff. Simultaneous operations understood and some controls in place. Defined process exists for development and review of standards.</td>
<td>- Change control procedures exist documenting evaluation, approval and the responsibilities and competencies of those involved.</td>
<td>- All ERPs in place including spill contingency. Not regularly drilled or tested. Roles maintained by responsible persons.</td>
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<tr>
<td>LEVEL 2 Performance and results inconsistent. System being implemented but generally at minimum levels.</td>
<td>- Some plans developed. Mostly copied from previous versions and not adapted to new conditions. Little information communicated outside management or HSE function. Pre-job meetings routine. HSE requirement occasionally included in operational plans, usually afterthought.</td>
<td>- Maintenance program developed, not fully implemented. Not all equipment and products conform with specifications.</td>
<td>- Critical processes requiring written procedures not well understood. Work practices not well aligned with operational risk reduction. Local procedures not documented or updated. Not all staff aware of HSE issues. Little understanding of impact of simultaneous processes and face controls in place.</td>
<td>- There is a change control procedure but its scope is not clearly defined and its application is not consistent.</td>
<td>- Some ERPs in place. Regulatory emergency response requirements are met. Medical access tested.</td>
</tr>
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<td>LEVEL 1 Overall performance is poor. Awareness may be low, but the implementation of this particular aspect of the management system is haphazard or not in evidence.</td>
<td>- No plans developed for health safety environmental security issues. HSE requirements not included in operational plans. No performance targets. Pre-job meetings driven by external owner.</td>
<td>- HSE issues not fully evaluated or addressed at design or purchasing stage. No proactive maintenance program in place. Equipment mostly used with HSE deficiencies.</td>
<td>- Critical activities requiring written procedures not identified or understood. Some procedures/instructions exist and are known to supervisors, inconsistently used and evidenced. Documents written by HSE personnel with no employee input.</td>
<td>- Changes to approved plans (cost, time, resources) are approved one level up and only formally documented and approved when required by financial controls.</td>
<td>- Only Nodex is in place. Emergency Response Plans (ERPs) only explained in briefings and courses, not tested or drilled.</td>
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Summary of Results 2009 (Leading KPI)
Results published every year in PIRSA Annual Compliance Report
Summary of Results 2009 (Leading KPI)
Results published every year in PIRSA Annual Compliance Report

Division of Minerals and Energy Resources
PIRSA
PIRSA Response to Self Assessment Results

Regulatory scrutiny on 5 HSEMS components in 2010:

- Audits & Reviews
- Training and Competence
- Management of Change
- Contractor Management
- Asset Integrity
Lagging & Leading Incident Reporting


**Incident Definitions**

Regulation 32:

- Serious incidents (defined in SEO)
- Reportable incidents, less serious incidents (defined in SEO)

Mixture of lagging and leading:

Incident Investigations

- Incident Investigations must detail:
  - Cause (Root Cause)
  - Consequences
  - Mitigation and remedial actions of consequences
  - Preventative mitigation measures
Incident Statistics (Lagging KPIs)
Published every year in PIRSA Annual Compliance Report

- Oil Spill: 92 (51%)
- Other Spill: 37 (21%)
- Pipeline Encroach: 11 (6%)
- Gas Release: 8 (4%)
- Security of Supply: 5 (3%)
- OHS&W: 23 (13%)

Legend:
- Oil Spill
- Other Spill
- Pipeline Encroach
- Gas Release
- Security of Supply
- OHS&W
Root Cause Analysis Results
Published every year in PIRSA Annual Compliance Report

Root Cause Summary - 2008

- Monitoring/Maintenance: 81 (49%)
- Design: 2 (1%)
- Work Practices: 4 (2%)
- Communication: 26 (16%)
- Supervision: 10 (6%)
- Induction/Training: 28 (17%)

Division of Minerals and Energy Resources
PIRSA
If all things fail then Emergency Response

Final Mitigative Control Regulation 31 Requires:

- Licensees must have ERP to address:
  - Environment impact
  - Public health and Safety
  - Security of gas supply

- ERP must include:
  - Measures which mitigate consequences in emergency
    - Eg Evacuation, safe shut down, supply contingencies, containment
  - Measures to rehabilitate environment affected by emergency
Management System Framework

- Vision/Mission
- Policy
- General Standards
- Procedures
- Work Instructions
- Performance Review & Reporting

Assessment Factors Reg. 16

Leading and Lagging Indicators
Role of PIRSA

Monitor to ensure:

• Integrity of company reporting and audits by assessing:
  • Available resources (technical, competency of people, systems)
  • Companies meet the regulatory conditions

Enforce compliance where necessary
Enforcement Pyramid

Report Step 1 to 4 measures in annual compliance report

- **Preventive measures**
  - Steps 1
- **Persuasive measures**
  - Step 2
- **Compulsive measures**
  - Step 3
- **Punitive measures**
  - Step 4

See 2009 annual compliance report for examples of such measures.