External Corrosion Project

INSTALLATION and DUTY HOLDER	DATE(S)	IMT and INSPECTOR(S)

KEY PERSONS INTERVIEWED (Not all persons need be named, group interviews can be identified by team names)	POSITION

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General

Project objective

The project objective is to reduce risks from external corrosion on offshore installations through a combination of improvements to:

- duty holder management systems; and
- the physical condition of offshore installations.

Definitions

For the purposes of this project:

- **external corrosion** covers topsides plant, equipment (including secondary structures) and includes:
  - Safety critical plant and equipment – parts of the installation defined as safety critical elements by SI 2005/3117; and
  - Safety related plant and equipment – parts of the installation which can cause non Major Accident Hazards (e.g. slips, trips and falls, dropped objects).
- **performance standards** are technical/engineering criteria for measuring the physical fitness for purpose of plant and equipment; and
- **performance indicators** provide measures by which management understand the physical condition of the installation.

Team roles and responsibilities

Project IMT:	lead inspector; delivery of inspection report; and lead on enforcement if installation IMT not involved in inspection
Installation IMT:	arranging inspection; and lead on enforcement
Topic specialist:	corrosion specialist advice

Project reports

Inspections are to be reported against the template items and to include:

Deficiencies found and actions to be taken;
Examples of best industry practice; and
photographic evidence of physical condition

Traffic light system

Traffic Light	Criteria
NON COMPLIANCE / MAJOR FAILING	Non-compliance with legislation. Major failing of system (hardware or management); or Partial failure with a history of failure. **MINDED TO SERVE A NOTICE**
ISOLATED FAILURE / INCOMPLETE SYSTEM	Isolated failure of a well-defined system. Incomplete procedures/systems. **RECOMMENDATIONS IN THE LETTER TO DUTY HOLDER**
IN COMPLIANCE / OK	Tested or inspected but with no significant issues found Complies with regulations, etc.
NOT INSPECTED	Not tested or no evidence. There are concerns or information is unclear - re-inspect at later date. **Issues in this category should include an explanatory note**

Persons to speak to:

The person(s) who controls the resources required to ensure effective control of topsides external corrosion, this is typically the Asset Manager, supported by Technical Authorities (TA).

The person(s) responsible for setting the technical standards to ensure that the correct maintenance is carried out to an acceptable quality.

The person(s) responsible for the implementation of the external corrosion maintenance.

Other persons may be included e.g. the Independent Competent Person (ICP), the Health, Safety, Environment and Quality (HSEQ) advisors, Safety Representatives and OIMs.

Onshore Inspection Templates

1 Company/Management Culture

Objective:

To establish that adequate management controls exist for external corrosion.

Background:

- The Company policy and management actions are crucial to ensure that external corrosion is adequately controlled.
- The relevant policy and strategies need to adequately address external corrosion – in particular it should place appropriate emphasis on **safety related (non major accident hazard),** as well as safety critical plant & equipment.
- The policy/strategy should be clearly linked to a defined target field/asset life of the installation, which should be realistic and justified. The policy/strategy should also recognise the likelihood of field/asset life extension, and what preparation and actions would be necessary in the event of an extension.

- Every level of management and supervision should have clearly defined roles and responsibilities for external corrosion and be provided with adequate resources to deliver such responsibilities.
- There should be arrangements for acceptance by each level of management responsible for the physical condition of the installation with regards to external corrosion of safety critical and safety related plant & equipment.
- Regular audits and reviews should be undertaken on the above to ensure their effectiveness in contributing to the management of external corrosion.

Evidence required:

Documents providing information on the following:

- Company corrosion management policy and strategy.
- Roles and responsibilities.
- Approval of physical condition.
- Audit & reviews.

Relevant legislation:

- Health & Safety at Work etc Act 1974 (HSWA); Section 2 General duties of employers to their employees.
- Health & Safety at Work etc Act 1974 (HSWA); Section 3 General duties of employers and self-employed to persons other than their employees.
- Management of Health & Safety at Work Regulations 1999 (MHSWR); Reg 5 Health and safety arrangements.

Published good industry practice:

- Successful Health and Safety Management HS(G)65.
- Step Change Hydrocarbon Release Reduction Toolkit
- Step Change Asset Integrity Toolkit
- Guidance for the Topic Assessment of the Major Accident Hazard Aspects of Safety Cases (GASCET)
- Review of corrosion management for offshore oil and gas processing - OTO 2001/044 {to be superseded by the proposed Energy Institute Guidance on Management of Corrosion for Offshore Oil and Gas Installations}

INSPECTION NOTES:	1 COMPANY/MANAGEMENT CULTURE
To be: ***assessed for adequacy; and verified for compliance (using the sample installation):***	
1 How the policy and/or strategy addresses: **a. external corrosion – for safety critical and safety related plant & equipment** **b. asset/field life and life extensions**	
2 The roles, responsibilities and provision of adequate resources for the various levels of management and supervision for external corrosion of safety critical and safety related plant & equipment	
3 The arrangements for acceptance by each level of management responsible for the physical condition of the installation with regards to external corrosion of safety critical and safety related plant & equipment	
4 The arrangements for audits and reviews undertaken of the policy, strategy and performance indicators relating to external corrosion of safety critical and safety related plant & equipment in particular: **a. The programme** **b. Relevant records of audits and reviews undertaken**	
Additional comments:	

NON COMPLIANCE / MAJOR FAILING	ISOLATED FAILURE / INCOMPLETE SYSTEM	IN COMPLIANCE / OK	NOT INSPECTED
Action taken:			

Intentionally left blank

2 Performance indicators

Objective:

To establish that there are in place appropriate external corrosion performance indicators to provide senior management (budget holders) with a clear understanding of the physical condition of the installation.

Background

- Performance indicators should exist which provide unambiguous information on the physical condition of the installation with respect to external corrosion to enable each level of management to fulfil its responsibilities.
- Performance indicators should, where appropriate, include targets and trending. This should apply to both safety critical and safety related external corrosion.
- Performance indicators may take many forms. They may be linked to statutory requirements e.g.
    - the number of incidents and failures caused by external corrosion for both safety critical and safety related plant & equipment. This requires effective arrangements for the reporting and root cause assessment of incident and failures; and
    - reservations or comments regarding good repair and condition of safety critical plant & equipment identified by the Independent Competent Person.

  Alternatively performance indicators could include matters such as:
    - Concerns expressed by the workforce.
    - Visual information e.g. installation photographs or videos.
    - Personal visits to the installation.

Evidence required:

Documents providing information on:

- performance indicators used
- targets and trending for the performance indicators
- incident and failure reporting and investigation
- ICP reservations relating to external corrosion.

Relevant legislation:

- Health & Safety at Work etc Act 1974 (HSWA); Section 2 General duties of employers to their employees.
- Health & Safety at Work etc Act 1974 (HSWA); Section 3 General duties of employers and self-employed to persons other than their employees.
- Management of Health & Safety at Work Regulations 1999 (MHSW); Reg 5 Health and safety arrangements.

Published good industry practice:

- Step Change Hydrocarbon Release Reduction Toolkit
- Step Change Asset Integrity Toolkit
- Developing Process Safety Indicators (HSE books ISBN 0 7176 6180 6)
- Review of corrosion management for offshore oil and gas processing - OTO 2001/044 {to be superseded by the proposed Energy Institute Guidance on Management of Corrosion for Offshore Oil and Gas Installations}

INSPECTION NOTES:	**2 PERFORMANCE INDICATORS**
To be: ***assessed for adequacy; and verified for compliance (using the sample installation)***	
1 The performance indicators for external corrosion of safety critical and safety related plant & equipment.	
2 The targets set for such performance indicators.	
3 The arrangements in place for trending performance.	
4 The arrangements for reporting and investigation of incidents and failures due to external corrosion of safety critical and safety related plant & equipment.	
5 Reservations or comments on good repair and condition raised by the Independent Competent Person regarding external corrosion.	
Additional comments:	

NON COMPLIANCE / MAJOR FAILING	ISOLATED FAILURE/ INCOMPLETE SYSTEM	IN COMPLIANCE / OK	NOT INSPECTED
Action taken:			

3 External corrosion maintenance plan

Objective

The duty holder to demonstrate that:

- Appropriate plans and procedures are in place to ensure that all plant & equipment remains in an efficient state, in efficient working order and in good repair with respect to external corrosion.
- Such plans and procedures are being complied with.

Expectation:

- Documented plan(s) should exist that define a programme of maintenance for external corrosion to ensure, insofar as it relates to health & safety, that all plant and equipment on the installation remains in good repair and condition.
- The maintenance plan should address:
  - the age of the plant and equipment and their function in the defined field/asset life
  - short and long term requirements to enable effective resourcing over the life of the installation.
- The programme should clearly define what needs to be done and when it needs to be done by. The programme can be prioritised on a risk basis but should adequately address both safety critical and safety related plant and equipment.
- Safety critical plant and equipment should be clearly identified and included within the verification scheme
- Maintenance activities should be scheduled to ensure that plant and equipment **'remain in an efficient state, in efficient working order and in good repair'** i.e. in compliance with performance standards.
- Failure to complete such work to the plan may not necessarily mean that such plant and equipment fails to comply with the performance standard, however when the plan is not achieved, the duty holder should demonstrate that such plant and equipment will continue to comply with the performance standard until the rescheduled maintenance activity is completed. This principle should apply equally to both safety critical and safety related plant & equipment.
- Where such rescheduling involves safety critical plant & equipment, the duty holder should have in place arrangements with the Independent Competent Person (ICP) to verify that such plant and equipment remains in good repair and condition until the rescheduled maintenance is carried out
- Rescheduled maintenance activities should be recorded as backlogs to enable trends and resourcing requirements to be evaluated.

Evidence required:

Documents providing information on the following:

- The external corrosion maintenance plan for the identified installation (this may be from several sources e.g. painting, fabric maintenance plans, work orders etc.).

- Procedures for prioritisation of work to be done (particularly with respect to safety critical versus safety related):
    - o Scheduling of the work
    - o Defining backlogs
    - o Permitting deferrals
    - o Arrangements with ICP

Relevant legislation:

- Health & Safety at Work etc Act 1974 (HSWA); Section 2 General duties of employers to their employees
- Health & Safety at Work etc Act 1974 (HSWA); Section 3 General duties of employers and self-employed to persons other than their employees
- Management of Health & Safety at Work Regulations 1999 (MHSWR); Reg 4 Principles of prevention applied
- Management of Health & Safety at Work Regulations 1999 (MHSWR); Reg 5 Health and Safety Arrangements
- Provision & Use of Work Equipment Regulations 1998 (PUWER); Reg 5 Maintenance
- The Offshore Installations and Wells (Design and Construction, etc) Regulations 1996 (DCR); Reg 8 Maintenance of integrity
- The Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995 (PFEER); Reg 9(1) Prevention of fire and explosion
- The Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995 (PFEER); Reg 19 Suitability and Condition of Plant.

Published good industry practice:

- Step Change Hydrocarbon Release Reduction Toolkit
- Step Change Asset Integrity Toolkit
- Review of corrosion management for offshore oil and gas processing - OTO 2001/044 {to be superseded by the proposed Energy Institute Guidance on Management of Corrosion for Offshore Oil and Gas Installations}

INSPECTION NOTES:	**3 EXTERNAL CORROSION MAINTENANCE PLAN**
To be: ***assessed for adequacy; and*** ***verified for compliance (using the sample installation)***	
1 The maintenance philosophy and plan(s) address: **a. the field/asset life and possible life extension** **b. short term and long term activities**	
2 The scope of the maintenance and repair programme for external corrosion of safety critical and safety related plant & equipment in particular: **a. Walkways & stairways** **b. Cable trays including fittings and brackets** **c. Bolted connections** **d. Flanges** **e. Pipe supports and pipes**	

f. Valves
3 The identification of the above equipment types when safety critical elements i e requiring verification
4 The arrangements for verification in particular: **reservations or comments of the Independent Competent Person as to the completeness of the scheme for plant & equipment identified by item 3; and** **where maintenance rescheduling occurs that such plant & equipment remain in good repair and condition until the rescheduled maintenance has been carried out**
5 The arrangements for maintenance task prioritisation for external corrosion in particular: **a. safety critical versus safety related maintenance scheduling** **b. defining and setting targets for backlogs of external corrosion of safety critical and safety related plant & equipment**
6 The current and historical record of backlogs for external corrosion of safety critical and safety related plant & equipment
7 The arrangements to enable provision of additional resource to reduce overdue maintenance
8 The arrangements for justifying and authorising deferrals

Additional Comments:	

NON COMPLIANCE / MAJOR FAILING	ISOLATED FAILURE / INCOMPLETE SYSTEM	IN COMPLIANCE / OK	NOT INSPECTED

Action taken:	

Intentionally left blank

4 Performance Standards

Objective:

To establish that rejection criteria for external corrosion of components are clearly defined and can be measured effectively and consistently**.**

Background:

- Where duty holders allow components to degrade and/or corrode as part of a condition-based scheme, performance standards should exist which define the point at which the component needs to be repaired or replaced i.e. rejection criteria. Such performance standards should be quantifiable such that they are capable of being measured effectively and consistently.
- The performance standards need to be supported by sound engineering justification and should be consistent with the basis of design, taking account of any changes to service conditions. This should include the necessary safety related strength and/or serviceability requirements of the component necessary to define the quantitative performance standard.
- Where components are part of the installation's Safety Critical Elements, the components should be verified against such performance standards by an Independent Competent Person.

Evidence required:

Documents providing information on the following:

- Measurable rejection criteria for external corrosion of safety critical and safety related plant & equipment.
- Records to demonstrate effective use of such rejection criteria.

Relevant legislation:

- Health & Safety at Work etc Act 1974 (HSWA); Section 2 General duties of employers to their employees
- Health & Safety at Work etc Act 1974 (HSWA); Section 3 General duties of employers and self-employed to persons other than their employees
- Management of Health & Safety at Work Regulations 1999 (MHSWR); Reg 5 Health and safety arrangements
- Provision & Use of Work Equipment Regulations 1998 (PUWER); Reg 4 Suitability of Work Equipment.
- The Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995 (PFEER); Reg 5(2)(c) Assessment
- The Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995 (PFEER); Reg 9(1) Prevention of fire and explosion

Published good industry practice:

- HSE Offshore External Corrosion Guide
- Step Change Asset Integrity Toolkit

INSPECTION NOTES:	4 PERFORMANCE STANDARDS
To be: ***assessed for adequacy; and*** ***verified for compliance (using the sample installation)***	
1 The rejection criteria for external corrosion on: **a. Walkways & stairways** **b. Cable trays including fittings and brackets** **c. Bolted connections** **d. Flanges** **e. Pipe supports and pipes** **f. Valves**	
2 The ability to measure such rejection criteria consistently	
3 For the above plant & equipment types in a safety critical function, the reservations or comments of the Independent Competent Person	
Additional Comments:	

NON COMPLIANCE / MAJOR FAILING	ISOLATED FAILURE / INCOMPLETE SYSTEM	IN COMPLIANCE / OK	NOT INSPECTED
Action taken:			

5 Offshore Workforce Awareness and Participation

Objective:

To establish the awareness and participation of the offshore workforce in identifying and reporting external corrosion.

Background:

- External corrosion can be seen by general visual observations whilst undertaking other activities around the installation. This provides a valuable source of opportunistic inspection by the workforce which the duty holder should fully utilise.
- The workforce should be made aware of external corrosion and provided with appropriate training and a reporting system to enable effective identification of corrosion which may be of concern.
- Arrangements should be in place to ensure the effective awareness and participation of the workforce with respect to external corrosion of safety critical and safety related plant & equipment.

Evidence required:

Documentation providing information on:

- Company corrosion awareness strategy
- Corrosion awareness campaigns e.g.
  - training courses
  - notice board posters
  - presentations
- Means by which workers can formally raise corrosion concerns
- Means of closing out worker concerns

Relevant legislation:

- Health & Safety at Work etc Act 1974 (HSWA); Section 2 General duties of employers to their employees.
- Health & Safety at Work etc Act 1974 (HSWA); Section 3 General duties of employers and self-employed to persons other than their employees.
- Management of Health & Safety at Work Regulations 1999 (MHSWR); Reg 5 Health and safety arrangements.
- Management of Health & Safety at Work Regulations 1999 (MHSWR); Reg 10 Information for employees.

Published good industry practice:

- Step Change Hydrocarbon Release Reduction Toolkit
- Step Change Asset Integrity Toolkit

Review of corrosion management for offshore oil and gas processing - OTO 2001/044 {to be superseded by the proposed Energy Institute Guidance on Management of Corrosion for Offshore Oil and Gas Installations}

INSPECTION NOTES:	5 WORKFORCE AWARENESS AND PARTICIPATION
To be: ***assessed for adequacy; and*** ***verified for compliance (using the sample installation)***	
1 Company corrosion awareness strategy	
2 Arrangements for general corrosion awareness for both safety critical and safety related plant & equipment e.g. **a. Presentations held on the platform** **b. Posters** **c. Training courses** **d. Specific campaigns**	
3 Arrangements to enable offshore workers to raise concerns on external corrosion of safety critical and safety related plant & equipment e.g. **a. Safety Representatives** **b Formal procedures** **c. Informal procedures**	
4 Arrangements for subsequent duty holder action e.g. **a. Assessment** **b. Actions taken** **c. Feedback to workforce**	
Additional Comments:	

NON COMPLIANCE / MAJOR FAILING	ISOLATED FAILURE / INCOMPLETE SYSTEM	IN COMPLIANCE / OK	NOT INSPECTED
Action taken:			

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Offshore Inspection Templates

6 Offshore inspection

Objective:

- To assess the implementation and effectiveness of the duty holders arrangements for managing external corrosion of safety critical and safety related plant and equipment.

Background:

- An offshore inspection will be undertaken on a sample installation of the duty holder to evaluate the effectiveness of the duty holders arrangements through inspecting the following:

  a. The general physical condition of a selected sample of plant & equipment types on the installation and implementation of the maintenance plan for external corrosion of the selected sample of plant & equipment types;
  b. The workforce awareness and participation in the control of external corrosion of safety critical and safety related plant & equipment; and
  c. The records for incidents and failures resulting from external corrosion of safety critical and safety related plant & equipment.

Evidence required:

Documentation providing information on:

- External corrosion maintenance plan.
- Records of workforce involvement in external corrosion.
- Records of incidents and failures due to external corrosion.

Relevant legislation:

- As per Section 3 External Corrosion Maintenance Plan
- As per Section 5 Offshore Workforce Awareness and Participation.
- As per Section 2 Performance Indicators

Published good industry practice:

- HSE Offshore External Corrosion Guide
- As per Section 3 External Corrosion Maintenance Plan
- As per Section 5 Offshore Workforce Awareness and Participation.
- As per Section 2 Performance Indicators

INSPECTION NOTES:	6a OFFSHORE - PHYSICAL CONDITION AND MAINTENANCE PLAN
To be: ***assessed for adequacy; and*** ***verified for compliance (using the sample installation)***	
1 The general condition of: **Walkways & stairways** **Cable trays including fittings and brackets** **Bolted connections** **Flanges** **Pipe supports and pipes** **Valves**	
2 Implementation of the external corrosion maintenance plan(s) for the above components in particular the following aspects: **Existing backlogs** **Progress against plan** **Identified unplanned activities** **Identified deferrals**	
Additional Comments:	

NON COMPLIANCE / MAJOR FAILING	ISOLATED FAILURE / INCOMPLETE SYSTEM	IN COMPLIANCE / OK	NOT INSPECTED
Action taken:			

INSPECTION NOTES:	6b OFFSHORE – WORKFORCE AWARENESS AND PARTICIPATION
To be: ***assessed for adequacy; and*** ***verified for compliance (using the sample installation)***	
1 General corrosion awareness activities for both safety critical and safety related plant & equipment e.g. **a. Presentations held on the platform** **b. Posters** **c. Training courses** **d. Specific campaigns**	
2 Implementation of arrangements to enable offshore workers to raise concerns on external corrosion of safety critical and safety related plant & equipment e.g. **a. Safety Representatives** **b. Formal procedures** **c. Informal procedures**	
3 Implementation of arrangements for subsequent duty holder action e.g. **a. Assessment** **b. Actions taken** **c. Feedback to workforce**	
Additional Comments:	

NON COMPLIANCE / MAJOR FAILING	ISOLATED FAILURE / INCOMPLETE SYSTEM	IN COMPLIANCE / OK	NOT INSPECTED
Action taken:			

INSPECTION NOTES:	6c OFFSHORE – INCIDENT AND FAILURE REPORTING AND INVESTIGATION
To be: ***assessed for adequacy; and*** ***verified for compliance (using the sample installation)***	
1 Records of incidents and failures caused by external corrosion of safety critical and safety related plant & equipment in particular from: **a. leaks** **b. dropped objects** **c. slips, trips and falls**	
2 Root cause findings of incidents and failures: **a. Technical; and** **b. Management**	
Additional Comments:	

NON COMPLIANCE / MAJOR FAILING	ISOLATED FAILURE / INCOMPLETE SYSTEM	IN COMPLIANCE / OK	NOT INSPECTED
Action taken:			

Photographs

Photographic evidence to be provided of the general physical condition of the following:

Walkways & stairways

Cable trays including fittings and brackets

Bolted connections

Flanges

Pipe supports and pipes

Valves