NETHERLANDS OIL AND GAS EXPLORATION AND PRODUCTION ASSOCIATION

INDUSTRY STANDARD NO. 90

Asset Integrity Management

19 October 2023

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This document will be controlled in accordance with the NOGEPA Industry Standard No. 80 on Standards and Document Control.

Abbreviations

AI	Asset Integrity
AIM	Asset Integrity Management
CoP	Cessation of Production
EXCOM	Executive Committee of NOGEPA
HSE	Health Safety and Environment
KPI	Key Performance Indicators
LTE	Lifetime Extension
MBW	Mijnbouwwet
MBB	Mijnbouwbesluit
MBR	Mijnbouwregeling
NOGEPA	Netherlands Oil and Gas Exploration and Production Association
OSD	Directive 2013/30/EU on the safety of offshore oil and gas operations
SECE	Safety & Environmental Critical Element
SIM	Structures Integrity Management
P&A	Plug & Abandon
PI	Pipeline Integrity
PIM	Pipeline Integrity Management
RoMH / RIGG	Report on Major Hazards / Rapport Inzake Grote Gevaren
QA	Quality Assurance
QC	Quality Control
UKCS	United Kingdom Continental Shelf
WI	Well Integrity
WIM	Well Integrity Management

Definitions

Term	Meaning
Asset / Installation/ 'Mijnbouwinstallatie'	In this Standard and in other Nogepa Standards are terms as asset, installation and 'Mijnbouwinstallatie' used by meaning an onshore or offshore installation. These three terms can be used simultaneously.
Asset Integrity	The ability of an asset to perform its required function effectively and efficiently whilst protecting Health, Safety, and the Environment (HSE)
Asset Integrity Management	The means to ensure that the people, systems, processes, and resources which deliver integrity are in place, in use and will perform when required over the whole lifecycle of the installation.
Independent Verification	Independent verification means an assessment and confirmation of the validity of written statements by an entity or an organisational part of the operator or the owner that is not under the control of or influenced by the entity or the organisational part using those statements
Good Operating Practice	The application of those methods and practices customarily used in good and prudent oil and gas field practice in the Netherlands and/or on the Netherlands Continental Shelf with that degree of diligence and prudence reasonably and ordinarily exercised by experienced operators engaged in the Netherlands and/or on the Netherlands Continental Shelf in a similar activity under similar circumstances and conditions.
Responsible Committee	The committee of NOGEPA that has been appointed by the EXCOM as the owner of a specific Standard.
Standard	A NOGEPA Industry Standard as approved in accordance with this Standard 80.
Material Change SECE's	A change to the basis on which the current of the RoMH was accepted including, inter alia, physical modifications, availability of new knowledge or technology and operational management changes.
Material Change Wells	In the case of a notification of Well Operations, a change to the basis on which the original notification was submitted including, inter alia, physical modifications, replacement of one installation with another, availability of new knowledge or technology and operational
Non-Production Installation	An installation other than an installation used for production of oil and gas as defined in article 1.ac of the Dutch Mining Act.

Term	Meaning
Operations	Oil or gas exploration or production management.
Operator	The entity appointed by the licensee or licensing authority to conduct (offshore) oil and gas operations, including planning, and executing a well operation or managing and controlling the functions of a production installation.
Production Installation	An installation used for production of oil and gas as meant in the article 1. ab of the Dutch Mining Act.
SECE	A Safety & Environmental Critical Element as identified in the RoMH.
Written Statement	A Written statement is a performance report of (a group of) SECE's (SECE-block).

Legal Requirements

MBW	Articles 33.2, 33A, 45j, 45k, 45l, 45n
MBB	Article 84f
MBR	Article 11a.5.1
OSD	Annexes V section 1 ; V section 2

Related Standards

NOGEPA Standard 42	Well Examination
NOGEPA Standard 45	Well Decommissioning
NOGEPA Standard 48	Independent Verification Management
NOGEPA Standard 49	Independent Verification Execution
NOGEPA Standard 83	RIGG Standard, Report on Major Hazards (RoMH)
ISO 9001	Quality Management

Important Nomenclature used in this Standard

In the context of this Standard and when so used to describe a method or practice:

'shall'	means that such method or practice reflects a mandatory provision of law (in Dutch: *dwingend recht*). Such method or practice is mandatory for those who are the addressees of such provision (mostly the operators). A Standard can describe or quote, but not amend, mandatory provisions. When an operator in exceptional cases cannot comply for technical, operational or HSE reasons, exceptions shall be documented and reported, and risks mitigated. Please note that this does not release the operator from the obligation to comply with the law. *
'should'	means that such method or practice reflects a Good Operating Practice. An operator is generally expected to apply such method or practice, but a specific situation may require a specific alternative. In other words: the operator complies or explains and documents the explanation. *
'**could**'	means that such method or practice is of an advisory nature or mentioned by way of example. An operator is not obliged to comply and is not obliged to explain if he does not comply.
* Please refer to paragraph 2.3 of Standard 80 (Standards and Document Control), for further explanation on an exception of a 'shall' provision, or on a comply-or-explain of a 'should' provision.	

1. Executive Summary

The NOGEPA Industry Standards aim to provide guidance and clarity on a range of topics relevant for onshore and offshore oil and gas operations in the Netherlands and on the Netherlands continental shelf. The Standards cover a wide variety of topics, many of them related to health, safety, and environment, and to operational matters.

This NOGEPA Standard describes practical approaches to Asset Integrity Management (AIM). It provides general guidance on good practice and is geared to enable and maintain management systems that fully address these conditions.

The Standard is intended for use by operator personnel who are involved in managing the asset lifecycle as illustrated in this Standard. The Standard is designed to inform and influence operator's management systems regarding Asset Integrity (AI) related factors. The operator's management systems in turn inform and instruct 'end users' (system implementers) on practical considerations of AIM. `

Standard 90 ties in to the Independent Verification, described in NOGEPA Standard 48 and to the Report on Major Hazards Standard as described in NOGEPA Standard 83.

In the drafting of this document helpful use was made of a comparable document published in 2012 in the UK: *'Guidance on the Management of Ageing and Life Extension for UKCS Oil and Gas Installations'* by Oil and Gas UK, Issue 1, April 2012, as well as the latest insights from members of the Netherlands Oil and Gas Exploration and Production Association, NOGEPA, in line with national and EU law and regulations for The Netherlands' oil and gas industry (in regard to AI/AIM).

This Standard acknowledges that a significant body of work already exists within the area of Asset Integrity (AI) and that current operator systems provide for considerations related to Asset Integrity Management (AIM). This Standard therefore:

- Recognizes and bridges existing operator management systems
- Aids the assessment or measurement of existing operator systems to manage assets
- Takes into account the legislative framework

Each Standard is owned by one of the committees of NOGEPA, in which all members of NOGEPA are represented and are actively participating. Through a process of drafting and reviewing, in liaison with external stakeholders where needed, each Standard will be assessed by all committees. All Standards require the endorsement of the committees and eventually the approval of the Executive Committee of NOGEPA. All approved Standards will be published on the NOGEPA website and subsequently maintained in accordance with Standard 80.

At revision 2 the content has been adjusted to the revision of the Mining Act as per 1-1-2017, due to the implementation of the EU 2013/30/EU Offshore Safety Directive.

2. Scope and application

2.1 Scope

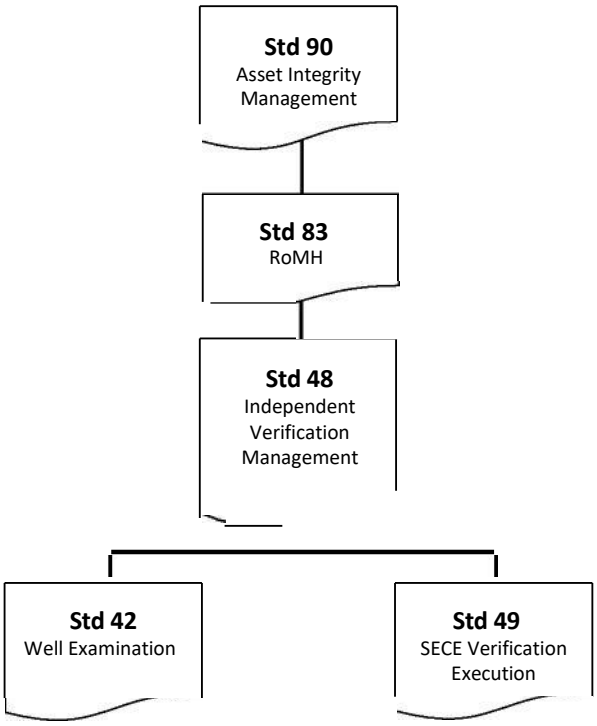
This Standard describes the methodology of AIM of an installation life cycle, design, up to and including decommissioning to demonstrate regulatory compliance addressing management of Major Hazards.

It provides general guidance on good practice and is geared to enable and maintain management systems that fully address required conditions.

Relation to NOGEPA Asset Integrity Standards

Standard 90 is part of NOGEPA Asset Integrity standards as outlined below.

Standard 90 describes practical approaches to Asset Integrity Management (AIM). It provides



general guidance on good practice and is geared to enable and maintain management systems that fully address these conditions.

Standard 83 is a goal setting document describing the regulatory requirements for a RoMH and provides a template to draw up a compliant RoMH document.
The RoMH provides a SECE listing for independent verification and a demonstration of suitability including their scheme of maintenance.

Standard 48 contains principles and requirements for independency, impartiality of Independent Verification Management and provides the principles for Standard 42 and 49.

Standard 42 works out the requirements and provides guidance for Well Examination during Design, Construction, Intervention and Abandonment.

Standard 49 contains principles and requirements for independency, impartiality of Independent Verification of SECE's.

2.2 Application

This Standard is applicable to AIM for all installations consisting of structures, plant and equipment, wells, and pipelines including organizational factors.

3. Introduction: Asset Integrity

3.1 Integrity throughout the Asset Lifecycle

Asset Integrity (AI) can be defined as the ability of an installation to perform its required function effectively and efficiently whilst protecting Health, Safety, and the Environment (HSE). Asset Integrity Management (AIM) is the means to ensure that the people, systems, processes, and resources which deliver integrity are in place, in use and will perform when required over the whole lifecycle of the asset.

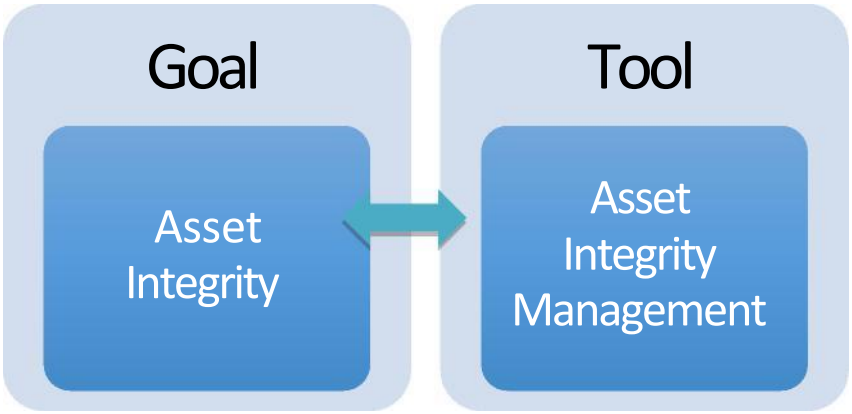


Figure 1 **Relation AI - AIM**

3.2 Six Stages of Lifecycle

The lifecycle of any Installation follows the six stages outlined below, over which the objectives, deliverables & activities considered fundamental to assuring AI are highlighted.

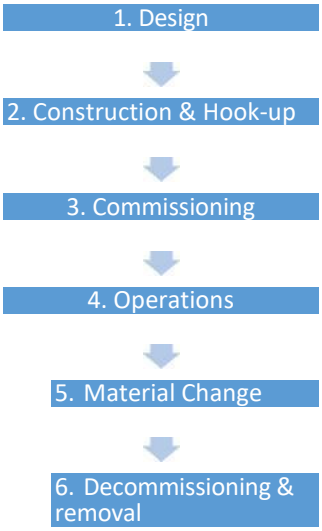


Figure 2 Lifecycle of Asset Integrity

3.3.1 Lifecycle: Design Stage

Objectives: To achieve optimal integrity performance of the installation throughout the lifecycle.

Typical deliverables and/or activities hereto are:

- Safety Studies (Technological Risk Assessment), RoMH [Ref. ST083]
- Design, plan for Maintenance & Inspection, Operating, Manning & Independent Verification [Ref. ST 048, ST049]
- Procurement Quality plans
- Document management
- Well architecture [Ref. ST083, ST048, ST042, ST041]

3.3.2 Lifecycle: Construction and Hook-Up Stage

Objective: Construct in accordance with design, through Quality planning process and confirm delivery up to & including 'mechanical completion'.

Typical deliverables and/or activities hereto are:

- Inspection/testing records
- Document completion & handover
- Independent SECE verification [Ref.ST048, ST049]
- Well examination [Ref.ST048, ST045, ST044, ST043, ST042, ST041]

3.3.3 Lifecycle: Commissioning Stage

Objective: Demonstrate through function testing & acceptance that design specification has been achieved & that performance standards are being met.

Typical deliverables and/or activities hereto are:

- Commission & function test against design specification & performance standards
- Commissioning completion packages & signoff & handover to operations
- Independent SECE verification [Ref. ST048, ST049]
- Well examination [Ref. ST048, ST042]

3.3.4 Lifecycle: Operations Stage

Objective: Operate plant within design limits; implement & monitor management systems.

Typical deliverables and/or activities hereto are:

- Ongoing evaluation of integrity risks
- Assurance Program
- Maintain & Inspect plant
- Monitoring 'Barrier System'
- Independent SECE verification [Ref. ST048, ST049]

3.3.5 **Lifecycle: Material change**

Objective: Control Material changes to an installation

Typical deliverables and/or activities hereto are:

- Implement Material Change management process (including construction of new or modification of existing equipment/facilities and mitigation of 'ageing'-aspects).
- Assure & verify Material changes.
- Specific requirements for Lifetime Extension (LTE) include (continuing) operations beyond the (original) anticipated service life of the installation.
- Specific requirements for (temporary) suspension / (temporary) cessation of production are implemented with the intention to always keep the installation in a safe condition for future (re-)use or until decommissioning will take place.
- If applicable Independent SECE verification [ST048, ST049]

3.3.6 **Lifecycle: Decommissioning Stage**

Objective: Remove from service entire installation.

Typical deliverables and/or activities hereto are:

- Safety studies, RoMH
- Decommissioning and removal plan
- Independent SECE verification [ST048, ST049]
- Well examination [ST048, ST042]

4. Asset Integrity Policy

In common with other aspects of responsible and prudent operatorship, sound AI Management (AIM) is largely shaped by effective leadership which **should** be expressed in the operator's HSE policy and management system. The extent to which senior managers drive company efforts in these key areas significantly influences successful implementation of AI related activities.

The following aspects are of particular importance in this regard:

1. Management Systems
2. Business Strategy & Life of Field planning
3. Ownership & Accountability
4. Senior leadership commitment & engagement
5. Continuous improvement

And are addressed as:

4.1 Management Systems

Operators' HSE Management Systems and / or AIM Systems **should** incorporate lifecycle management principles within AI, and this Standard provides a framework for that provision.

4.2 Business Strategy and Life of Field Planning

Oil & Gas exploration and production business strategy and Life of Field planning have an obvious linkage to AIM. Life of Field strategies must include medium- to long-term business plans. Cessation of Production (CoP) dates **should** be communicated to appropriate parties to make a true connection to AIM.

Conversely, the outputs from AIM activities should influence Life of Field planning. The organization directly involved in operating, inspecting and maintaining assets must be aware of its intended life span in order to manage AI accordingly. Leaders setting Life of Field expectations **should** review asset condition over time, understand the risks and consider any threats to their CoP date and associated AI planning.

Decisions on divestment and/or acquisition activity also impact AIM. AI considerations should influence those decisions, including ensuring that AI activities are carried out responsibly and adequately until a transfer or decommissioning, all with the intention to keep the installation in a safe condition until transfer or decommissioning takes place.

This will form a key part of due diligence associated with any production commitments made for the total asset's life.

4.3 Ownership and Accountability

Arrangements to deliver the operator's policy regarding AI **should** be via defined roles, responsibilities and accountabilities and the company management system.

Company leadership needs to assign clear ownership and accountability for matters related to AI. That accountability primarily rests at a senior level; but leaders also must ensure that arrangements are in place to manage all throughout the organization. These arrangements must clearly define accountability for AI-related issues and activities.

4.4 Senior Leadership Commitment and Engagement

Leaders **should** be engaged in appropriate processes that enable them to understand and contribute to the company's efforts. There are requirements for senior leadership involvement in many cross-discipline activities from strategic planning through to review.

4.5 Continuous Improvement

Throughout business process continuous improvement is embedded and results in an ongoing improving of processes and process results. The focus is on increasing effectiveness and efficiency to fulfil policy and objectives.

5. AIM Planning and Implementation

Engineering design and subsequent activities in the chain require thorough and careful consideration of AIM. This section sets out key elements with the primary focus on those aspects most affecting or affected by AI.

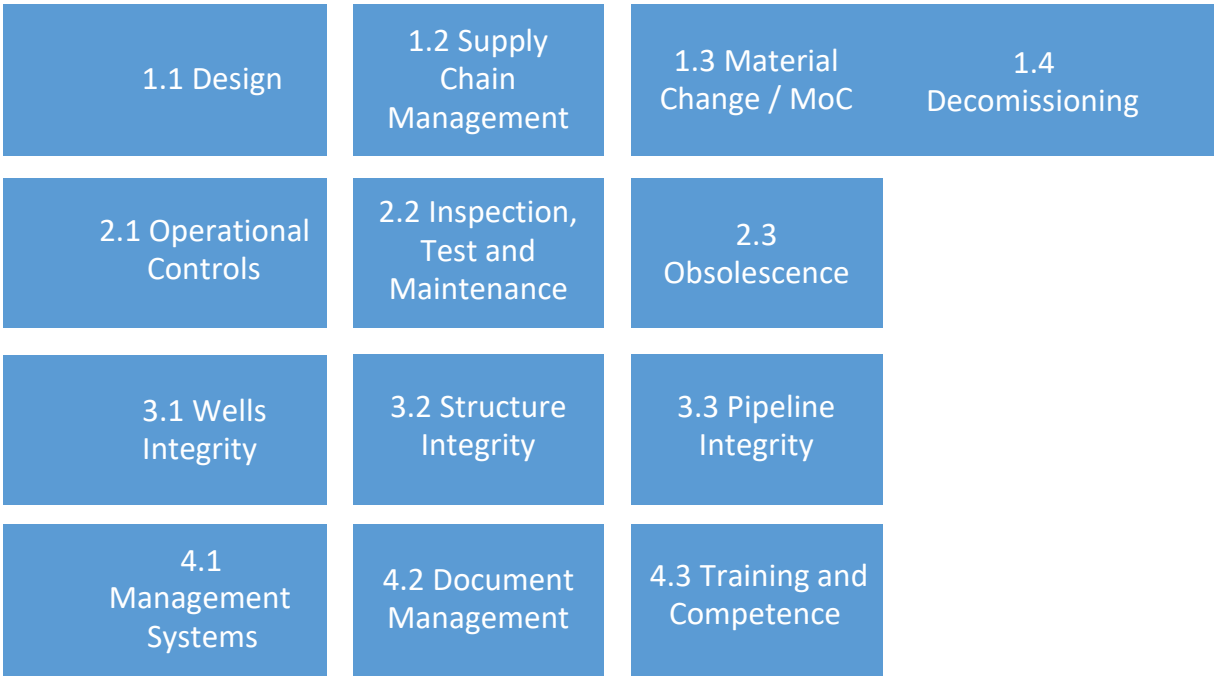


Figure 3 Planning and Implementation Aspects of Asset Integrity Management

This will be addressed in the subsections below.

For further explanation and detailed information is referred to the publication of Oil & Gas UK, Guidance on the Management of Ageing and Life Extension for UKCS Oil and Gas Installations, ISBN 1 903 003 816. 2012 issue 1.

5.1.1 Design

All installations **shall** have up to date design documentation available and accessible. This documentation sets out the design criteria by which the installation meets safety, operational and other performance requirements. This supports effective design engineering at all stages of the installation lifecycle and in relation to AIM issues.

The following aspects require attention:

- The original design **shall** align with the anticipated service life and be factored into all design considerations.
- The design documentation will be the primary means by which engineers are informed of key requirements and design assumptions, so it is essential that it is maintained and up to date.
- The design documentation must be controlled to ensure that only current documentation is accessible to users.
- The design documentation **should** be reviewed and endorsed by relevant technical authorities to ensure that the design basis remains aligned with Life of Field strategies and AIM.
- Design documentation **should** be organized in such a way as to be readily accessible for reference by relevant personnel.
- Design documentation **should** be subject to audit and review.
- Independent SECE verification & Well examination

All engineering activity undertaken throughout the anticipated service life of an installation **should** properly address AI considerations. Engineers **should** be kept informed of AI-related decisions and plans, and factor those into modifications and other forms of engineering activity to achieve good alignment. Areas of focus will be modification interfaces between new and ageing equipment, and where inspection has shown some degradation to the existing systems compared to design assumptions.

5.1.2 Supply Chain Management

Supply Chain Management **should** align with the AIM cycle and associated engineering, inspection, testing and maintenance to ensure that AI considerations address the following:

- Ensure that to the extent possible, procured items have a service life and supplier support commitment that considers the installation lifecycle business plans, with a focus on Quality Assurance (QA) and Quality Control (QC) of materials/products/services delivered.
- Identify and respond appropriately to potential obsolescence issues such as critical spares availability and changes to level of vendor support.
- Support effective ongoing inspection, maintenance, testing, repair or replacement of plant and equipment.
- Ensure proper Spares management

5.1.3 **Material Change**

In relation to AIM, the primary objective of a Material Change process is to ensure that sufficient rigor is applied to AIM and the planning, assessment, documentation, implementation, and monitoring of changes affecting an installation or operation so that any potentially adverse effects of or on AI are identified and managed effectively, as part of their Health & Safety Management System. Cross-functional disciplines such as operations, facilities, maintenance, planning and HSE **should** be involved in the Material Change.

In case of installation lifetime extension, review of the associated maintenance system(s) is recommended and, if required, an action plan **should** be drafted and implemented timely to cater to changing circumstances, with all related Safety & Environmental Critical Elements (SECE) to be identified and assessed. Such change(s) to the installation should follow the working practices in this Standard.

If the Material change effects the Major hazards and/or the SECE's as identified in the Report on Major Hazards or to the Well architecture as identified in the Well notification, independent verification of the Material change shall be performed. [ST083, ST048, ST042, ST049]

a. Plant & Equipment (Including Critical Software)
b. Processes, Procedures and Programs
c. Regulatory & Industry

5.1.4 **Decommissioning**

All platforms will require decommissioning. Experience has shown that this could involve several years of additional operation postproduction depending on complexity, removal strategy and resource availability.

Accordingly, service life requirements and maintenance strategies for identified critical components must consider the decommissioning phase which will include well Plug & Abandonment (P&A), hydrocarbon cleaning and isolation of systems prior to the final removal.

Elements typically key to this phase are structural components including safe access, cranes, drill equipment, power generation and safety & environment critical equipment.

5.2.1 **Operational Control**

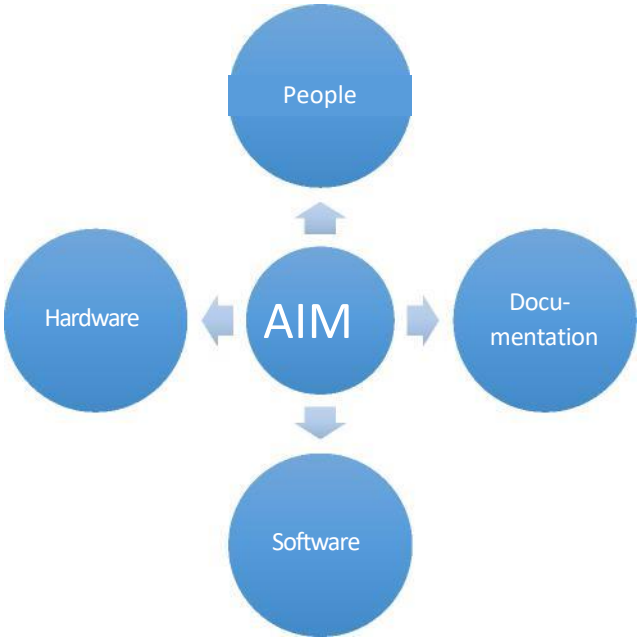
Listed below are examples of operational controls established to ensure that plant and equipment continue to be operated within specified safe working design envelopes.

Each of these elements can be impacted by ageing or obsolescence issues as part of AIM and must be continuously assessed against the requirements of Life of Field requirements

including new technologies, improved standards, and best practice; and reservoir performance such as changes in flow rate, temperature, pressure and fluid composition.

Operational controls identified as a SECE's, shall be subject of Independent verification.

Figure 4 **Asset Integrity Management Control Elements**



- People aspects, e.g.:
- Documentation, e.g.:
- Software, e.g.:
- Hardware, e.g.:

5.2.2 Inspection, Testing and Maintenance

An important element of AIM is the assessment of the changing condition of an installation.

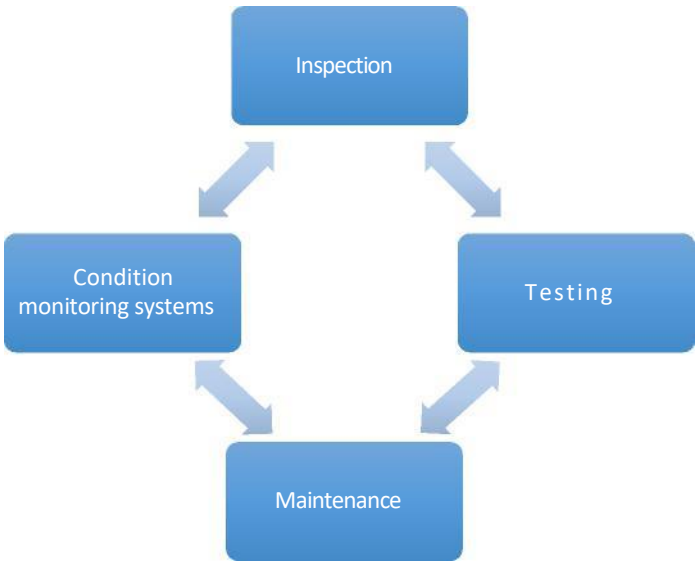
This is achieved by:

- Inspection
- Testing
- Maintenance
- Condition monitoring systems

of its integrity throughout an installations' life.

Figure 5 ***Asset Integrity: Role of Inspection, Testing, Maintenance, CMS***

This requires a systematic approach supported by timely repairs, replacements, and restoration



of installation condition so that the installation remains fit for its operational purpose and that safety & environmental critical performance is maintained throughout installations' life.

The management of inspection, testing and maintenance must be a continuous learning process that targets the degradation mechanisms that will affect plant and equipment and an installations' Safety & Environmental Critical Elements (SECEs), their subsystems and components. The process **should** anticipate, assess, and respond to degradation risks including all forms of corrosion, erosion, fatigue and all other failure mechanisms presenting risks to an installation so that deterioration is detected and addressed before failure can occur.

The inspection testing and maintenance elements/parts/processes that support this approach are indicated below, for consideration:

- Installation Register
- Integrity Risk Assessment
- Inspection, Testing and Maintenance program
- Planning and Scheduling
- Task Implementation
- Reporting results and defects/anomalies
- Defect/Anomaly/Assessment & Corrective Actions
- Inspection, Testing and Maintenance program review
- Installation Improvement – Updates and program improvements

An Installation Register (IR) **should** be available to include information on all permanent and temporary parts/equipment that are relevant to AIM. The IR **should** form a central database in which the status and all changes to (parts of) the installation is logged and kept ongoing, with easy access for all staff involved in AIM. The IR is preferably directly linked to the relevant inspection, testing and maintenance processes described above.

The schedule of SECE examination and testing shall be subject of Independent

verification.

5.2.3 **Obsolescence**

Obsolescence can be defined as systems or components passing out of usefulness because of changes in knowledge, standards, technology or needs. Obsolescence is typically characterized by the absence of necessary spares and technical support in the supply chain. This can also occur due to changes in standards or technology but excludes physical deterioration. For equipment related to the production of oil and gas, this typically can result from any of the following (or a combination of more than one) factors:

- Vendors will no longer support equipment.
- Vendors are out of business.
- Spare parts are no longer available.
- Upgrades have been made to software systems.
- Equipment functionality no longer meets industry requirements or standards.

The operator's organization **should** be aware of current and potential obsolescence areas affecting the installation so that suitable plans can be developed to deal with issues, minimizing unplanned/ unexpected problems. Note that obsolescence should not necessarily be considered synonymous with age, as it is possible for relatively young equipment to suffer obsolescence issues. Where obsolescence issues are noted but no action is taken, it is important that the reason is documented and properly risk assessed.

All action resulting from obsolescence issues should be identified, planned, and executed as detailed elsewhere in this document.

5.3.1 **Wells Integrity**

Wells Integrity (WI) can be defined as the ability of the well(s) to perform its required function effectively and efficiently whilst protecting Health, Safety, and the Environment, in line with the definition of AI.

Wells Integrity Management (WIM) is the means to ensure that the people, systems, processes, and resources that deliver integrity are in place, in use and will perform when required over the whole lifecycle of the well(s), in line with the definition of WI.

WIM encompasses the physical condition of the well(s) as well as the necessary organization and activities needed to avoid the possibility of failure, which potentially can result in serious incidents.

Well Design (Architecture) and well control measures identified as a SECE shall be subject of Independent verification.

Risk mitigation related to the following activities/operations/conditions must be addressed, but is not limited to, for consideration:

- Wells without normal annuli behavior
- Well barriers for drilling and workover operations
- Barriers on completed wells
- Periodical tests/maintenance of surface wellhead/Xmas tree valves and subsurface safety valves

WIM provides the guideline on how the various actors are involved in the well(s) activities. It is important to always have an overview of the WI of all wells.

Deliverables (not limited to), for consideration:

- Organization scheme (responsibilities and accountabilities)
- Risk assessment
- Identification of all elements considered to be safety critical
- Test/inspection/maintenance schedule per well
- Data management structure
- Meeting structure and communication to address possible constraints in well integrity
- Well examination

5.3.2 **Structures Integrity**

Structures Integrity (SI) can be defined as the ability of a structure (e.g., platform or subsea) to perform its required function effectively and efficiently whilst protecting Health, Safety, and the Environment, in line with the definition of AI.

Structures Integrity Management (SIM) is the means to ensure that the people, systems, processes, and resources that deliver integrity are in place, in use and will perform over the whole lifecycle of the structure(s), in line with the definition of SI.

SIM encompasses the physical condition of the structure(s) as well as the necessary organization and activities needed to avoid the possibility of failure, which potentially can result in serious incidents. Besides the physical condition of the structure(s), SIM also encompasses the management of mitigation measures against external risks and emergency response.

Structure sections identified as a shall be subject of Independent verification.

Risk mitigation related to the following activities/operations/conditions must be addressed, but is not limited to, for consideration:

- Review of design and installation requirements strength + fatigue calculations)
- Corrosion management
- Periodical inspection in compliance with permitting prescriptions

SIM provides the guideline on how the various actors are involved in the structure(s) activities. It is important to always have an overview of SI.

Deliverables (not limited to), for consideration:

- Organization scheme (responsibilities and accountabilities)
- Risk assessment
- Test/inspection/maintenance schedule per structure
- Data management structure
- Independent SECE verification

5.3.3 Pipeline Integrity

Pipeline Integrity (PI) can be defined as the ability of pipeline(s) to perform their required functions effectively and efficiently whilst protecting Health, Safety, and the Environment, in line with the definition of AI.

Pipeline Integrity Management (PIM) is the means to ensure that the people, systems, processes, and resources that deliver integrity are in place, in use and will perform over the whole lifecycle of the pipeline(s), in line with the definition of PI.

PIM encompasses the physical condition of the pipeline(s) as well as the necessary organization and activities needed to avoid the possibility of failure, which potentially can result in serious incidents. Besides the physical condition of the pipeline, PIM also encompasses the management of mitigation measures against external risks, emergency response and the suitability, resp. control of the qualitative specification(s), of the product(s) transported.

Pipelines identified as a SECE shall be subject of Independent verification.

Risk mitigation related to the following activities/operations/conditions must be addressed, but is not limited to, for consideration:

- Review of design and installation requirements
- Flow assurance (e.g., slug management, pipeline cleaning)
- Corrosion management (internal and external)
- Periodical pipeline inspection in compliance with permitting prescriptions
- Periodical test and maintenance of safety systems
- Quality monitoring of (the specifications of the) product transported

PIM provides the guideline on how the various actors are involved in the pipeline(s) activities. It is important to always have an overview of the PI.

Deliverables (not limited to), for consideration:

- Organization scheme (responsibilities and accountabilities)
- Risk assessment
- Test/inspection/maintenance schedule per pipeline
- Data management structure
- Independent SECE verification

5.4.1 Management Systems

Operators **should** have management systems based on national or international norms.

Operators **should** review existing management systems and related processes to ensure that AI factors impacting integrity management are addressed explicitly where appropriate or made integral to other aspects of HSE and business management systems. Operators developing new or significantly revised management systems **should** take the opportunity to ensure that AI features to an appropriate degree in such systems.

5.4.2 Operational Documentation / Document Management

Operators **should** be able to demonstrate that relevant, up-to-date documentation is readily accessible by maintaining an effective Document Management System.

A proper Document Management System **should** include, at least:

- Clearly defined criteria to develop and revise documents
- Allocated responsibilities and authorities to review and issue documents
- Established arrangements to issue, access and withdraw documents
- Information on the Document Management System, if a certain system of standard is followed
- Arrangements to ensure that documentation is revised and updated to reflect ` changes in organization, systems, equipment, etc.
- Arrangements and responsibilities to withdraw and retain obsolete documents

5.4.3 Training and Competence

Personnel responsible for managing, inspecting, maintaining, and assuring integrity of plant and equipment **should** have a demonstrable understanding of ageing mechanisms and mitigation measures. Basic professional and technical competence should be supplemented where necessary with training in the management of ageing. Training can be applied in different forms such as via industry work groups, seminars, and formal training courses both within and outside the industry.

Competence levels **should** be maintained to account for changes in technology and standards, for example, so that personnel have a current understanding of AI issues and the management thereof.

6. AIM Monitoring Audit and Review

6.1 Monitoring, Audit, Review

6.2 Independent verification

Operators **should** have monitoring, audit, and review arrangements in place as part of their HSE or related management systems. Steps **should** be taken to ensure that these processes adequately provide for AIM. This chapter offers guidance on the key elements of approaches to assure AIM processes and status. In addition to monitoring, audit and review, the paragraph also provides guidance on other critical aspects of overall performance management.

Operators shall establish and implement schemes for Independent verification to perform an assessment and confirmation of the validity of SECE's as mentioned in the Report on Major Hazards and Well architecture.

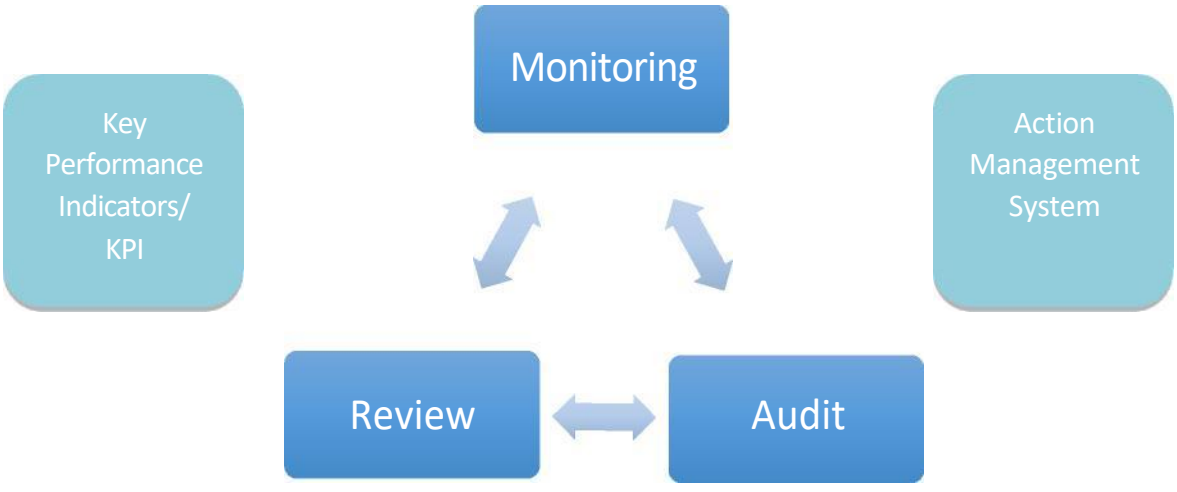


Figure 6 **Monitoring, Audit & Review Cycle**

6.1.1 Monitoring

Monitoring processes will provide reasonable assurance that there is compliance with AIM arrangements and that the arrangements continue to be effective in practice.

6.1.2 Audit

Operator management systems **should** include a requirement for audit as part of internal assurance processes. Audits will typically be carried out by competent personnel.

- Audits **should** assess compliance with documented AIM processes, and on another level **should** assess the effectiveness of those processes in managing AI.
- The operator management program **should** also include audit of third parties (e.g., key suppliers and contractors) who are influential in AIM.
- Audits of operator management systems and practices by external parties (e.g., certification bodies) will address AIM-related matters to the extent that these are features of the management system being audited.

6.1.3 Review

Management review processes **should** provide a reliable overview of AIM by assessing outputs from monitoring and auditing activities to assure that AI is well managed or to identify and address areas for improvement

6.1.4 Key Performance Indicators

Operators typically have Key Performance Indicators (KPIs) in place to help evaluate HSE operational performance against defined leading and lagging indicators. These arrangements **should** include KPIs designed to monitor and measure the effectiveness of AIM.

6.1.5 Action Management System

Arrangements **should** be in place to ensure that all related corrective or improvement actions arising from monitoring, audit, and review above are recorded, documented and tracked to closure.

6.1.6 Lessons Learned

AIM-related lessons learned from assurance activities or from incidents **should** be captured and communicated within the operator's organization and across the wider industry as necessary.

6.2 Independent verification

Independent verification is an assessment and confirmation of the validity of written statements by an entity (3rd party) or an organizational part of the Operator or the owner (2nd party) that is not under the control of or influenced by the entity or the organizational part using those statements.

Independent verification can consist of a 5 yearly audit-based confirmation cycle of validity of suitability statements and other statements.

Article 45l MBW requires that Operators establish schemes for Independent verification.

The design of schemes for Independent verification and the selection of the independent verifier (IV-er) shall meet article 84f MBB.

The scheme for Independent Verification shall meet the information as required according to Annex V, section 2 of OSD 2013/30/EU.

The selection of Independent Verifier shall meet article 11a.5.1.1 MBR with a reference to Annex 5, section 1 of OSD 2013/30/EU.

In the event of a Material Change according to article 45n MBW section 3, the results of Independent verification shall at request, be provided to SodM.

For further and detailed information regarding Independent Verification is referred to NOGEPA Standard 048