

# Best practice PIMS in low oil price environment

## Executive summary

This white paper examines best practice in pipeline integrity management schemes (PIMS) and discusses the key elements of a PIMS, shown below:

Element 1 : Governance	Element 9 : Operations
Element 2 : Integrity management process	Element 10 : Monitoring, inspection, testing & maintenance
Element 3 : Infrastructure	Element 11 : Emergency response
Element 4 : Organisation, roles & responsibility	Element 12 : Remedial works
Element 5 : Competence	Element 13 : Incident investigation and reporting
Element 6 : Risk management	Element 14 : Change control
Element 7 : Design, fabrication, installation & commissioning	Element 15 : Document and data control
Element 8 : Handover to operations	Element 16 : Review and audit

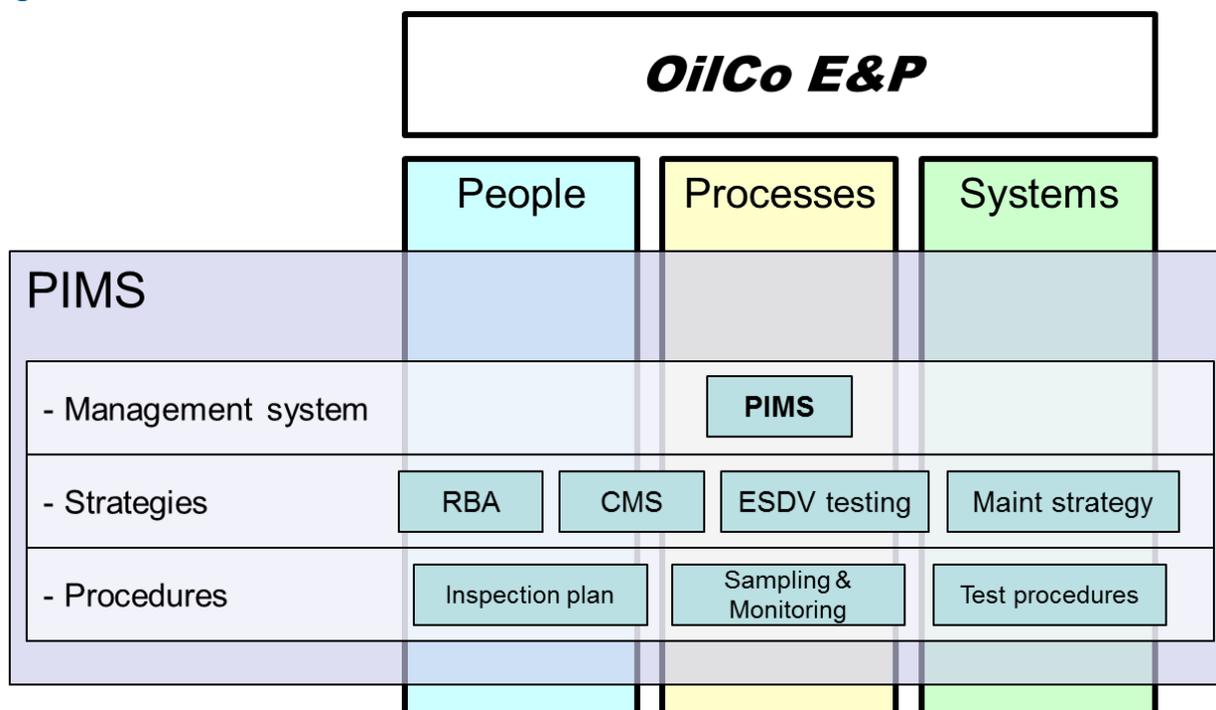
Ways to managing pipeline integrity in the current climate with fewer resources is also discussed.

## What is a PIMS?

A pipeline integrity management system is a framework for managing the integrity of a pipeline system to ensure its design intent is maintained and is available for operations over its lifetime in accordance with the pipeline operator's health, safety and environmental commitments.

The key point here is that it is a framework detailed within a management system document. As can be seen in Figure 1 the oil company is made up of people, processes and systems. The PIMS framework is a vertical slice across all of these areas as they all affect pipeline integrity. The arrangements in each area are documented within the management system document to ensure visibility, clarity and engagement.

Figure 1: PIMS framework



## What constitutes PIMS best practice?

The PIMS document encompasses 16 key elements that define every aspect of effective management of pipeline integrity. In this section we shall discuss each of these elements.

### Element 1 : Governance

The PIMS document should identify where it interfaces into the company business management system. This is likely to be under a specific company policy, for example the HSE policy or an integrity management (IM) policy. The PIMS should outline the objectives of that policy in relation to pipeline integrity.

The PIMS should define the legislation and regulatory framework that applies to pipelines, and also make reference to key documents that are required under legislative requirements. In the United Kingdom this would include reference to the major accident prevention document (MAPD).

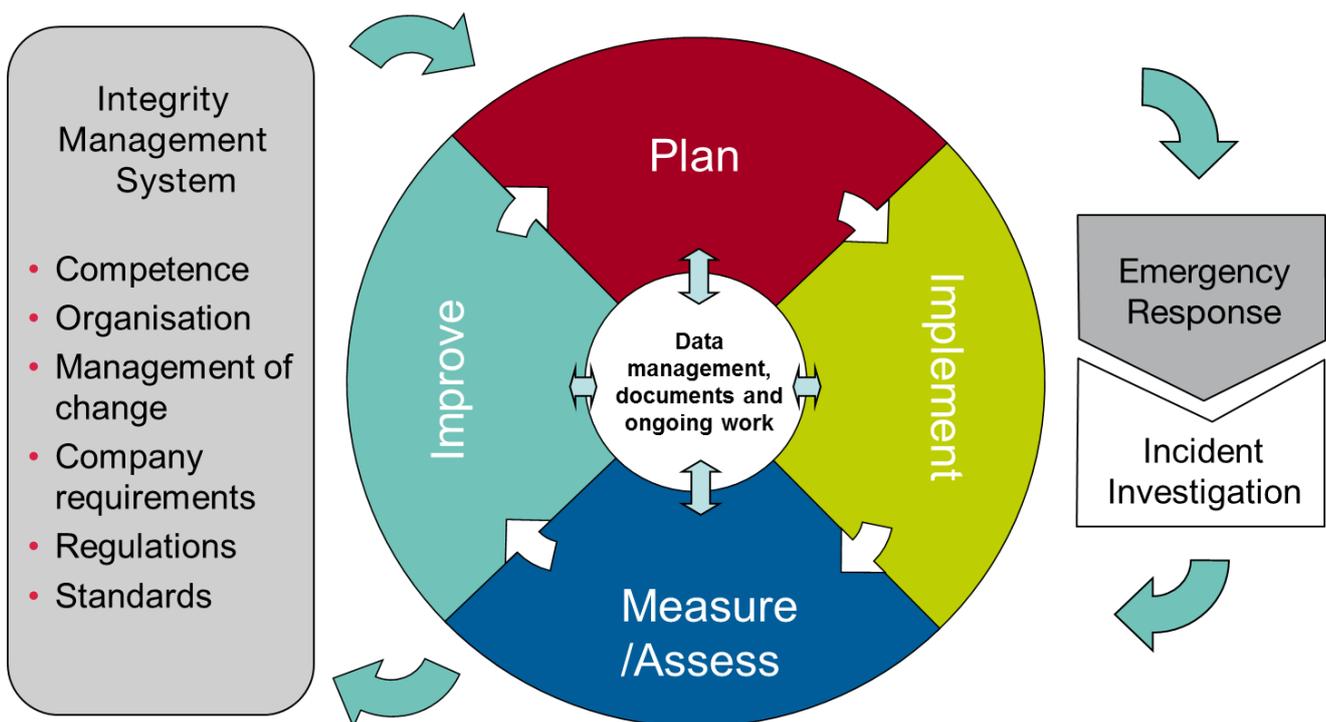
The PIMS document should also define the key industry and company codes and standards that are applicable to the integrity management of the system

### Element 2 : Integrity management process

The IM process will be set out in the PIMS document. This will show the overall process and describe each step of the process. A typical IM process is shown in Figure 2, it takes the form of a “plan, do, measure, learn” business improvement process that is customised to IM.

Supporting each step of the process, there will be a series of documents that undertake the various functions within that step. The PIMS document should describe each supporting document outlining its purpose and objectives.

Figure 2: PIMS process



### Element 3 : Infrastructure

The equipment covered by the PIMS should be described in this section. The components of the system should be discussed and the limits of the system define. Where there are interfaces with third party operators for elements of the system the boundaries for these interfaces should be defined here.

### Element 4 : Organisation, roles & responsibility

This is one of the most important sections to get right. Identifying all of the people that have a role in pipeline integrity and defining how they communicate to each other through a clearly defined functional organisation chart (not a line management chart), headed up by the nominated pipeline operator (duty holder).

For each role it is important to identify and document their responsibilities under PIMS. This can be harder to do in practice than it sounds. We have found that facilitating a roles and responsibilities workshop is an effective way of agreeing who is truly responsible for each item. Initially at these workshops we have had multiple people claiming to be responsible for certain items but through detailed discussion the real responsible party is identified.

This section should also define interfaces with third party operators or others parties that have a role to play. Many pipeline systems extend onto platforms or sites operated by other organisations. The

responsibilities for these interface companies need to be well captured here and the content agreed with them to ensure buy-in. They need to embrace the fact that they are part of your PIMS team and co-operate fully by providing the information necessary to make system integrity decisions.

#### **Element 5 : Competence**

The company will already have a competency assessment process in place. These need to be summarised and referred to here. There should also be an activity performed to ensure that this process captures the roles and responsibilities within PIMS as these might not be currently assessed for their normal job function.

#### **Element 6 : Risk management**

This is another key section in the PIMS document as risk management is the main aim of the PIMS. The document should describe the risk management approach and refer to risk management processes from the company BMS. This sets the context for the overall process. It may be appropriate to include the risk matrix within the PIMS document to provide greater context.

The PIMS will need to define the risk management strategy for pipeline integrity. This will include reference to supporting documents like procedures and risk based inspection assessments. Different elements of the pipeline may follow different processes and this should be covered in the document.

Emergent risks are inevitably going to present themselves during pipeline operations. The process for assessing these risks and mitigating them through an action plan should be documented within the PIMS. This management of live risks is arguably the most important aspect of risk management.

Further details of risk management will be addressed in the Jee webinar scheduled for 12<sup>th</sup> October 2016.

#### **Element 7 : Design, fabrication, installation & commissioning**

This is when integrity is built in to the facilities. Decisions made during this stage of life can have a significant influence over the risks and costs during the operating phase. Having operations personnel involved during the project is beneficial for optimising the system for operations. It also develops system knowledge within the operations team during the project.

A high level summary within the PIMS of the process for design, fabrication, installation and commissioning of new facilities and reference to any internal standards will cover this area. Reference should also be made to where DFI information can be found for existing systems.

#### **Element 8 : Handover to operations**

The process of handover from projects to operations is an interface where vital information must be transferred. This process should be defined for your organisation as well as the expectations placed on the project. These expectations should clearly set out what the project has to deliver and by when.

This process can be greatly assisted by having operations personnel within the project team to guide this process. On some of our projects we have had great success by holding an integrity risk assessment with the project team. They understand the likely behaviour of the pipeline and can input into the risk assessment more effectively than someone reading the design reports.

#### **Element 9 : Operations**

The PIMS should outline how the pipeline system is operated and refer to the operating procedures. An overview of the safety systems in place should be given. The pipeline safe operating limits should be defined in this section. The actual limits by pipeline should either be included here or referenced here.

#### **Element 10 : Monitoring, inspection, testing & maintenance**

This element is the core of the IM activity; The “implement” part of the IM process. For each of these activity types the strategy needs to be set. This will normally be a risk based strategy in order to ensure an optimised and cost effective approach. The governing documents (risk based inspection (RBI)/risk based

assessment (RBA), inspection plan, maintenance strategy, corrosion management strategy) for each area need to be referred to within the PIMS.

#### **Element 11 : Emergency response**

A summary of the emergency response arrangements for the pipeline system are to be included and the emergency response procedures referenced.

#### **Element 12 : Remedial works**

Inevitably we end up having to repair defects and anomalies in pipelines. If we have good IM practices then these repairs are small and carried out well in advance of them becoming a bigger problem. Within the PIMS the procedure for managing and prioritising remedial works should be described and referenced. This should include how these repairs are included within the relevant planning system.

#### **Element 13 : Incident investigation and reporting**

IM incidents where we have a situation that takes us outside of our operating envelope or design parameters need to be recorded and investigated. The PIMS should set out the types of situation that is considered an IM incident. It should also refer to the relevant process and supplement this with any additional requirement if the process does not handle IM incidents satisfactorily.

#### **Element 14 : Change control**

Changes to pipelines come in different forms from physical modifications to documentation updates and creeping changes. The change management system has to be able to address each of these types of change and ensure the appropriate responsible person is in the approval loop. An overview of the applicable change control procedures and how they apply to pipelines should be included within the PIMS.

#### **Element 15 : Document and data control**

Document and data management is a vital part of having a robust IM system. With data, whether it is from design or from inspections, integrity decisions can be made with less uncertainty and therefore they will be more cost effective. These topics should be discussed including the use of a pipeline database as required.

#### **Element 16 : Review and audit**

This element has several different aspects that need to be documented within the PIMS document. Crucially review of the results of each IM activity and assessment of the data that it produces is the initial step. All of these assessments then have to be rolled up to assess fitness for continued service of the pipeline system. This review will highlight where there are problems and risks that need addressing. This might result in a repair as discussed in Element 12 or it might require a change in the monitoring or inspection. Changes to IM activities needed from review of results will need to be fed back into a review of the relevant strategy document discussed in Element 10.

The PIMS document should detail performance metrics for the IM system. This will review critical aspects of the IM system to ensure that it is functioning efficiently and also to highlight risks to the infrastructure.

This section must also define an update and audit schedule to the PIMS systems, ensuring that this complies with company policies.

## **How do we do all that with fewer resources?**

Phew! That seems like a lot of things to do. Well it is but many of the sections should be reflecting what the company has in place and referring to these systems. This highlights their role and importance to the PIMS system. Going through the process will also highlight any gaps that need additional work to fix.

The parts that require the main resource is the elements that implement the integrity management process. Element 6, risk management, is the starting point for having a “right-sized” process. Historically



we have been collecting a large amount of data on our pipelines and we need to leverage this data to have a detailed understanding of the threats and how they develop. This, along with a detailed understanding of the failure mechanisms, allow a review of the frequencies of the integrity activities to reduce the base cost burden of the regular tasks detailed in Element 10.

The annual reporting that is detailed within Element 16 needs to be a streamlined process starting with anomalies and moving through to overall integrity assessment of the system. This shortens the timeline for these assessments allowing more time to plan a response which reduces the cost of remedial activity. These costs can be optimised further by having sufficient technical knowledge to make swift integrity decisions and prioritise repairs.

Taking a more pragmatic approach to these areas can reduce the scale of the overall activity set allowing it to be carried out by less people. If you are interested in how to apply these ideas, join our risk management webinar on 12<sup>th</sup> October or attend our workshop on the 30<sup>th</sup> November, which will be a great forum to discuss your difficulties in applying these concepts.

**Jee is hosting a free webinar on ‘risk management in subsea integrity’ on 12th October at 2pm (GMT). Visit [www.jee.co.uk/knowledge/risk-management](http://www.jee.co.uk/knowledge/risk-management) to register your place.**

## Author biography

Grant is an experienced chartered engineer who has been working in the oil and gas industry since 1994. He is the head of Jee’s integrity management discipline and has an in-depth knowledge of the field and its associated areas, including internal and external inspection. Working closely with a number of major operators, Grant provides technical support and pipeline technical authority services, advising on all aspects of design, construction, integrity, repair and the operation of pipeline systems.

Grant has broad experience integrity management related projects, including creating riser inspection strategies, inspection tool and stuck pig contingency plans, corrosion management strategies and pipeline lifetime extension studies.

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