

**181157 Series of reports
an overview
prepared for nabim**

BY

HSD SAFETY LTD

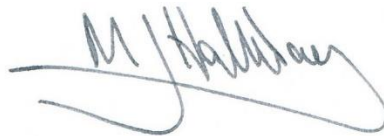
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**181157 Series of reports
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1.0 Introduction

HSD Safety Ltd. (HSD) has prepared a series of three reports for nabim providing guidance relating to:

- 181157-A Explosion Protection Ignition Assessment Methodology non-electrical equipment.
- 181157-B Management of Electrical Equipment in Hazardous Areas (Ex Zoned)
- 181157-C Management of Change: Explosion Risk Management

These are simply referred to as the 'A', 'B' and 'C' reports this document. This series of reports is unlike our historical series of reports which, to a great extent, discussed matters relating to particular standards such as e.g. explosion relief of bucket elevators. What characterises this series of reports is the breadth of equipment and management structures.

In preparing these reports HSD has faced two difficulties. Firstly, the membership of nabim spans global businesses and independent millers; and their sites range from single stream to multi-stream with a variety of mill types.

The second difficulty, particularly for the 'B' and 'C' reports, is the sheer variety of possible management and personnel structures. For example, engineering responsibilities could be centralised for large multi-site organisations or they might be deployed site-by-site. Of course, company to company the variety of management structures is matched with an array of job titles for individuals whose job function is similar to someone else in a different business. Furthermore, the Standards employ given titles for roles. Thus, these are challenges addressed in the reports; although the task remains for the nabim member to map the descriptions to their context.

Searching for an analogy to the second difficulties, there is a long-established brand of DIY car maintenance manuals¹. A particular manual is specific to a model of car and most likely for a span of production years. All cars have engines, brake systems,

¹ Haynes.com

electricians that undertake a given function, but the details will vary model by model. Within this analogy reports 'B' and 'C' are not manuals for specific models / year – they are generalist. The 'B' and 'C' reports do not discuss the details of e.g. diesel or electric engines but rather that the engine exists and will require attention. It is the task of the nabim member who has intimate knowledge of their 'engines', 'electricians' or 'brakes' by analogy to interpret the general ('A', 'B' or 'C') report to their management structure or job roles.

The objective of this document is to stand back from the individual reports and help guide the nabim member towards an interpretation and application to their business and facility / facilities.

2.0 181157-A Explosion Protection Ignition Assessment Methodology non-electrical equipment.

The 'A' report is centred around physical equipment and as a result is far less abstract and is probably the easiest to follow. Many sites continue to use mechanical equipment which pre-dates DSEAR. The legal imperative is for operators to use equipment that is safe and in this 'non-electrical DSEAR Ignition Assessment' perspective is directed towards design, installation, operation and maintenance. DSEAR does not explicitly require wholesale replacement of 'non-electrical' [i.e. mechanical] equipment with 'ATEX approved' items. However, it is for the operator to be able to demonstrate the equipment they use is safe for the materials it is exposed to; both internally and externally.

This report introduces a methodology for undertaking retrospective ignition assessments. It looks at some common milling mechanical equipment [conveyors, elevators, mills etc] and provides example ignition risk assessments for the equipment covering Hazardous Areas classified as Zones 20 / 21 and 22. These assessments are item by item as if they could operate in isolation.

A final Section of the report examines the combination of equipment as an 'assembly' [e.g. roller mill and feeder].

These are not assessments for copying and pasting but are a secure starting point for you to complete your assessments for your site(s) and equipment.

2.1 Implementing the advice

For the nabim member there is much work to be undertaken in gathering information. The information stems from:

- the properties of the material being processed (equipment internals), and that the equipment is exposed to (equipment externals),
- the original equipment manufacturer (OEM), design, installation, operation, cleaning and maintenance manuals. Including any limitations on use.
- cleaning, service and maintenance records
- any historical events with the equipment
- your Hazardous Area Classification (internals and workplace)
- any assumptions you have made such as maximum rpm or temperature.

This needs to be undertaken for all equipment and the task suddenly appears overwhelming. Much of the information will be repeated for different pieces of equipment. The flow diagram (Figure 1.1) implies that a catalogue could be constructed because it is most likely that there will be replication of information or duplicate equipment. As an illustration many drag link conveyors are fundamentally the same design, construction and configuration. It is also a good strategy to use a risk-based approach to decide where to begin. For example, examine Zone 20/ 21 equipment first; a benefit of this approach is there should be many less higher risk items to examine.

2.2 Examples

A good number of representative examples are provided and drill down into considerable detail particularly in the appendices.

3.0 181157-B Management of Electrical Equipment in Hazardous Areas (Ex Zoned)

As previously outlined the 'B' report is abstract because HSD cannot identify all the different

- management structures,
- variety of job titles
- single or multi-site businesses,
- centralised functions or local site functions
- centralised responsibility or local sites with autonomous responsibilities.

With these difficulties to be overcome we cannot be prescriptive as to how to address the matters. The Standards attempt to express best practice in terms of a management structure that is unlikely to match yours.

Two tasks have to be undertaken by nabim members. The first is to gain an understanding of how the standards express themselves. This includes technical terms (such as Close and Detailed inspections) as well as roles, responsibilities and competencies. How nabim members approach this is a matter for individual choice.

3.1 Implementing the advice

Some teams may prefer to treat the standard as if it is a business they are visiting and gain an understanding of how it is structured and operates avoiding any attempt to align information to their own business. Having gained an understanding, the second step is to see how their business matches / aligns to the functions of the standard. The standard does not prescribe how the business should be structured.

In the second step by mapping the 'who', 'where' and 'how' of the standard to the business the outcome will probably identify gaps, duplications and training needs.

An alternative approach would be to undertake the two steps as a single exercise.

For either approach a limited number of iterations might be required. This might be necessary if a business begins the study on the basis of "Regular periodic inspection" and wonders if "Continuous supervision" is more appropriate. From our experience HSD suspects "Continuous supervision" is unlikely to be the choice for nabim members.

3.2 Roles, responsibilities and competencies

This is an area where the context of the business has been difficult for HSD to map to 'Job Titles'. A table has been prepared (Section 2.1) with Responsibilities / Roles paired to competency requirements. This should help nabim members prepare a mapping to their own business and staff. It is at this stage where multi-site businesses may consider adding another column to identify if the role is centralised or local to each site. Completing this element will also highlight any gaps or opportunities for improvements.

3.3 Technical and behavioural competencies.

By this stage of the analysis we really are heading to identifying individuals. Again, HSD has no knowledge of how nabim members exercise personnel reviews and planning / recording the competencies and training of staff. The topic of technical competence is probably best addressed through the CompEx training modules. Although training has associated costs the independence of CompEx is well established and is recognised across a wide number of industry sectors.

4.0 181157-C Management of Change: Explosion Risk Management

Change is inevitable be it a result of replacing aged equipment, plant expansion or a modification to staff numbers or changing roles and responsibilities. Change should not undermine safe operations and therefore there is the need for the business to be alert to and responsive to change so as to protect safe working. An example of undermining safety from HSD's corporate knowledge will help. A miller (not flour) was unable to maintain a source of a particular grain; being in need of the material they bought a supply of milled grain. They then faced the problem of how to get the milled material into their system; the solution was simple. Feed the milled material into the grain infeed system and arrange for it bypass most processing stages. The simple solution had devastating consequences; a primary explosion in the head of an elevator with propagation to silos and a devastating secondary explosion. There was an underlying fault in the intake elevator that had not resulted in an incident when handling grain but was a strong source of ignition to the finer milled material. Was the change from grain to milled material trivial? A system of managing change has the goal of preventing such unsafe occurrences.

In recent years it has been a pleasure to see and hear of a significant number of new mills and improvement projects undertaken by nabim members. In response to this the HSD report has adopted the span of a plant / process life cycle (Sections 1 and 2). For large projects such as new builds managing explosion hazards need to be in the process from the very beginning.

Sadly, it is HSD's experience for large and small projects, across many industry sectors, that we are engaged once the new or modified plant has been installed, commissioned and only then asked to prepare the DSEAR explosion risk assessment and hazardous area classification. In addition to commissioning with dangerous substances before having the risk assessment and hazardous area classification being

against the duties of DSEAR any remedial modification required to make the plant / equipment safe will be considerably more costly than when the project 'is on the drawing board'. HSD respectfully and strongly recommend nabim members to consider and manage explosion prevention and mitigation measures from the project conception. This is the driving point of Section 2 of the report.

However, Section 3 of the report presents the nub of the matter; that is recognising change, responding to the need for change, and having mechanisms appropriate to the nature / scale of change to manage safety throughout change.

Once again, we are faced with the needs for systems and people with defined roles and responsibilities. The nabim member needs to map these to the structures and personnel within their business.

Example workflows are provided to help businesses develop systems and methods appropriate for them. These cover equipment changes, process changes and organisational change. It is likely that there will only be a few large 'changes' for a site each year; though there may well be many small changes. An 'all-singing-and-dancing' system employed for both small and large changes will quickly fall into disrepute when small projects are required to pass a full in-depth change system.

Often a good strategy begins with the day-to-day types of change. To examine how your current processes, procedures and personnel are engaged to recognise and defend underlying safety. Don't forget to include those occasions where a change almost went ahead but was halted by someone identifying a latent problem or safety concern. As larger and more complex projects / changes arise the analysis can be expanded in both breadth (types of changes) and depth (how much time and effort are required to properly examine the change).

This report has many pages because many scenarios and examples are provided. The appendices contain example forms; they are not prescriptive. Maybe nabim members consider they are too complex or detailed for their needs; that is a matter for the individual business to determine.

A somewhat similar system is the Permit To Work system where the planned work is examined and assessed for hazards and controls; often a Permit Form has been developed. A Management of Change system with appropriate Form(s) allows demonstration that change has been effectively examined, assessed and managed. Such forms also provide evidence of management to e.g. regulators, insurance, auditors etc.

No matter how large or streamlined a Management of Change system a business creates the goal remains the same – to protect the safe operation of the plant.

5.0 Discussion

HSD appreciates that this series of reports covered some topics which are new or unfamiliar to nabim members. It is regretted that the reports may appear long and complicated. The readership we envisaged ranged from senior managers, requiring an overview, to practitioners needing detail and examples. Much of the length is given to examples and very detailed appendices. The basic pattern of the reports is to outline the subject, to refer to prevailing standards and begin the translation to the nabim context.

Recognising the roles and responsibilities and mapping them to individual businesses remain as tasks for individual businesses. It is very true that for these topics there is no one-size-fits-all solution.

The topics are far from trivial, it is anticipated that nabim members will consider putting them into their three to five-year plans. It is hoped that this document will assist nabim members in seeing ways forward to implementing matters raised in each report of the series.