

VISTA CHEMICAL COMPANY - ABERDEEN PLANT

PROCESS SAFETY MANAGEMENT MANUAL

PART B: PROCESS SAFETY INFORMATION DEVELOPMENT PLAN
-----Approved By: *RW Layman*

Plant Manager

Date: 8/14/92**1.0 Scope**

This plan establishes a system for developing and organizing written process safety information for the Aberdeen Plant. Included in this plan are formats for the various components of the Aberdeen Process Safety Information (PSI) system. PSI will be maintained current and accurate through the Management of Change Procedure. PSI will be developed for all "processes" at the Aberdeen Plant containing VCM, propane, chlorine, and peroxide initiators. Development of PSI in accordance with this plan will fulfill the requirements of OSHA 29 CFR 1910.119, paragraph (b) (see Attachment 2).

2.0 Purpose

The purpose of this plan is to set forth the methodology and organization to be used in the development of the Aberdeen Plant PSI system. This plan will also establish review and approval requirements to be used in the development of PSI (see Attachment 1).

3.0 Definitions

Process - Process Safety Information (PSI) will be developed around "processes" covered by the regulation. For purposes of development of PSI, covered "processes" at the Aberdeen Plant are:

- 3.1 VCM Storage & Unloading Facility
- 3.2 Old Reactor Module and Associated Equipment
- 3.3 New Reactor Module and Associated Equipment
- 3.4 Boilers, De-aerators, and Propane System
- 3.5 SA Module and Catalyst Freezers
- 3.6 New Water Plant
- 3.7 Blend Tanks, Dryers, Incinerators, and Silos
- 3.8 Utility Systems (air, N₂, etc.)

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VISTA CHEMICAL COMPANY - ABERDEEN PLANT

PROCESS SAFETY MANAGEMENT MANUAL

PART B: PROCESS SAFETY INFORMATION DEVELOPMENT PLAN
-----**4.0 PSI Content and Format**

A PSI Book will be developed for each of the processes listed in 3.0 above. The PSI Book will contain the following sections:

- I. Hazards of the process
- II. Technology of the process
- III. Equipment of the process

Detailed content information for the PSI Book is as follows:

4.1 Hazards of the process -

This section shall contain a brief description of the hazards presented by the chemicals in the process. MSDS's will be either included in this section or appropriately referenced for all hazardous chemicals in the process under consideration including any stable intermediates which may be formed.

4.2 Technology of the process -

This section of the PSI Book will contain the following:

4.2.1 Process Flow Diagram(s) - The PFD should be developed in a manner which logically shows the flow through the process. Each PFD should include the following information:

4.2.1.1 Title block listing company name and location, process name, revision date, and approval. (PFD approval is detailed in Attachment 1).

4.2.1.2 The major process lines and pieces of equipment including pumps, compressors, vessels, exchangers, and reactors.

4.2.1.3 The major process streams should be labeled with the commonly used name of the chemical it handles (e.g. VCM, charge water, etc.) and the normal operating conditions or ranges.

4.2.2 Process Chemistry Description - This section should contain a description of all process chemical reactions taking

VISTA CHEMICAL COMPANY - ABERDEEN PLANT

PROCESS SAFETY MANAGEMENT MANUAL

PART B: PROCESS SAFETY INFORMATION DEVELOPMENT PLAN

place. The description should be written in straight forward language so that both technical and non-technical individuals can understand the content. The following information should be included in the process chemistry description:

- 4.2.2.1 A written description of the reactions which are taking place.
- 4.2.2.2 Raw materials.
- 4.2.2.3 Products and any co-products.
- 4.2.2.4 Reaction equation(s).
- 4.2.2.5 Nature of reactions (e.g. endothermic, exothermic, etc.).
- 4.2.2.6 General operating conditions (e.g. high temperature, high pressure, etc.).
- 4.2.2.7 Hazards of mixing the wrong materials.

4.2.3 Maximum intended inventory - This sub-section applies to VCM, propane, phthalic anhydride, chlorine, and peroxide initiators at the Aberdeen Plant. The inventory maximums shall be provided for each of these chemicals in the following categories:

- 4.2.3.1 Plant-wide inventories.
- 4.2.3.2 In-process inventories (e.g. maximum inventory of VCM in Old Module at any given time).
- 4.2.3.3 Storage maximum of each hazardous chemical.
- 4.2.3.4 Maximum amount likely to be involved in one incident (e.g. VCM sphere volume, propane storage tanks, etc.).

4.2.4 Safe operating limits - This section applies to critical operating parameters which could result in a major incident if exceeded. This does not mean that all reading and control inputs need to have established operating limits. Examples of what might be included are maximum temperatures and pressures for reactors, design flow rates for a unit, or maximum contaminant levels for a stream. The limits should be established for what is safe for the process (e.g. these are not quality limits). The operating manuals are a good resource for compiling this information. Attachment 3 is a table which should be filled out for critical operating limits for equipment in each process.

VISTA CHEMICAL COMPANY - ABERDEEN PLANT**PROCESS SAFETY MANAGEMENT MANUAL****PART B: PROCESS SAFETY INFORMATION DEVELOPMENT PLAN**

4.2.5 Consequences of deviation - This section should contain a qualitative description of the consequence of exceeding the critical operating limits in 4.2.4. An example is; for high pressure on a reactor: "A relief valve opens releasing VCM. Potential for explosion or exposure". The operating manuals are a good source of information for this section as well. The consequences of deviations should be listed in the table in Attachment 3.

4.3 Equipment of the process -

This section of the PSI Book shall contain information pertaining to the equipment in the process. Some equipment information (e.g. P&ID's, ladder logic drawings, etc.) may be bulky and need to be maintained external to the PSI Book. In these cases, the PSI should be appropriately referenced in the PSI Book and filed externally. Required equipment information is as follows:

4.3.1 Materials of construction -

4.3.1.1 Information on materials of construction is required for all equipment listed on the P&ID. Equipment and instrument specification sheets will be used to accomplish this at the Aberdeen Plant. These specification sheets shall always contain the reference number to the P&ID on which the equipment is located. Tag and loop numbers shall be requested from the Indocs or VMS coordinator as required in development.

4.3.1.2 Information on materials of construction is also required for all piping listed on the P&ID. The line numbering system used on the P&ID shall be used to indicate the materials of construction (current Pipe Specification Books perform this function).

4.3.1.3 A master line list shall be maintained for all processes in the Aberdeen Plant. The master line list shall contain the number of the P&ID where the line is located, the line number, the number of lines or equipment to which it connects, and the service. Attachment 4 is the format for the Aberdeen Plant master line list.

VISTA CHEMICAL COMPANY - ABERDEEN PLANT

PROCESS SAFETY MANAGEMENT MANUAL

PART B: PROCESS SAFETY INFORMATION DEVELOPMENT PLAN

4.3.2 P&ID's - P&ID's shall be developed and maintained for all processes at the Aberdeen Plant with priority in development given to those containing VCM, propane, peroxide initiators, and chlorine. The P&ID shall be the basis for all PSI at the Aberdeen Plant. All P&ID's shall be maintained on an AutoCAD system. All P&ID's shall be drawn in accordance with the Aberdeen Plant drafting standards. A master set of P&ID's shall be maintained for each process. All project generated P&ID's shall be incorporated into the master set upon project completion.

4.3.3 Electrical Classification Drawings - Electrical classification drawings shall be maintained for the Aberdeen Plant. Written descriptions of the area classification should be provided along with the drawings when needed for clarity.

4.3.4 Relief System Design and Design Basis -

4.3.4.1 All relief devices (including relief valves, rupture disks, pressure/vacuum valves, and thermal relief valves) shall have associated design information. The design information shall include the sizing calculations for relief valves and associated piping and design basis (e.g. fire, blocked flow, thermal, reaction, etc.).

4.3.4.2 Relief systems such as collection headers, incinerators, etc. shall also have design information provided. This information is normally contained in the Class "A" or mechanical design. This information should include the sizing basis and a description of the instrumentation and controls for the relief system.

4.3.4.3 Relief device and relief system design information shall be kept on specification sheets at the Aberdeen Plant. The specification sheets shall contain the number of the P&ID on which the relief device is located.

4.3.5 Ventilation System Design - This section applies to vent hoods, control room pressurization, MCC pressurization, analyzer houses, and other systems which control the dispersion of hazardous chemicals. Design information should include calculations showing sizing of vent systems (if

VISTA CHEMICAL COMPANY - ABERDEEN PLANT

PROCESS SAFETY MANAGEMENT MANUAL

PART B: PROCESS SAFETY INFORMATION DEVELOPMENT PLAN

applicable) and a description of instrumentation and controls used in the ventilation system. This information shall be kept on a separate sheet which appropriately references the P&ID where the ventilation system is located. A schematic of the ventilation system should be included where needed for clarity.

4.3.6 Design Codes Employed - This section applies to all major equipment in a process including pressure vessels, storage tanks, piping, pumps, compressors, heat exchangers, fired heaters, boilers, and major electrical equipment. Sheets (these may be specification sheets from the Class "A" design) shall be developed for each P&ID to record the design codes and standards used in the construction of each piece of equipment on that P&ID. Design code information for piping shall be identified through the master line list (Attachment 4).

4.3.7 Material and Energy Balances - Material and energy balances shall be developed for all processes built after May 26, 1992. Material and energy balances are not required for existing processes at the Aberdeen Plant. The material and energy balances should be organized around the Process Flow Diagram for a given process.

4.3.8 Safety Systems - Information on all safety systems at the Aberdeen Plant must be assembled and maintained. Drawings and a written description shall be provided for each of the safety systems listed below:

4.3.8.1 Safety interlocks and safety shutdowns (this includes ladder logic diagrams as well as a written description of the interlocks). The Indocs system should be used as a resource in this documentation.

4.3.8.2 Measurement, control, and alarm systems for critical operating parameters (see section 4.2.4 for critical parameters).

4.3.8.3 Gas monitoring systems.

4.3.8.4 Deluge and firewater systems as well as mobile fire protection systems (plot plans showing fire

VISTA CHEMICAL COMPANY - ABERDEEN PLANT**PROCESS SAFETY MANAGEMENT MANUAL****PART B: PROCESS SAFETY INFORMATION DEVELOPMENT PLAN**

extinguisher locations, etc.).

4.3.8.5 Fire and explosion suppression systems.

4.3.8.6 Safety showers.

4.3.8.7 Breathing systems.

4.3.8.8 PA system and other communication systems.

4.3.8.9 Compressors and generators used during power outages.

4.4 Documentation of Good Engineering Practices

The design code information sheets (these may be specification sheets) shall be used to certify and document that all equipment on the P&ID (e.g. piping, vessels, pumps, compressors, exchangers, etc.) has been designed in accordance with generally accepted good engineering practices. These sheets shall contain the number of the P&ID on which the equipment is located. If design code information is unavailable for a particular piece of equipment, a written statement shall be prepared for signature by the Plant Superintendent which certifies that the equipment is designed, maintained, inspected, tested, and operated in a safe manner. The Mechanical Superintendent shall be responsible for preparation of the necessary certification documents on equipment for which design code information is not available.

5.0 PSI Document Approval and Control Policy

The Aberdeen Plant PSI Document Approval and Control Policy is shown in Attachment 1.

VISTA CHEMICAL COMPANY - ABERDEEN PLANT

PROCESS SAFETY MANAGEMENT MANUAL

PART B: PROCESS SAFETY INFORMATION DEVELOPMENT PLAN

Attachment 1

PSI Document Approval and Control Policy

The purpose of the PSI Document Approval and Control Policy is to streamline efforts for the development of PSI. This policy will ensure that all PSI documents generated for review receive timely review and approval. This policy shall be adhered to in the development of all Aberdeen Plant PSI. PSI shall be reviewed and approved in the following manner:

1. The Chief Process Engineer shall be responsible for assigning individual(s) the responsibility for the development of PSI for each process (e.g. Process Engineer(s) will be assigned to coordinate the development of PSI for each process). The Chief Process Engineer will also designate the Sr. Process Engineer(s) who will be responsible for review and approval of PSI documents for each process.

2. For each process, the Mechanical Superintendent will be responsible for assigning individual(s) the responsibility of initial review of PSI documents listed in paragraph 4.3 - "Equipment of the Process". The assigned Project Engineer(s) will be responsible for initial review of these PSI documents before the documents are submitted for approval. The assigned Project Engineer will not be responsible for reviewing the PSI documents listed in paragraphs 4.1 and 4.2 ("Hazards of the Process" and "Technology of the Process", respectively).

3. Each PSI Document generated for review and approval shall contain the following:

- 3.1 The name of the process.
- 3.2 The name of the PSI document (e.g. P&ID, PFD, relief valve sizing sheet, etc.).
- 3.3 The date of issuance for review.
- 3.4 The signature of the assigned Process Engineer.
- 3.5 An approval block for the Sr. Process Engineer.

4. After initial development, all PSI documents described in paragraph 4.3 - Equipment of the Process shall be marked

VISTA CHEMICAL COMPANY - ABERDEEN PLANT

PROCESS SAFETY MANAGEMENT MANUAL

PART B: PROCESS SAFETY INFORMATION DEVELOPMENT PLAN

"PRELIMINARY - FOR INITIAL REVIEW" and submitted to the assigned Project Engineer(s) for review.

5. The assigned Project Engineer shall review and return the PSI documents no later than three working days after issuance.

6. PSI documents related to paragraph 4.1 - "Hazards of the Process", paragraph 4.2 - "Technology of the Process", and all revised documents covered in paragraphs 4. and 5. above shall be submitted to the assigned Sr. Process Engineer(s) and marked "FOR APPROVAL". The Sr. Process Engineer shall either return the PSI document or indicate his approval by signing the approval block within three working days of issuance.

7. The assigned Process Engineer(s) shall be responsible for assembling the PSI Book for each assigned process.

VISTA CHEMICAL COMPANY - ABERDEEN PLANT

PROCESS SAFETY MANAGEMENT MANUAL

PART B: PROCESS SAFETY INFORMATION DEVELOPMENT PLAN

Attachment 2

OSHA Process Safety Management of Highly Hazardous Chemicals
29 CFR 1910.119(d)Process Safety Information

1. The employer shall complete a compilation of written process safety information (PSI) before any process hazard analyses (PHA's) are conducted. The purpose of the PSI is to enable the employer and the employees involved in operating the process to identify and understand the hazards posed by those processes involving highly hazardous chemicals. The PSI shall include information pertaining to the chemical hazards of the process, the technology of the process, and the equipment used in the process.

2. Information pertaining to the hazards of the process shall include at least the following:

- 2.1 Toxicity information
- 2.2 Permissible exposure limits
- 2.3 Physical data
- 2.4 Reactivity data
- 2.5 Corrosivity data
- 2.6 Thermal and chemical stability data
- 2.7 Hazardous effects of mixing improper materials.

MSDS's that meet the requirements of 29 CFR 1910.1200(g) may be used to comply with this subparagraph.

3. Information pertaining to the technology of the process shall include at least the following:

- 3.1 A block flow diagram or a simplified PFD
- 3.2 Process Chemistry
- 3.3 Maximum intended inventory
- 3.4 Safe upper and lower limits for temperatures, pressures, flows, compositions, etc.
- 3.5 An evaluation of the consequences of deviation.

Where the original information no longer exists, such information may be developed in conjunction with PHA's.

VISTA CHEMICAL COMPANY - ABERDEEN PLANT

PROCESS SAFETY MANAGEMENT MANUAL

PART B: PROCESS SAFETY INFORMATION DEVELOPMENT PLAN

4. Information pertaining to the equipment of the process shall include at least the following:

- 4.1 Materials of construction
- 4.2 P&ID's
- 4.3 Electrical classification
- 4.4 Relief system design and design basis
- 4.5 Ventilation system design
- 4.6 Design codes and standards employed
- 4.7 Material and energy balances for processes built after May 26, 1992
- 4.8 Safety systems (e.g. interlocks, detection systems, etc.)

The employer shall document that equipment complies with good engineering practices. For existing equipment that was designed and constructed with outdated codes, the employer shall determine and document that the equipment is designed, maintained, inspected, tested, and operated in a safe manner.

VISTA CHEMICAL COMPANY - ABERDEEN PLANT

PROCESS SAFETY MANAGEMENT MANUAL

PART B: PROCESS SAFETY INFORMATION DEVELOPMENT PLAN

Attachment 3

Critical Operating Limits

Critical Parameter	Loop Number	Oper. Limit	Consequence of Deviation	Prevention or Corrective Action

VISTA CHEMICAL COMPANY - ABERDEEN PLANT

PROCESS SAFETY MANAGEMENT MANUAL

PART B: PROCESS SAFETY INFORMATION DEVELOPMENT PLAN

Attachment 4

Master Line List

Line Specification	P&ID Number	Line or Eq From To	Des F	Cond PSIG	Op F	Cond PSIG	Service