



SARNIA REFINERY

NITROGEN IDENTIFICATION AND CONTROL

STANDARD

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4000-ZPR-SMSAFESA-018715

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Document Owner: Manager, EH&S

Document Contact: Occupational Hygienist

SCOPE AND PURPOSE:

The purpose of this document is to outline the Identification, control, and use of Nitrogen.

IDENTIFICATION AND CONTROL:

1. All Nitrogen supplies that are located at a Utility station are to be clearly labelled and locked out with an Operations lock. Labelling, at a minimum, shall indicate "NITROGEN" using the following colour schemes:
 - (a) Yellow label with black lettering (old/existing labels); or
 - (b) Pink label with white lettering (new labels).

A Utility station is defined as a common location that supplies Plant Air, Water, Steam and Nitrogen for general use – however, should a N₂ supply be located in close proximity to only a plant air supply connection, and there is potential for mistaking one for the other, the N₂ supply shall be locked out.

2. All normally accessible N₂ take off points (bleeds/vents/supply headers) that are not part of a Utility station will be identified by labelling at a point close to the bleed/vent.
3. All permanent tie-ins for equipment will be clearly identified with labelling and blanked off when not in use.
4. All temporary supplies of N₂ will be clearly identified with tagging or labelling. They will also be secured via Operations lock. A log entry must be made in the OLT when the connection is provided. Any temporary N₂ supply headers will be clearly labelled and locked via Operations lock.

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5. Only Operations may remove a lock at a Utility station N₂ supply. They may authorize maintenance/contractors to use a N₂ supply via a safe work permit. A N₂ supply at a Utility station may remain unlocked while it is in use – including over multiple shifts – but it must be relocked and bull plug reinstalled when its use is complete.

CONNECTIONS TO PROCESS EQUIPMENT:

1. Temporary tie-ins between the N₂ supply system to process equipment shall include a check valve to prevent the inadvertent backflow of process material into the Nitrogen system.
2. Where temporary spool pieces or temporary connections are used, the spools/connections must be removed when Nitrogen is no longer required.
3. Nitrogen is not to be opened up to process equipment unless the pressure within the process equipment is, at a minimum, 100 kPa lower than the N₂ header pressure as indicated at 04PI090.pv. Typical Nitrogen header pressure is 1100 kPa but this can change depending on use in other areas of the refinery.
4. As per #3 in “Identification and Control” section, permanent tie-ins to process equipment will be blanked off when not in use unless a documented exemption exists which will be the responsibility of CFT to identify, document and approve via MOC process.

Documented exemption is needed in cases where the permanent connection is closed but not blanked. In cases where all existing permanent connections are opened during normal operations there is no need for MOC. They should be captured on an identified list.

5. Turnaround and maintenance activities must support this standard and may include additional nitrogen controls.

GENERAL USE:

- Use of yellow “air” hose for Nitrogen is forbidden.
- Use of standard “air” hose fittings/connections in Nitrogen service is forbidden.

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- When large volume of nitrogen is intentionally discharged to the refinery flare system, it needs to be quantified and communicated to CB4 operations so that a decision can be made whether to shutdown the flare gas recovery system and thereby avoid significant calorific value (BTU) reductions to the refinery fuel gas system. Nitrogen flow shall be monitored by 04FI028.PV or 04FY029.PV in PDH.
- An OLT entry is to be made when using Nitrogen.
- Where Nitrogen use exposes a worker to an oxygen deficient atmosphere, breathing air is required.
- Whenever possible, alternatives to clearing lines/vessels with nitrogen to atmospheric storage tanks should be used (i.e., pumping out, draining to a sump, nitrogen clearing to a pressure vessel that is vented to flare, etc...). When nitrogen is being used to purge out lines/vessels, the purging must be stopped and the line/vessel isolated from the storage tank before the nitrogen can reach the storage tank in order to avoid damaging a floating roof, over-pressuring a tank or creating a hazardous odour/vapour. Lines/vessels should never be purged with nitrogen or any other gas to an atmospheric storage tank..

EMERGENCY SUPPLY:

Nitrogen is used as an emergency back-up gas supply to maintain the *Instrument Air* header pressure. The nitrogen addition stations for the instrument air system are normally blocked-in. If the refinery must run with nitrogen in the system, the nitrogen station at 31V-014 in Plant 3 is the primary addition location with the Plant 1 and Plant 4 nitrogen additions station being secondary.

The nitrogen addition station in Plant 4 at 40V-004 has a check valve that prevents this vessel from supplying the instrument air system for the rest of the refinery so this station is not appropriate as the sole N₂ supply to the compressed air system in a system wide emergency but it will assist greatly in meeting the refinery instrument air needs.

Whenever N₂ is added to the system, the Instrument Air to Plant Air letdown in Plant 1 (**04PC-707**) should be put on manual and closed. Also, an information announcement is to be made to the refinery to make everyone aware that there will not be a supply of plant air (for example, to drive air driven tools) until further notice.

An instrument air emergency is defined as the instrument air header pressure reaching 550 kPa and falling as observed at any one of the following indicators;

- **04PI-707** in Plant 1

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- **04PI-076** in Plant 2
- **31PI-628** in Plant 3
- **40PI-002** in Plant 4

The first response to an instrument air emergency is to notify CB4 and have them add Nitrogen to the system at 31V-014 and then notify the Shift Engineer who can then determine what, if any, additional measures need to be taken, which include;

- Ensure that the Instrument air to plant air letdown **04PC-707** in plant 1 is closed to prevent N₂ from entering plant air header.
- Notify all control rooms that N₂ is being supplied to instrument air headers.
- Ensure that a spare compressor is started as per scenarios below.
- Arrange for a portable compressor to be brought onsite and tied in at appropriate location. Typically a 1600scfm portable is required.

NITROGEN TIE POINT LOCATIONS:

- Plant 1 - Gas Plant at the northeast corner of "B" and "C" pipe rack
- Plant 2 - In the high line at the S.E. corner of the C-186 building
- Plant 3 - Reaction Unit at 31V-014 instrument air receiver
- Plant 4 - Plant 4 Air Receiver 40V-004

DESCRIPTION OF TIE POINTS:

Each installation (Area 1/ Area 2) there are 2" double block valves with a 1" (painted orange) bleed valve between the block valves left open (bull plug not required, exempted as per Standard Plugging Vents and Bleeds. A pre-set gas regulator at each location will control the instrument air header pressure.

OPERATION:

Normal - The three tie-ins are isolated (2" valves closed; 1" bleed open).

Abnormal - For instrument air failures (i.e. loss of compressors), one or all nitrogen tie-ins will be used under the direction of the Shift Supervisor/ Chief Engineer or Shift Engineer.

NOTE

If a nitrogen station is used, nitrogen entering the instrument air header will affect the operation of the following equipment.

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Tank Farm/ WWT

1. **A-05007** TOC Contaminated Sewer,
2. **A-05008** TOC Process Sewer,
3. **A-03042 #2** ULSD SIMDIS,

Plant 1

1. **A-19034** Alky Sulphur,
2. **A-18106** LSD Distillation,
3. **A-18102A** H₂S in the Debut,
4. UOP – Plant Air to Unit,
5. 12AH-101 Pilot Purge Air,
6. CB1/ Admin Offices HVAC Units – Notify HVAC Maintainer if Plant Air is lost.

Plant 2

1. **A-21004** SIMDIS Naphtha,
2. **A-21007** SIMDIS Kerosene,
3. **A-21008** SIMDIS LVGO,
4. **A-24003** GC ORTHO/XYLENE O'HEAD,
5. **24AI-002** Extract,
6. **24AI-005** Prefrac Bttms,

Plant 3

1. **A-33200** GC Hydrogen Product,
2. **A-32300** GC (5 STREAMS) PREFLASH TWR O/H, PREFLASH TWR BTMS, DEBUT BTMS, DEISOBUT IN C3, PRESAT GAS,


Plant 4

1. Pilot combustion air to the Plant 4 SRUs and the TGTU will trip at 560 kPa. Will not affect process but will impact ability for trains/TGTU to restart.

END OF STANDARD

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|  | | <u>REVISION LOG</u> | |
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| Date MM/DD/YYYY | Revision | Section | Comment |
| 09/26/2012 | Original | All | New Standard. |
| 10/17/2012 | 1 | Header | Updated format of dates. |
| | | Revision Log | Original revision was replacing Work Practice document 4000-ZSD-S-MSAFEcA-00224 titled "Use of Nitrogen" which was moved to "Obsolete" folder. (K. Devereux) |
| 07/24/2013 | - | Header | Document Owner & Contact Updated. NO content change. (L. Lebert) |
| 12/06/2016 | 2 | All | <ul style="list-style-type: none"> All information from the "Nitrogen Tie-in to The Refinery Instrument Air System" document has been added to this document to provide one consolidated document. |
| | | Identification and Control | <ul style="list-style-type: none"> Added new labelling colour scheme. Added requirement to secure temporary N2 with Operations lock. Added requirement to make a log entry into the OLT when a temporary N2 connection is provided. |
| | | Connections to Process Equipment | <ul style="list-style-type: none"> Added requirement for documented exemption where permanent connection is closed but not blanked. Added requirement for turnaround and maintenance activities to support this standard. |
| | | General Use | <ul style="list-style-type: none"> Removed reference to separate document for connecting N2 to the instrument air system (that document has been added to this consolidated document). |
| 11/29/2018 | 3 | General Use | <ul style="list-style-type: none"> Added requirement to stop line purging before N2 can reach the storage tank. |