



SILICA & REFRACTORY

SOP #19000-015

Issue Date: September 2015 Next Review Date: Sept. 2018 Area: SCEP

Document Owner: Environment, Health and Safety Manager

Document Contact: Safety and Hygiene Advisor

SCOPE AND PURPOSE:

This standard defines the controls used to reduce the risk of potential silica and/or refractory exposure at the Suncor St. Clair Ethanol site.

ROLES AND RESPONSIBILITIES:

The **Safety and Hygiene Advisor** is accountable to provide support, as necessary to ensure appropriate control of worker exposure to silica and/or refractory and conformance to this Standard.

Workers and **Supervisors** are accountable to evaluate their work tasks for the potential risk of silica and/or refractory exposure and implement necessary controls. Workers and Supervisors must receive training to support competency.

Workers are accountable to report to their Supervisor and/or EH&S representative any physical or medical conditions that increase their vulnerability to silica and/or refractory exposure. Workers do not have to disclose the specifics of the physical or medical condition. If they choose to do so, the worker may disclose the specifics of the condition to Suncor Medical. Workers must receive training to support competency.

Shift Supervisors are accountable to ensure all personnel involved in completing aspects of the permit are competent.

Contractors are accountable to evaluate their work tasks for the potential risk of silica and/or refractory exposure and implement necessary controls.

GUIDANCE AND STANDARDS:

Identification of Potential for Silica and Refractory Containing Materials

The presence of silica and/or refractory must be considered by the primary Suncor St. Clair Ethanol Plant (SCEP) contact (in consultation with any contractors involved in the work) during the planning of all work activity that involves the disturbance of potential silica and refractory containing materials, including but not limited to;

1. **Crystalline silica-containing materials** (Ex: quartz, cristobalite, tridymite, tripoli, coesite, flint etc.);
 - Cement and cement containing materials
 - Brick and mortar
 - Rock and stone
 - Sand

2. **Amorphous silica-containing materials** (may convert to crystalline silica upon exposure to significant heat. As a result materials that contain amorphous forms of silica and have been exposed to significant heat must be considered suspect materials. Ex. Diatomaceous earth, silica gel, fused CAS 7631-86-9)
 - Refractory - refractory will be managed as a silica containing material at all times to ensure best practices are followed
 - Silica-containing catalyst

Please note that known locations of silica and/or refractory at the Suncor St. Clair Ethanol site include, but are not limited to;

1. The Molecular Sieve Beds
2. Driers
3. Heaters
4. Thermal Oxidizers

All suspect materials will be assumed to be silica and/or refractory containing unless verified by one of the following methodologies;

1. **Bulk sampling and analysis**– during work planning activities the primary SCEP contact will engage the Safety and Industrial Hygiene Advisor to determine sampling requirements and scheduling to ensure sampling is conducted a minimum of two weeks in advance of work activities wherever practicable.

Samples representative of all areas to be disturbed shall be collected and analyzed by an accredited laboratory. Any suspect material containing less than 1% Silica by weight will be deemed silica-free. The 1% concentration limit aligns with the laboratory limit of detection, as well as the Industrial Accident Prevention Association (IAPA) guideline “Silica in the Work Place”. A record of all samples collected shall be maintained by the Safety and Industrial Hygiene Advisor.

2. **Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS) review** –the primary SCEP contact must ensure MSDS or SDS have undergone the SCEP Chemical Approvals Process by submitting the following to the Environment, Health and Safety Department;
 - MSDS or SDS and;
 - completed Chemical Approvals Forms located P:\Operations\Employee Resource Centre\Forms\Chemical Approvals Forms

The material may be deemed silica/refractory free if the MSDS or SDS is available for review, has been approved through the chemical approvals process and;

- It does not indicate the presence of silica and/or refractory; or
- Indicates the presence of silica and/or refractory in concentrations of less than 1% by weight and the material will not be used for abrasive blasting

Risk Assessment

All work involving the potential disturbance of silica and/or refractory containing materials shall be classified as a Type 1, Type 2, Type 3 (or any combination of – in which case the highest classification will be the determining classification for instituting controls) operation. All steps outlined in the work scope are to be reviewed in accordance with the following parameters (please note that if work activities are not defined below or clarity/support is required), the Industrial Hygiene and Safety Advisor must be engaged);

Type 1 Work

- Drilling of holes in concrete or rock that is not part of a tunneling operation or road construction
- Milling of asphalt from concrete highway pavement
- Charging mixers and hoppers (molecular sieve beds) with materials that contain >95% silica and/or refractory
- Any other operation at a project that requires the handling of silica and/or refractory containing materials in a way that may result in a worker being exposed to airborne silica and/or refractory
- Entry into a dry mortar removal or abrasive blasting area while the airborne dust is visible for less than 15 minutes for inspection and/or sampling

- Cristobalite and Tridmite >0.05-0.50 mg/m³
- Quartz and Tripoli >0.10-1.0 mg/m³

Type 2 Work

- Removal of silica and/or refractory containing materials with a jackhammer
- The drilling of holes in concrete or rock
- The use of a power tool to cut, grind or polish concrete, masonry, or terrazzo
- The use of power tools to remove silica and/or refractory containing materials
- Tunnelling
- Tuckpoint and surface grinding
- Dry mortar removal with an electric or pneumatic cutting device
- Dry method dust cleanup from abrasive blasting operations
- The use of compressed air outdoors to remove silica and/or refractory dust
- Entry into an area where abrasive blasting is being carried out for more than 15 minutes
- Cristobalite and Tridmite >0.05-2.50 mg/m³
- Quartz and Tripoli >1.0-5.0 mg/m³

Type 3 Work (please note that Type 3 work is not typically conducted at the Suncor St. Clair Ethanol site and therefore the leadership team and EH&S must be engaged in proposed type 3 work)

- Abrasive blasting of or with material that contains silica and/or refractory
- Cristobalite and Tridmite >2.5 mg/m³
- Quartz and Tripoli >5.0 mg/m³

Classification of work activities not adequately represented above must be conducted in consultation with the Industrial Hygiene and Safety Advisor.

Whenever appropriate, air monitoring may be conducted to verify controls and support Industrial Hygiene data

The Risk Assessment must also provide consideration for all other applicable St. Clair Ethanol standards/procedures and associated controls (I.e. SWS 19000-01 Confined Space Standard)

Once work activities have been classified, control measures must be clearly defined and implemented in accordance with the highest classification (i.e. if Type 1 and Type 2 work are included in the scope, Type 2 control measures will be applied).

Control Measures

There are a minimum of 6 control measure categories associated with Silica and/or Refractory work;

- Training
- General Controls
- PPE
- Signage
- Barrier/Enclosures

- Change rooms/Decontamination Areas

Training

Workers performing work in an area where there is a potential for Silica exposure will be trained in;

- Workplace Hazardous Materials Information System (WHMIS) training. Suncor St. Clair Ethanol employees will be provided WHMIS site specific training.
- Suncor St. Clair Ethanol Contractor Orientation Training (contractors - annually) and/or New Employee Orientation training (Suncor St. Clair Ethanol employees – one-time) which includes the identification of potential Silica exposures at the site and associated standards
- Respirator fit testing

General Controls

Wet all silica and/or refractory materials prior to disturbance wherever practicable. Work areas must be supplied with spray bottles, paper towels and/or wet wipes as a minimum to facilitate wetting activities.

No compressed air or dry sweeping activities are to be undertaken.

HEPA vacuum used where practicable

All work locations are to be supplied with a designated disposal bin which contains clear double bags, along with duct tape and labels to ensure all contaminated materials are marked and readily identifiable

All Type 1 work locations must be clearly marked with danger tape and signage (see below).

All Type 2 locations must be danger taped with a 10 meter isolation or shrouded – with signage affixed (see below)

Prior to leaving work area, removal of disposable coveralls and gloves is required. All potentially contaminated materials are to be placed in a designated disposal bin.

All tools, work boots, hard hats, fall arrest (if applicable), eyewear and respirators are to be thoroughly wet wiped or HEPA vacuumed prior to leaving the area (please note wiping activities are to occur **while still donning respiratory and eye protection**) and wiping materials to be disposed of in the designated bin.

Every effort must be made to eliminate the migration of silica and/or refractory fibers outside of the work location.

Workers must then leave the area, place respirator and fall arrest (if applicable) in appropriate storage and proceed to the nearest washroom and hands must be thoroughly washed.

PPE

In addition to standard PPE requirements for the St. Clair Ethanol site, the following must be worn;

Gloves (mandatory)

Fire retardant disposal coveralls (to be worn over top of standard fire retardant coveralls)

Respiratory Protection;

Type 1 – a minimum of a Half face air purifying respirator with P100 filters and worn with mono-goggles. Full face recommended

Type 2 – a minimum of a full face air purifying respirator with P100 filters

Type 3 – consult with Industrial Hygiene and Safety Advisor

Signage

Signs will be posted at all work location where there is a potential to disrupt Silica and confined space entry points (or affix shrouding surrounding the entry point and/or on the 10m taped off area for Type 2 work) reading as follows:

“There is a silica and/or refractory dust hazard; Access to the work area is restricted to authorized persons; and respirators must be worn in the work area”

Please note that for confined spaces the “work area” is considered to be the entry point and the vessel and/or the shrouding.

Barriers/Enclosures

Type 1 – a danger tape barrier must be erected immediately around the work area with signage clearly posted

Type 2 - Shrouding or a 10m restricted access area will be used for Type 2 work areas with signage clearly posted.

Type 3 - Shrouding or a 25m restricted access area will be used for Type 3 work areas with signage clearly posted. Please note Type 3 work activities require additional consultation and approval from the EH&S department during the planning stages before any work may begin

Change Rooms/ Decontamination Areas

Type 1 Silica and Refractory Work

Spray bottles of water, paper towels (or wet wipes) and garbage bins outfitted with clear bags (double bagged) must be located immediately within the work location or just outside of the confined space entry point.

Prior to exiting the vessel associated with a confined space entry – workers are required to brush off material from coveralls, boots, eyewear and hard hat to limit the material leaving the vessel.

Workers are required to exit the vessel and immediately remove disposable coveralls and gloves – placing them in the designated garbage bin, wipe down work boots, hard hats, fall arrest, eyewear and respirator **while still donning the respirator (and eye protection when applicable)**, placing paper towels etc. in the designated bin. The worker will leave the area, place respirator and fall arrest in appropriate storage and proceed to the nearest washroom and hands must be washed.

Any potentially contaminated materials (tools, scaffold etc.) removed from a work location where Type 1, Type 2 or Type 3 Refractory or Silica work has occurred must be decontaminated via wet wipe or double bagged in clear poly and duct taped closed immediately following removal from the confined space entry point or prior to leaving the work location.

All silica materials must be double bagged, duct taped and removed to the appropriate disposal area before each work break from the area or when the bin is full – whichever occurs first. All efforts must be made to ensure materials remain inside any open containers at all times.

Type 2 Silica and Refractory Work

A decontamination room (shrouding) will be erected immediately at the confined space entry point or within the 10 meter restricted access area when shrouding is not used or a confined space is not included in the work scope.

The change room will contain a 3 stage filter negative air ventilation system wherever practicable.

Wetting agents will be used during work activities wherever practicable

Prior to exiting the vessel – workers are required to brush off material from coveralls, boots, gloves, respirator and hard hat to limit the material leaving the vessel.

Prior to exiting the vessel associated with a confined space entry – workers are required to brush off material from coveralls, boots, eyewear and hard hat to limit the material leaving the vessel.

Any potentially contaminated materials (tools, scaffold etc.) removed from a work location where Type 1, Type 2 or Type 3 Refractory or Silica work has occurred must be decontaminated via wet wipe or double bagged in clear poly and duct taped closed immediately following removal from the confined space entry point or prior to leaving the work location.

Workers are required to exit the vessel and immediately remove disposable coveralls and gloves – placing them in the designated garbage bin, wipe down work boots, hard hats, fall arrest, eyewear and respirator **while still donning the respirator**, placing paper towels etc. in the designated bin. Where a HEPA vacuum is available, it will be used to support decontamination of work boots, hard hats etc.

The workers are then to exit the decontamination room (still donning respiratory protection and eye protection), hang respirators and fall arrest at the appropriate locations and proceed to the nearest washroom to wash hands etc.

All silica materials must be double bagged, duct taped and removed to the appropriate disposal area before each work break from the area or when the bin is full – whichever occurs first. All efforts must be made to ensure materials remain inside any open containers at all times.

Type 3 Silica and Refractory Work

Please note that additional training, consultation with EH&S during the planning phase, and a safety pause will be required prior to any Type 3 Silica work occurring at the Suncor St. Clair Ethanol site.

A decontamination room (shrouding) will be erected immediately at the confined space entry point or within the 25 meter restricted access area when shrouding is not used or a confined space is not included in the work scope.

The change room will contain a 3 stage filter negative air ventilation system wherever practicable.

Wetting agents will be used during work activities wherever practicable

Prior to exiting the vessel – workers are required to brush off material from coveralls, boots, gloves, respirator and hard hat to limit the material leaving the vessel.

Prior to exiting the vessel associated with a confined space entry– workers are required to brush off material from coveralls, boots, eyewear and hard hat to limit the material leaving the vessel.

Workers are required to exit the vessel and immediately remove disposable coveralls and gloves – placing them in the designated garbage bin, wipe down work boots, hard hats, fall arrest, eyewear and respirator **while still donning the respirator**, placing paper towels etc. in the designated bin. The worker will leave the area, place respirator and fall arrest in appropriate storage and proceed to the nearest washroom and hands must be washed.

Where a HEPA vacuum is available, it will be used to support decontamination of work boots, hard hats etc.

The workers are then to exit the decontamination room, hang respirators and fall arrest at the appropriate locations and proceed to the nearest washroom to wash hands etc.

Any potentially contaminated materials (tools, scaffold etc.) removed from a work location where Type 1, Type 2 or Type 3 Refractory or Silica work has occurred must be decontaminated via wet wipe or double bagged in clear poly and duct taped closed immediately following removal from the confined space entry point or prior to leaving the work location.

All silica materials must be double bagged, duct taped and removed to the appropriate disposal area before each work break from the area or when the bin is full – whichever occurs first. All efforts must be made to ensure materials remain inside any open containers at all times.

Designated Bins for Waste

Refractory and Silica waste must be double bagged, duct taped closed before leaving the work area for break or as they become full, and clearly marked.



Silica must be disposed of following the Suncor St. Clair Ethanol Outbound Materials Procedure in consultation with the Environmental Advisor.

REFERENCES TO RELATED DOCUMENTS:

- Construction Safety Synthetic Vitreous Fibres: Guidelines for Construction
- Occupational Health and Safety Branch Ministry of Labour: Guideline on Silica Projects 2011
- SWS 19000-002 Outbound Waste Materials
- SWS 19000-001 Confined Space Standard
- SWS 19000-007 Temperature Stress Standard
- Industrial Accident Prevention Association (IAPA) Guideline "Silica in the Work Place"

END OF PROCEDURE

REVISIONS			
No.	Date (mm/dd/yyyy)	Author	Description
0	09/01/2015	L. Nauta	Updated for format and numbering