

**NATURAL GAS PIPING AND HYDROGEN PIPING PURGE
AND DEPRESSURIZATION OF THE COMPRESSED AIR, HELIUM, AND ARGON SYSTEMS**

**NUCLEAR METALS INCORPORATED SUPERFUND SITE
NON-TIME CRITICAL REMOVAL ACTION
CONCORD, MASSACHUSETTS**

Prepared for:



de maximis, inc.

200 Day Hill Road, Suite 200
Windsor, CT 06095

NOVEMBER 28, 2011

Objective: This task plan provides a process to safely terminate pressurized gas and vacuum piping within the buildings and structures at the Nuclear Metals, Inc. Site (“site”).

The site has both low and high pressure natural gas piping systems. In addition, the site is known to have a hydrogen storage and piping system, a compressed air system, a helium storage and piping system, an argon storage and piping system and a vacuum system. *de maximis, inc. (de maximis)* will perform a site assessment to identify the locations and layout of gas and vacuum piping to be terminated, and potential flame and spark sources.

Natural Gas Purging

For all natural gas piping that is not utilized for interim building heat, *de maximis* will arrange for a licensed and experienced contractor to perform purging of the remaining gas piping. *de maximis* and the contractor will review the layout of the low pressure and high pressure piping systems to ensure both understand and agree on the gas piping that will be purged by the contractor and that the piping is disconnected from the gas supply. The contractor will also review this plan to confirm that the information and approach in this plan are safe and acceptable. All flammable gas piping purging shall be in accordance with the “Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems”, NFPA 56 (PS), 2012 Edition.

The contractor shall submit a gas purging plan and job hazard assessment for *de maximis* review prior to initiating the gas purging event. *de maximis* and the contractor shall agree on the personnel exclusion zone prior to each gas purging event. All work will be performed pursuant to the Interim Health and Safety Plan, and if appropriate, a task-specific Radiation Work Permit. The contractor shall provide site specific gas purge training to all personnel participating in the purge events prior to starting the on-site work.

All the piping to be purged will be disconnected from the equipment.

All disconnected piping shall be connected together and vented at a location a minimum of five feet above the roof and a minimum of ten feet from any building opening or existing vent. The purge vent shall have a readily accessible or remotely activated shut off valve. The vent shall be positioned such that venting debris does not endanger personnel.

All work within the buildings will cease and employees will be evacuated to a safe distance prior to and during the purging and until gas monitoring indicates the buildings and the area are free of gas.

The Local Fire Marshall will be provided this plan for review and comment prior to implementing the work, and will be notified a minimum of 48 hours in advance of purging.

Prior to each purging event, *de maximis* shall ensure that all identified flame sources and potential spark sources have been turned off, locked out, and tagged out and that all work within the buildings has stopped and that all employees have been evacuated to a safe distance prior to and during purging and until gas monitoring indicates the buildings and the surrounding area are free of gas (particularly topographic low points and courtyard areas between buildings where gas dissipation may be limited or slow) No hot work shall be performed during the gas purging event.

The exclusion zone shall be roped off and adequate danger signage put up. No cell phones or non-intrinsically safe radios will be used within the exclusion zone. No smoking will be permitted in the exclusion zone.

The morning of the gas purge event, a documented meeting will include all personnel on site to review the procedure and job hazard assessment and sign off on both documents. A head count of all personnel on site and separately all personnel involved with the purge event shall be taken. All personnel will be made aware of the exclusion zone and be advised of the evacuation route and plan.

A four gas meter will be utilized to check air quality within the buildings being purged, at the point where nitrogen is being introduced, and at the venting locations. The meters will be used to monitor for gas/explosives and also to confirm that nitrogen is not depleting the oxygen within the building.

Nitrogen gas will be connected to the piping to be purged.

A gas monitor will be placed on the roof of the building in a location that is structurally sound to test the exhaust from the installed purge vents during the purging.

Nitrogen gas will be introduced to the gas piping. Low pressure gas piping purging will be performed separately from the high pressure gas piping purging.

The exhaust from the vents will be monitored.

The gas piping will be deemed clear after the gas monitor indicates no gas from the vents and at least two gas piping volumes have been introduced into the piping.

Once the nitrogen purge is complete, the building will be swept with monitors to ensure air quality before allowing access to the building by personnel other than the purge personnel.

When the gas piping purging is completed, the contractor shall supply *de maximis* with a letter documenting the purging event and summarizing what buildings and piping have been purged.

When building heat is no longer required on site and prior to demolition, *de maximis* will arrange for the utility to purge the remaining gas piping system from the property lines to the buildings. *de maximis* and the natural gas utility will review the layout of the gas piping systems and ensure both understand and agree on the piping that will be purged by the utility, the

potential gas venting locations, and the gas purging method. *de maximis* will arrange with the natural gas utility company to disconnect the gas feed at the property line, remove all gas meters at the buildings and purge the gas line from the disconnection point to the gas meter connections. Prior to the natural gas utility purging, *de maximis* shall ensure that all identified flame sources and potential spark sources have been turned off, locked out and tagged out, and that all work within the buildings has stopped and that all employees have been evacuated to a safe distance prior to and during purging and until gas monitoring indicates the buildings and the surrounding area are free of gas (particularly topographic low points and courtyard areas between buildings where gas dissipation may be limited or slow). Subsequent to the disconnections, the gas utility will provide written documentation of all building terminations and piping purged.

Hydrogen Gas System Purging

For all hydrogen gas piping *de maximis* will arrange for a licensed and experienced contractor to perform purging of the hydrogen gas piping. *de maximis* and the contractor will review the layout of the hydrogen piping systems to ensure both understand and agree on the hydrogen gas piping that will be purged by the contractor. The contractor will also review this plan to confirm that the information and approach in this plan are safe and acceptable. All flammable gas piping purging shall be in accordance with the “Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems”, NFPA 56 (PS), 2012 Edition.

The contractor shall submit a hydrogen gas purging plan and job hazard assessment for *de maximis* review prior to initiating the gas purging event. *de maximis* and the contractor shall agree on the personnel exclusion zone prior to each hydrogen gas purging event. All work will be performed pursuant to the Interim Health and Safety Plan, and if appropriate, a task-specific Radiation Work Permit. The contractor shall provide site specific hydrogen gas purge training to all personnel participating in the purge events prior to starting the on-site work.

Prior to beginning work, the contractor shall valve off and tag out the hydrogen source. Exclusion zones shall be set up and hydrogen gas monitoring performed as detailed below. A vent shall be installed to purge out any remaining hydrogen pressure in the piping system. The vent shall be installed at a location a minimum of five feet above the roof and a minimum of ten feet from any building opening or existing vent. The vent shall have a readily accessible or remotely activated shut off valve. The vent shall be positioned such that venting debris does not endanger personnel. Once the hydrogen piping pressure is bled off, the hydrogen source shall be disconnected from the hydrogen piping and plugged.

All the piping to be purged will be disconnected from the equipment and connected to venting piping.

All disconnected piping shall be connected together and vented at a location a minimum of five feet above the roof and a minimum of ten feet from any building opening or existing vent. The

purge vent shall have a readily accessible or remotely activated shut off valve. The vent shall be positioned such that venting debris does not endanger personnel.

All work within the buildings will cease and employees will be evacuated to a safe distance prior to and during the purging and until gas monitoring indicates the buildings and the area are free of gas.

The Local Fire Marshall will be provided this plan for review and comment prior to implementing the work, and will be notified a minimum of 48 hours in advance of purging.

Prior to each purging event, *de maximis* shall ensure that all identified flame sources and potential spark sources have been turned off, locked out, and tagged out, and that all work within the buildings has stopped and that all employees have been evacuated to a safe distance prior to and during purging and until gas monitoring indicates the buildings and the surrounding area are free of gas (particularly topographic low points and courtyard areas between buildings where gas dissipation may be limited or slow). No hot work shall be performed during the gas purging event.

The exclusion zone shall be roped off and adequate danger signage put up. No cell phones or non-intrinsically safe radios will be used within the exclusion zone. No smoking will be permitted in the exclusion zone.

The morning of the hydrogen gas purge event, a documented meeting will include all personnel on site to review the procedure and job hazard assessment and sign off on both documents. A head count of all personnel on site and separately all personnel involved with the purge event shall be taken. All personnel will be made aware of the exclusion zone and be advised of the evacuation route and plan.

A four gas meter will be utilized to check air quality within the buildings being purged, at the point where nitrogen is being introduced, and at the venting locations. The meters will be used to monitor for gas/explosives and also to confirm that nitrogen is not depleting the oxygen within the building.

Nitrogen gas will be connected to the hydrogen piping to be purged.

A gas monitor will be placed on the roof of the building in a location that is structurally sound to test the exhaust from the installed purge vents during the purging.

Nitrogen gas will be introduced to the gas piping. The exhaust from the vents will be monitored.

The hydrogen gas piping will be deemed clear after the gas monitor indicates no gas from the vents and at least two hydrogen gas piping volumes have been introduced into the piping.

Once the nitrogen purge is complete, the building will be swept with monitors to ensure air quality before allowing access to the building by personnel other than the purge personnel.

When the hydrogen gas piping purging is completed, the contractor shall supply *de maximis* with a letter documenting the purging event and summarizing what buildings and piping have been purged.

Compressed Air Depressurization

de maximis and the contractor will review the layout of the compressed air piping and attached equipment to ensure both understand and agree on the piping and equipment that will be depressurized.

Prior to disconnecting any equipment from the compressed air piping, the compressed air source will be locked and tagged out. The piping will then be depressurized at the compressed air source and the compressed air source will be disconnected and the piping permanently air gapped.

All equipment that is connected to the compressed air piping will have the piping disconnected and permanently air gapped. Each piece of equipment will then be tagged out. The contractor will supply *de maximis* with a written list, for each building, of the equipment disconnected from the compressed air piping.

Vacuum System Pressure Normalization

de maximis and the contractor will review the layout of the vacuum piping and attached equipment to ensure both understand and agree on the piping and equipment that will be normalized.

Prior to disconnecting any equipment from the vacuum piping, the vacuum source will be locked and tagged out. *de maximis* and the contractor will determine an appropriate location to open the piping to atmospheric pressure. After the vacuum system has been brought to atmospheric pressure, *de maximis* and the contractor will agree on locations to disconnect the vacuum piping and verify that the entire vacuum system has been normalized.

Argon and Helium System Piping Purge

de maximis and the contractor will review the layout of the argon and helium piping and attached equipment to ensure both understand and agree on the piping and equipment that will be depressurized.

Prior to disconnecting any equipment from the argon and/or helium, the argon and/or helium source will be locked and tagged out. *de maximis* and the contractor will determine an appropriate location to vent the piping to atmospheric pressure. The vent shall be installed at a location a minimum of five feet above the roof and a minimum of ten feet from any building opening or existing vent. The purge vent shall have a readily accessible or remotely activated shut off valve. The vent shall be positioned such that venting debris does not endanger personnel.

Natural Gas Piping and Hydrogen Piping Purge
Non-Time Critical Removal Action
NMI Superfund Site
November 2011

Prior to venting, an exclusion zone at the vent location shall be roped off and adequate signage put up. During venting, monitoring will be performed at the vent location and in the building to confirm that argon and helium is not depleting the oxygen within the building or at the vent location.

All argon and helium equipment shall be disconnected from the piping and all disconnected piping shall be connected to the vent. Monitoring will be performed in the building and at the vent. Each piece of equipment shall be tagged out.

After the argon and helium venting is completed, the contractor will supply *de maximis* with a written list, for each building, of the equipment disconnected from the argon and/or helium piping.