Nuiqsut H_2S Gas Scrubber – Skid Production

Amendment to ROW

Scope of Work

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CIP No.:63-260
Revision 2

Revision	By	Date	Checked	Date	Approved	Date
REV. 1	R. Wasserman	11/27/2017	CGK	12/7/17	TJB	12/8/17
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1. GENERAL

1.1. PROJECT OVERVIEW

The Nuiqsut Gas Utility obtains its gas source from the Alpine Production Facility operated by ConocoPhillips. The original design basis for the Nuiqsut Gas Conditioning Module assumed the hydrogen sulfide (H2S) level in the natural gas to be 0 parts per million (ppm). Subsequent data obtained by the Nuiqsut Gas Utility indicates H2S levels for the Alpine Fuel Gas System that supplies the gas to Nuiqsut was ranging from 0 to 4 ppm from 2003 through 2006 and from 2007 through 2008 the H2S level sporadically ranged from 0 – 10 ppm. In 2010, H2S levels ranged from 0 – 15 ppm in the gas to Nuiqsut. Escalation of the H2S content of produced gas from water flooded oilfields can occur under certain circumstances and is expected to continue to increase at the Alpine Field.

A high H2S content in natural gas can have several detrimental effects including 1) hazards to the human respiratory system which in sufficient quantities may be fatal, 2) accelerate corrosion of piping systems and associated components in the presence of wet gas (water), 3) cause Hydrogen Stress Cracking in piping systems and associated components. As a precautionary measure, it is beneficial to limit the content of H2S in utility gas systems.

The NSB is responsible for the equipment and operating costs to condition the gas for pipeline transport and residential consumption. The current equipment is not capable of supplying the existing gas in an efficient or reliable manner.

It was determined that a new skid with increased H2S removal capacity was required, and the original equipment would return to dehydration of the gas only.

The design includes:

- Installation of pilings and foundation to support the pre-fabricated module.
- Installation of supports for new piping and cable tray on both new and existing pipe racks.
- Installation of process, flare and utility piping for operation of the module and process equipment.
- Installation of power and controls to integrate a pre-fabricated module for removal of H2S from local gas supply.

1.2. DEFINITIONS AND TERMS

- “Owner” shall mean North Slope Borough (NSB).
- “Operator” shall mean ConocoPhillips Alaska Inc. (COPA).
- “Module Fabricator” or “Fabrication Contractor” shall mean the party providing prefabricated assemblies, sub-assemblies, or structures to be incorporated into the complete design.

- "Installation Contractor" shall mean the contractor selected by the Owner to conduct the onsite (Alpine) work set out within this scope document.
- "Owner's Representative" shall mean the Owner's onsite representative or designee.
- "Drawings" shall mean all drawings, documents and information issued with this scope of work.
- "Specifications" shall mean all documents that are references in this scope of work. The specifications include regulations, codes, design, and construction specifications; all of which are deemed to be a part of this scope of work.
- "Owner's Engineer" shall mean Coffman Engineers Inc.

2. SCOPE OF WORK

2.1. EXISTING NSB FACILITIES/OPERATING ROW

The existing ROW will be expanded to include the N9 skid and on pad piping at Alpine. The N9 module is currently in place and operating. This skid is responsible for gas dehydration and H2S removal for the Village of Nuiqsut. On pad piping runs on COPA pipe racks until the edge of pad where the current Nuiqsut gas line ROW exists.

The existing ROW will be expanded from the edge of pad up stream to the N9 module. The ROW expansion will include the new N7 skid, the existing N9 skid and the on pad piping. The operating ROW expansion will extend 25' on either side of the piping for a total of 50' wide ROW. The ROW around the N7 and N9 modules will extend 10' beyond the module exteriors on all sides. The total area of new operating ROW on the Alpine pad will be 1.5 acres (Appendix A, Attachment 1).

2.2. NEW NSB FACILITIES/CONSTRUCTION ROW

The new H2S conditioning skid is classified as an improvement to the village of Nuiqsut and not an improvement for the Alpine facility. Thus, the permit required for the work will require an extension of the existing right of way for construction and final operation of the new skid.

The construction ROW will include the limits of the new operating ROW discussed in section 2.1 as well as additional area around the new N7 module. The additional construction ROW would be extended to the North of the new N7 skid to allow for equipment access and material laydown. This additional construction ROW will extend 50' to the West, 100' to the North and 100' to the East encompassing an area of .63 acres (Appendix A, Attachment 1).

3. CIVIL/STRUCTURAL

3.1. GENERAL

The C/S scope of work includes the installation of the structural support and foundation system for the CPN7 Module to be located at the Alpine. The C/S scope encompasses all new piping and cable tray supports in existing pipe racks and new supports.

3.2. DEMOLITION

There is no anticipated civil/structural demolition included in the scope of work

3.3. FABRICATION/INSTALLATION

3.3.1. Module Pilings and Foundation

The modules, walkways and stairs will be supported on steel pilings. Four 24-inch diameter piles and six 16-inch diameter piles will be used. The piles will be drilled, set, and slurried. Piles will have an embedment depth of 32-feet below the pad surface.

3.3.2. Pipe and Cable Tray Supports

New pipe and cable tray supports will be provided at the new modules and provide support to the existing pipe racks. At the existing pipe racks, new supports will be installed for the pipes. The cable trays will end at existing pipe racks and the cables will continue in existing cable trays.

3.3.3. Set/Fix Module on Foundation

Module will need to be lifted, set and fixed to the foundation. The module will be shipped as two individual units that will have to be attached and installed on the foundation. The units consist of the vessel/tower skid and the enclosed process module.

In addition to installing the module stairs, landings and external working surfaces will be installed to facilitate egress for the module.

3.4. PRE-CONSTRUCTION

3.4.1. Site Preparation and Utility Locate

The existing site is currently being used to store connexes, which will need to be moved prior to pile installation. The location of the piles will need to have a utility locate conducted to confirm the area is clear for drilling. Other than the piles, there are no other areas of subsurface work.

3.4.2. Survey

Survey will be used to locate the piles and locate the elevations for the new pipe supports on the existing pipe racks. In addition, a new ROW survey will be performed and as-built for the existing ROW will be submitted to accompany final documentation for the module.

3.4.3. Fabrication of stairs and landings

Stairs, landings and external working surfaces for the module will be prefabricated and installed onsite.

4. MECHANICAL/PIPING

4.1. GENERAL

The following is the M/P scope of work for the installation of the process piping, utility piping, flare piping and equipment related CPN7 Module to be located at Alpine. The M/P scope encompasses all new piping from the module connection flanges to the Alpine facility tie points.

4.2. DEMOLITION

4.2.1. 3" Nuiqsut Gas Line

A portion of the Nuiqsut Gas line adjacent to the new CPN7 module will be removed in the PW pipe rack to allow for installation of the gas supply line, return line and temporary pigging spool.

The Nuiqsut gas line modifications are planned to be conducted during a scheduled Alpine outage/turnover. If the edge of pad valve on the Nuiqsut line does not hold pressure, the entire Nuiqsut line will need to be de-inventoried for the piping modifications.

4.2.2. Utilities

Blind flanges will be removed at the tie-in valves for each of the Nitrogen, Instrument Air and Utility Air tie point locations.

4.3. FABRICATION/INSTALLATION

4.3.1. Flare

The new scope for the flare line includes fabrication and installation of the 6" flare line from the CPN7 H2S module to the Alpine facility high pressure flare. The tie-point to the 24" facility flare header will require a Hot Tap between existing pipe rack supports PSPY001C and PSPY001B. the flare line will be insulated and heat traced.

Additionally, an automated blow down valve/ relief line will be added for emergency relief of the segment of the 3" Nuiqsut Gas line between the CPN9 skid outlet and the CPN7 inlet. This will be located at near the CPN7 module.

4.3.2. Utilities

The new scope for the utilities will include fabrication and installation of the 2" Nitrogen, 2" Instrument Air and 2" Utility air piping. The utility piping will run on new supports from the CPN7 module to the PW pipe rack, then along existing rack PW and PY pipe rack to the KO drum area.

4.3.3. Gas

The scope for the process/gas piping includes the fabrication and installation of the 2" and 3" gas piping. The gas piping includes 2" supply and return lines to the CPN7 module from the Nuiqsut gas line. A 3" temporary pigging spool and isolation valves will be installed in the Nuiqsut gas line in the PW pipe rack.

A plug valve and bleed valve will be added to the blinded tee that is downstream of the edge of pad valve. This will allow for the isolation of the pipeline and de-inventory downstream of the Alpine pad.

4.4. PRE-CONSTRUCTION

COPA Alpine facility personnel will develop the energy isolation procedure prior to project implementation. This will likely require de-inventory of the Nuiqsut pipeline due to uncertainty of the edge of pad valve seal integrity.

5. ELECTRICAL

5.1. GENERAL

The electrical scope of work includes installation of the 480V electrical supply from Alpine to the new CPN7 module.

Coordinate with the Operator for all connections into existing equipment. Install new cable penetrations as required.

5.2. INSTALATION

5.2.1. Module Power

480V power will be fed from the Alpine facility to new module. An additional and independent power feed will be supplied to the process heater located in the new CPN7 module.

5.2.2. Flare Heat Trace

Heat trace for the flare line will be installed from the CPN7 module to the tie-point on the Alpine HP flare header tie-in. This heat trace loop will be powered by the CPN7 heat trace panel.

5.3. AREA CLASSIFICATIONS

The new CPN7 module is classified as Class I Zone 2 per API RP 505. Per API RP 505 Section 6.5.4.4, modules in which the interior is shown as Zone 1, a Zone 2 transition zone of 10' around all non-vapor tight walls, doors, and openings must be maintained.

Adequate ventilation has not been provided for the module per API RP 505 section 6.6.2 (only four air changes per hour). Gas detection is used to increase air changes in the module in the event of a flammable gas release, per the criteria established in API RP 505 Section 6.8.

6. INSTRUMENTATION & CONTROL SYSTEMS

6.1. GENERAL

The Instrumentation and Control Systems scope of work includes installation and interconnection of the CPN7 to the Alpine facility BPCS, SIS and F&G control panels.

6.2. INSTALLATION

6.2.1. BPCS Control

Instrumentation cable for the Basic Process control system will be routed from the CPN7 BPCS junction box module to an Alpine facility BPCS panel. Module control and monitoring will be handled by the Alpine basic process control system.

6.2.2. SIS

Instrumentation cable for the safety monitoring and control of the process system will be installed from the CPN7 SIS junction box to an Alpine facility SIS control panel.

6.2.3. F&G/HVAC

HVAC and Fire/Gas systems and control cable will be routed from the CPN7 module F&G junction to an Alpine F&G control Panel.

APPENDIX A – REFERENCE DRAWINGS