Pressure Pumping Services: Cementing
Sanjel Corporate Standard (SCS) 07A

Document Control

Filename:	SCS 07A - Pressure Pumping Services: Cementing
Version:	1.3
Document Owner:	Engineering
Author:	James Gray
Document Management Library:	SCORE Reporting Platform
Document Approver:	Jeff Spence, VP Engineering
SCS Advisor:	Jeff Spence, VP Engineering
Public or Private:	Private Document

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1.0 GENERAL SANJEL CORPORATE STANDARD STATEMENT

This Cementing Sanjel Corporate Standard (SCS) has been prepared to identify Sanjel approved processes, procedures and training required to aid in reducing Health, Safety and Environment (HSE) & Quality incidents and accidents.

The requirements specified in this Cementing SCS are mandatory. Should a local standard, client or government regulation differ from this SCS, Sanjel Personnel must comply provided the local standard, client or government regulation exceeds this standard.

Conformance to this SCS is assured through inspections, assessments and audits. Management shall conduct these assessments and audits in compliance with the SCS for Sanjel Performance Management System (SPMS) in order to:

- Ensure conformance to the SCS
- Assess effectiveness and adequacy of the SCS requirements
- Continuously improve operations with respect to Health, Safety, Environment and Quality (HSE and Q)
- Take appropriate corrective and preventive actions as necessary

2.0 OBJECTIVE

It is the Sanjel objective to prevent injury to all personnel and loss or damage to equipment on location. It is also Sanjel's objective that this standard be implemented and enforced for the successful execution and completion of well treatments.

3.0 SCOPE

All Sanjel wellsite cementing pumping operations shall comply with the requirements outlined in this SCS. In addition any standards, procedures, policies, best practices, etc. that are referenced in this standard must be followed.

4.0 KEY DEFINITIONS

4.1 OEM

Original Equipment Manufacturers

4.2 Envelope

The combination of several elements that will be exposed to fluid and pressure (eg. all Sanjel High-Pressure Iron together

4.3 Element

Single component in the pressure envelope (eg. Plug Valve, Pup Joint, Nubbin, Plug Loading Head)

4.4 Element WP

Element OEM continuous duty Working Pressure

4.5 Envelope WP

Lowest working pressure of all Element OEM continuous duty Working Pressure (all parts seeing pressure)

4.6 MATP

Maximum Anticipated Treating Pressure – Anticipated pressure based on Friction and the treatments largest hydrostatic difference

4.7 System Pressure Test

The pressure which the equipment and piping will be tested to on location. This pressure must never exceed the Envelope Working Pressure. The minimum pressure for a system pressure test is the greatest of 7 MPa or 11% over the MATP but never exceeding the Envelope WP (For example if the PRV setting in Sanjel iron is 4 MPa for a conductor barrel the High Pressure Test must not exceed the PRV setting of 4 MPa.). Local regulations or client standards may exceed this minimum and must be adhered to.

4.8 Isolation Valve

Any pump or group of pumps must have at least one full bore valve that allows that pump or group of pumps to be isolated from the pressure on the well. This valve must be in good operating condition and be located such that it is readily accessible at all times. All lines tied directly to the wellhead will have an isolation valve in each line as close to the wellhead as possible.

4.9 Management of Change (MOC)

The Management of Change procedure ensures that all field operational changes are effectively and efficiently managed in a systematic fashion and that unapproved change(s) are not implemented. The MOC ensures the proposed change to the authorized standard, practice or procedure is approved by the appropriate authority level, properly implemented and communicated.

4.10 On Site Representative (OSR)

The On-Site Representative is defined as the client's "on-site" representative or consultant.

4.11 Job Hazard Assessment (JHA)

The Sanjel Job Hazard Assessment (JHA) process identifies hazards and determines the risk(s) associated with these hazards of jobs performed by a specific activity (e.g. rigging in bulk truck) in order to determine the safest method to perform the tasks. Refer to Sanjel Health, Safety and Environmental Practice (HSEP 007) for Hazard Analysis and Risk Assessment.

4.12 Job Safety Assessment (JSA)

The Sanjel Job Safety Assessment (JSA) is a method for conducting ongoing hazard assessments of jobs/tasks and worksites that are continually changing. A job safety assessment JSA must be conducted for crew briefings (rig-in and pre-job meetings). JSA may also be conducted as part of the safe work permit procedure, or may be used as a stand- alone process. Refer to Sanjel HSEP 007 for Hazard Analysis and Risk Assessment.

4.13 Bleeding Lines

The release of pressure and any single fluids or co-mingled fluids from the surface lines connected to the well.

4.14 Flowback

The release of fluids in the wellbore under pressure through surface lines connected to the well, with the wellbore isolation valves open. An example of a typical flowback for Sanjel operations would be checking the floats during cementing or an acid ball-out (e.g. the release of ball sealers off of the perforations).

4.15 Return Fluids

The return of Sanjel pumped fluids through surface lines that have remained overbalanced for their duration in the wellbore.

5.0 SANJEL PERSONNEL RESPONSIBILITIES

5.1 Sanjel Corporate Management

Sanjel's Corporate Management shall communicate, enforce and support this standard.

5.2 Sanjel Line Management

Sanjel's Line Management shall communicate, train and provide resources necessary to ensure that this standard is implemented as required on all Sanjel locations.

5.3 Sanjel Supervisors

Sanjel Supervisors shall ensure that, with the co-operation of the client, that all Sanjel Personnel at the wellsite is compliant with this and other applicable standards, procedures, policies, best practices, etc. If unacceptable risks exist the Sanjel Supervisor must take action to mitigate the risks. If unacceptable risks cannot be mitigated or the standard requirements cannot be complied with, the Sanjel Supervisor must terminate the job and notify Sanjel Line Management of the situation to seek an acceptable solution that will allow continuation of the operation.

5.4 Sanjel Personnel

Sanjel Personnel shall comply with the requirements of this standard, be current with required training on this standard and understand this standard.

5.5 Sanjel Client Solutions Personnel

Sanjel Client Solutions Personnel shall comply with the requirements of this standard, be current with required standard training and understand this standard. In addition, Client Solutions Personnel are to design and sell jobs that comply with this and other applicable Sanjel or client standards, policies, procedures, best practices, etc.

5.6 Health, Safety and Environmental (HSE) Management

HSE shall ensure that all employees who work in areas where hazardous conditions and/or material may be or is present have received required training to understand the risk and procedures to safely work within those locations.

5.7 All Sanjel Personnel

Any Sanjel Personnel on location witnessing unsafe activities or situations must notify the Sanjel Supervisor and take appropriate action to immediately stop the activities or situation from continuing.

6.0 TRAINING AND COMPETENCY REQUIREMENTS

All Sanjel Personnel shall be compliant with competence and training requirements for their position as defined in the Sanjel Operational Career Path.

All Sanjel Personnel shall be current with regulatory and Sanjel compliance requirements outlined in the NSC Safety and Training Matrix.

7.0 CEMENTING SERVICES SAFETY

7.1 Minimum Personal Protective Equipment (PPE)

7.1.1 Sanjel approved personal protective equipment (PPE) requirements for related Sanjel activities and operations can be located in Sanjel HSEP 009 for Personal Protective Equipment and Sanjel HSEP 011 for Respiratory Protection.

7.1.2 Sanjel Personnel must follow the PPE requirements outlined in the Safety Data Sheets (SDS) for any controlled products that are being handled. A copy of all SDS' utilized in cementing operations must be located in an area that is accessible to all Sanjel Personnel at the district and in each pumper.

A copy of all SDS' for controlled products sent to a location when a pumper is not accompanying the products must be sent with the transport unit.

7.2 Minimize Personnel Exposure to Dangerous Situations

7.2.1 All required Sanjel approved personal protective equipment (PPE) must be worn on the location at all times. The only exceptions to this requirement are when Sanjel Personnel are inside a pickup, a large unit driving cabin, the data monitoring trailer, the doghouse or onsite office trailers.

7.2.2 All Sanjel Personnel must review SDS's for the onsite chemical and must follow the safe handling procedures including PPE requirements outlined in SDS's to minimize exposure to onsite chemicals. Refer to the SCS for Materials Storage and Handling for SDS compliance information.

7.3 Contractor Management

7.3.1 All contract personnel and contractors employed by Sanjel to assist in any form of executing cementing operations must comply with Sanjel HSEP 022 for Contractor Safety. All aspects of this SCS apply to these personnel and for this document they are considered equivalent to Sanjel Personnel.

7.4 Hydrogen Sulfide (H_2S)

7.4.1 All Sanjel Personnel must be compliant with training, safety and emergency procedures as related to Sanjel activities and operations involving potential H_2S locations. Refer to the SCS for Hydrogen Sulfide and Sanjel HSEP 014 for Hydrogen Sulfide Field Crew Preparations.

7.5 Rules for Sanjel Wellsite Personnel

7.5.1 Sanjel Personnel must never tighten or loosen bolts, on an element that is under pressure.

7.5.2 Sanjel Personnel may only tap, a pressure vessel that has a pressure differential less than 14.9 psi with a rubber mallet (eg. bulk storage and transport vessels). No pressure vessel will be struck with something harder than a rubber mallet

7.5.3 Sanjel Personnel shall never start pumping unless under direct orders from the Sanjel Supervisor.

7.5.4 Sanjel Personnel must follow Sanjel HSEP 013 for Working at Heights when performing any activities on or under structures falling in this category.

7.5.5 If Plug Loading Head (PLH) valves are being operated by rig personnel due to being at a height deemed unsafe for Sanjel personnel a qualified Sanjel employee must be present to direct the rig crews operation of Sanjel's equipment.

7.5.6 Sanjel Personnel must never touch or move any utility line. In the event that a power line or utility line is obstructing travel or causing equipment placement problems, the OSR or district is to be notified immediately. Refer to Sanjel HSEP 010 for Transport Safety.

7.5.7 Sanjel heavy equipment shall not be moved in a reverse direction or through congested areas without a land guide. Refer to Sanjel HSEP 010 for Transport Safety.

7.5.8 Once equipment is spotted, chock blocks must be installed in compliance with Sanjel HSEP 010 for Transport Safety.

7.5.9 Sanjel employees must never operate equipment that does not belong to, is not leased to or is not rented to Sanjel.

7.5.10 Sanjel employees shall only perform activities associated with the Sanjel operations.

7.5.11 Third party personnel must not operate Sanjel equipment.

7.5.12 During job execution, fire extinguishers for each piece of equipment must be removed and placed on the ground in a safe and accessible position.

7.5.13 Smoking shall be prohibited on the wellsite except in designated areas specified by the OSR. Sanjel Personnel must only use areas that are a minimum of 25 m (83 ft) away from the wellhead.

7.5.14 Only those Sanjel Personnel that are assigned by the Sanjel Supervisor shall operate valves during operations.

7.5.15 Use of radios to communicate between the Sanjel crew, rig crew and OSR must be used when lines of sight are compromised.

7.5.16 Environmental concerns, leaks or spills must be handled and disposed of as per applicable local regulations. Refer to Sanjel HSEP 021 for Environmental Impacts and Controls.

7.5.17 Sanjel Personnel must follow Sanjel's incident reporting procedures for an unplanned events. Refer to Sanjel HSEP 005 for Incident Reporting, Investigation and Analysis.

7.6 Wellsite Mobile Communication Usage

7.6.1 While performing any tasks pertaining to a job or operating any equipment on a wellsite Sanjel Personnel must not use any form of mobile communications device (verbal or otherwise). The only exception to this is when the Sanjel Supervisor needs to make the district aware of a wellsite situation.

7.6.2 Sanjel Personnel must comply with onsite client mobile communications policies during all operations such as tight holes and when perforating activities are taking place.

7.6.3 Personal cell phone use is not allowed on wellsites as use will distract from assigned duties. This includes pre-job preparation, rig-in, pressure test, pumping operation, and rig-down. Other Client cell phone restrictions may also be in place.

7.7 Weather Safety Guidelines

7.7.1 The Sanjel Personnel must follow Sanjel's weather condition practices whenever inclement weather (extreme hot or cold) may create hazardous working conditions. Refer to Sanjel HSEP 026 for Weather Conditions and Wildlife Safety.

7.7.2 Sanjel Personnel must always review SDSs to determine if any limitations and/or dangers exist with any job-related chemicals when exposed to extreme high or low temperatures.

7.8 Simultaneous Operations

7.8.1 Sanjel Personnel shall adhere with the Client's onsite concurrent operations policies during all operations when on a wellsite with simultaneous activities taking place.

7.8.2 Each operation being conducted on a wellsite where simultaneous operations are taking place must use an independent radio channel.

8.0 LOCATION SAFETY

8.1 Equipment Requirements

8.1.1 Only Sanjel-approved manufactured components and treating equipment shall be used on Sanjel equipment. If there is a need to use a non-standard component or treating connection, the Sanjel MOC process must be followed. Refer to the SCS 05 for Treating Equipment Inspection and Testing and the Sanjel SPMS for Management of Change.

8.1.2 If the customer standard(s) does not meet Sanjel's standards, the Sanjel Supervisor must stop the operation, and the MOC process must be followed. Refer to SPMS Management of Change.

8.1.3 The customer representative must be present, or must provide written permission to proceed before Sanjel Personnel will perform any wellhead- or well related activities.

8.1.4 When possible, equipment must be positioned in a manner that allows removal from the wellsite in the event of an emergency.

8.1.5 All Sanjel pumping units must have all high-pressure pumps, discharge iron, valves and pressure relief valves pressure tested every crew change (minimum twice every three weeks) to verify the equipment is functional. Tests should be performed using a low rate pump (Haskel or equivalent). These tests must be recorded, filed and retained for 12 months.

8.1.6 Pressure relief valves (PRV) must be function tested every crew change (minimum twice every three weeks) to confirm pressure setting. Function tests must be performed using a Haskel or equivalent pump. These tests must be recorded, filed and retained for 12 months. PRV to be set to 35 MPa unless pressures for the job (Pressure test) will be higher than 33 MPa. In such cases the PRV will be set to the Pressure test value +5%. The MOC process must be followed.

8.1.7 Chassis, Treating iron, and pump greasing shall be completed using the grease type and frequency stipulated in the Greasing IDHA's

8.1.8 If adjustment of a pressure relief valve is required in the field authorization must be obtained by following the MOC process. This will only be considered in emergency situations and after all other measures have been exhausted. Refer to the Sanjel SPMS for Management of Change.

8.1.9 All Sanjel bulk transport units must have their pressure relief valves tested weekly to verify they are functional and relieving at the correct pressure. These tests must be documented and kept on file for 12 months.

8.1.10 Bulk Transport tractor units PRV will be 18PSI and bulk transport trailer mounted PRV's will be set to 15PSI.

8.1.11 Any third-party treating iron components must have their working pressure confirmation documented in the crew briefing: pre-job.

8.1.12 The Sanjel Supervisor must inform the OSR that Sanjel's liability is ended at the last connection between Sanjel equipment and third-party equipment.

8.1.13 Any piece of third-party equipment that is not covered within the SCS for Treating Equipment Inspection and Testing must have valid testing documentation prior to being used for Sanjel operations.

8.1.14 Sanjel Personnel must follow the SCS for Lifting – Wellsite Operations and the SCS for Mechanical Lifting when performing any lifts on location and a tag line must be used to control these lifts when they involve overhead movements.

8.2 Treating Iron Securement during Cementing Operations

8.2.1 Treating iron for "non-energized' fluid treating lines used by Cementing Services must be secured in the following manner:

- Slings must be used at any elevation change, change in direction or termination point of the line.
- Slings must tie the standpipe (high-pressure treating iron going from the ground to the rig floor) back to the rig floor.
- Slings must be placed on all treating lines that are located on the rig floor.
  - If elevators are used slings must be placed from the PLH to the treating line and secured back to the rig elevators.
  - If Top drive is used slings must be placed from the PLH to the treating line.

8.2.2 Treating iron for "energized" fluid treating lines used by Cementing Services must be secured in the following manner:

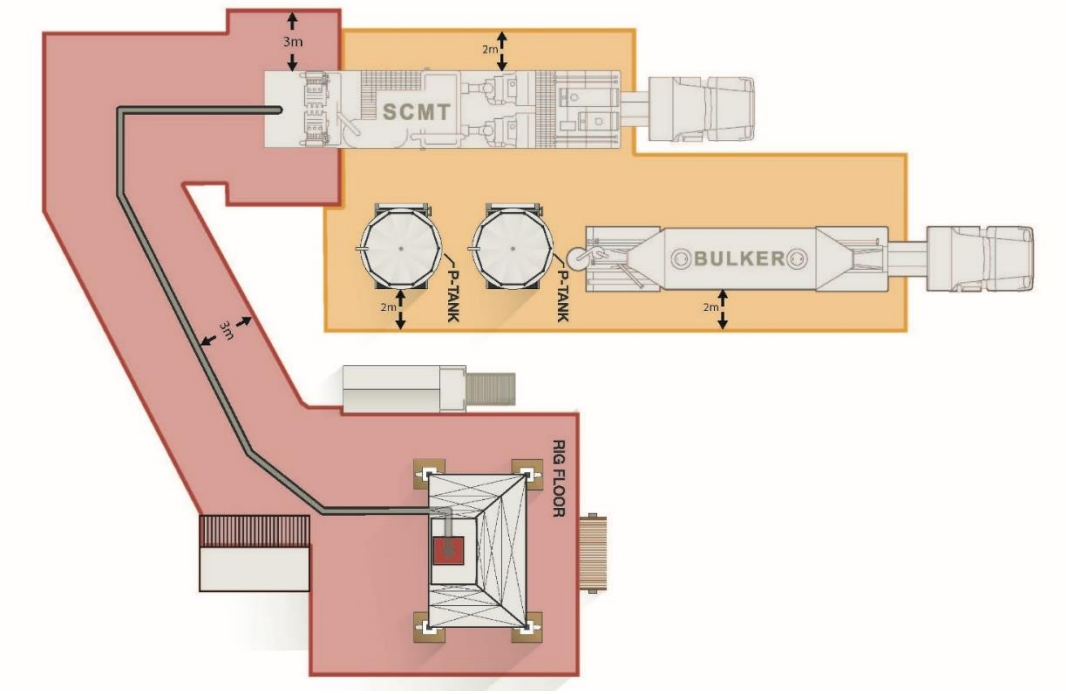
- All energized fluid treating lines must be restrained.

8.2.3 Certain areas/provinces/states of a country may require or impose additional slinging of and or restraint requirements. Sanjel must follow local regulation and comply with the most stringent requirements.

8.3 High-Pressure Access

8.3.1 All Sanjel Personnel must comply with the High-Pressure Access zones to minimize exposure to areas with contained pressure. These two zones are described below:

- Red Zone: A minimum of 3 m (10 ft) region surrounding high-pressure lines, discharge valve at the back of pump units, flowback lines, manifolds, swages, plug loading heads and wellhead. The only exception to the 3 m (10 ft) region is that this region terminates at the front end (operating platform side) of the triplex pumps.
- Red Zone Active: Red zone becomes active when pressure is on the high-pressure lines.
- Red Zone Access:- Access in the Red Zone when active will be restricted and controlled by the Supervisor. No one shall be in the active Red zone without authorization and direct communication with the supervisor. Only necessary work will be permitted by the Supervisor and duration will be minimized (eg visual inspection for leaks during pressure test).
- Orange Zone: A minimum of 2 m (7 ft) region around pneumatic pressure, chemical lines and uncontrollable dust.
- Orange Zone Active: Any time there is pressure on the chemical lines or a risk of dust from the silica sources.
- Orange Zone Access: Only Sanjel Personnel assigned to operating equipment shall be permitted within the orange zone while operations are occurring.



8.3.2 The Sanjel Personnel must create a visual and physical barrier to the Red Zone by placing High-Pressure Pumping and Silica warning signs and if required by local legislation / requirements barrier tape prior to pressure being placed on the treating iron.

8.4 Operations Involving Top Drives or Small Rig Floors

8.4.1 The following must occur before any activities occur on the rig floor:

- Lockout/function test top drive
- V-door barricade
- Verify no drilling or casing operations are ongoing

8.5 Standpipe Installed On Third-Party Rig

8.5.1 Standpipes must be tested and inspected in compliance with the SCS for Treating Equipment Inspection and Testing or greater local legislation / requirements.

8.6 Safety Data Sheets (SDS) Onsite

8.6.1 All Sanjel controlled products and third party products pumped by Sanjel shall be available onsite with the required SDS's that contains information on the potential hazards (health, fire, reactivity and environmental), the use, storage, handling and emergency procedures and how to work safely with the chemical product. Refer to the SCS 16 for Materials Storage and Handling.

8.7 Flammable Fluids

8.7.1 When dealing with Flammable Fluids, Sanjel Personnel must follow the SCS for Flammable Fluids and Sanjel HSEP 019 for Fire Protection.

9.0 CEMENTING OPERATIONS

9.1 Approved Equipment and Sources

9.1.1 Only equipment issued by Sanjel or a Sanjel authorized supplier maintained within the Sanjel Business System (SBS) shall be used in cement operations. Equipment in use must not conflict with any SCS or HSE Practices. If a job requires equipment that is not issued by Sanjel or a supplier maintained in SBS then the MOC process must be followed. Refer to SPMS 021 for Management of Change.

9.2 Equipment Maintenance

9.2.1 All Sanjel Mechanical and Electronic Equipment will be maintained in accordance with the Sanjel Maintenance Program.

9.3 Cement Treating Iron

9.3.1 Check Valves

- If a check valve is required in a line carrying large solid material like diverters a flapper type check valve must be used. The dart type check valve must be installed on all N2 or CO2 lines.
- If a check valve is used a bleed valve must be installed downstream of the check valve to allow all line pressure to be bled off.
- Sanjel Personnel must confirm that the check valve is installed in the correct orientation prior to commencing any pumping operations.
- Follow the SCS for Nitrogen Oilfield Operations for fluids energized with N2.
- Follow the SCS for Carbon Dioxide Operations for fluids energized with CO2.

9.4 Approved Connections

9.4.1 Sanjel Personnel must refer to the SCS 05 for Treating Equipment Inspections and Testing for a listing of approved equipment and connections.

9.5 PLH, PLH Subs, Swages and Nubbins

9.5.1 Sanjel Personnel must refer the SCS 05 for the maximum working pressure by size of the PLH, PLH subs, swages or nubbins.

9.5.2 All PLH and subs must be clearly labeled with the size, pressure rating and where applicable thread type

9.5.3 All casing swages or nubbins must be clearly labeled with the size and pressure rating of component.

9.6 Iron Color

9.6.1 Iron color must be in accordance with SOP-MCT-007.

9.7 Welded and welded-on connections

9.7.1 Welded and welded-on connections must be used in accordance with Sanjel's standards. Refer to SCS 05 for Treating Equipment Inspection and Testing.

9.8 Job Design

9.8.1 The following information must be included on all cementing programs:

- Program creation date
- Program revision or version number
- Client name
- Name of client representative and contact information
- Client Solutions contact information
- Well location
- Job type
- Well design specifications (e.g. depths, tubular and/or hole sizes, tubular weights, connection types, etc.)
- Line test pressure
- Anticipated final treatment pressure
- Type and number of units
- Cement type and additives
- Well temperatures
- Job procedures
- Pricing instructions

9.9 Departure Meeting

9.9.1 Sanjel Personnel must complete a JMP.

9.9.2 The Sanjel coordinator must verify that sufficient storage is present on location for all required product prior to dispatching Sanjel Personnel to the wellsite.

9.9.3 The Sanjel coordinator must verify that the correct quantity and blend of product is on location or will be traveling with the crew prior to dispatching Sanjel Personnel to the wellsite.

9.9.4 Sanjel Personnel must ensure the pressure relief valves are set to 35 MPa unless pressures for the job (Pressure test) will be higher than 33 MPa. In such cases the PRV will be set to the Pressure test value +5%. The MOC process must be followed. Pressure relief valves must be set using a Haskel or equivalent pump.

9.9.5 All Sanjel Personnel partaking in a trip shall comply with Sanjel HSEP 010 for Transport Safety.

9.9.6 Sanjel Personnel must review any job specific requests made by the client prior to departure and verify that all materials, personnel, training or equipment required to achieve the request will be present on location.

9.9.7 The items listed on the SCM Prejob Checklist must be present on the pumping unit or with the crew prior to departing for the wellsite

9.9.8 Sanjel Personnel must verify the items listed in the Cement Bulker Operator Manual Prejob Checklist must be present on the bulk transport unit(s) prior to departing for the wellsite.

9.10 Arrival at Location (Wellsite)

9.10.1 The Sanjel Supervisor must contact the OSR prior to spotting and rigging up the equipment.

9.10.2 The Sanjel Supervisor must conduct crew briefing: rig-in with all Sanjel Personnel prior to commencing any wellsite activities. Refer to Sanjel HSEP 007 for Hazard Analysis and Risk Assessment.

9.10.3 Pre-job meetings must be conducted prior to performing any job activity or when job scopes change. The MOC process must be used whenever there are any job scope changes not outlined in the job program. Refer to the Sanjel SPMS for Management of Change.

9.10.4 The Sanjel Supervisor must verify that all required fluids (water, mud, etc) are present on location including fluids required for contingencies and transfer source are available for moving these fluids to the pumper during mixing, displacement and wash-up.

9.10.5 The Sanjel Supervisor must complete casing lift (buoyancy) calculations prior to commencing operations. If calculations show casing will be lifted or the overpressure required to lift casing is less than 7 MPa over MATP, then the casing must be chained down prior to commencing displacement.

9.10.6 The Sanjel Supervisor must review all job calculations with the OSR after arriving on location and prior to commencing job.

9.10.7 The Sanjel Supervisor must verify all fluids, materials, equipment and personnel are at the wellsite and accounted for with OSR prior to commencing operations.

9.10.8 The Sanjel Supervisor must provide the Sanjel Cement Pump Operator with a copy of all required job calculations, volumes, pump rates and maximum allowable pump pressure prior to commencing operations.

9.11 Sanjel Personnel On-Location

9.11.1 There must be clear understanding of the safety procedures and communication signals between the Sanjel Supervisor and the rig personnel. The Sanjel Supervisor must document the communication method in the crew briefing: pre-job.

9.11.2 If work permits are required, Sanjel HSEP 016 Permit to Work must be followed.

9.11.3 Job and wellsite specific hazards and risks must be identified / reviewed with the client and reduced to an acceptable level and must be covered in the crew briefing.

9.11.4 Prior to commencement of the operation the radio channel(s) must be defined and required personnel must have a functional radio.

9.11.5 Any risks remaining that are deemed unacceptable by the Sanjel Supervisor and/or the OSR must be eliminated before the job is started.

9.11.6 If the remaining risks are deemed unacceptable, the Sanjel Supervisor has the responsibility to postpone or cancel the treatment until the risks are addressed. In the event that this occurs the Sanjel Supervisor must notify district management and follow the MOC process. Refer to Sanjel SPMS 021 for Management of Change.

10.0 RIG-IN

10.1 General

10.1.1 A land guide must always be used when moving Sanjel equipment in congested areas or in a reverse direction. Refer to Sanjel HSEP 010 for Transport Safety.

10.1.2 When applicable, Sanjel Personnel must ensure that all units are grounded in accordance with SCS 14 Flammable Fluids.

10.1.3 All non-flame arrested ignition sources must be located a minimum of 25 m (83 ft.) away from the wellhead and flowback tanks. Refer to Figure 1.

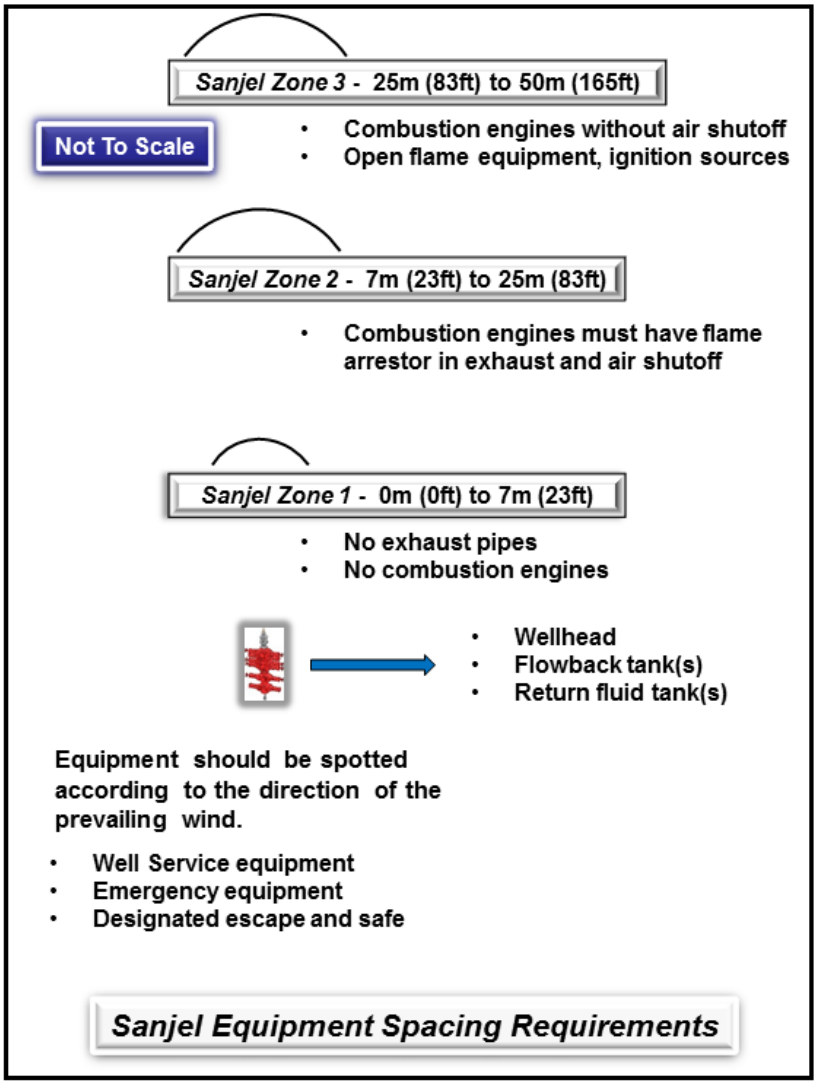


FIGURE 1 – Sanjel Equipment Spacing Zones

10.2 Cement Bins – Spotting

10.2.1 Each type of cementing operation requires a slightly different rig-in procedure; Sanjel Personnel must obtain specific instructions from district management and authorization from the OSR before spotting bins on location.

10.2.2 Sanjel Personnel must make sure ground is solid and add support planks as specified on the bin or by district management.

10.2.3 Sufficient Space must be left on the discharge side of the bin to allow for the spotting of equipment.

10.2.4 A travel path allowing the pumper to move on either side of the bin discharge must be provided with one of the directions providing access to the lease entrance.

10.3 Bulk Transfer to Cement Bins or Onsite Storage

10.3.1 When working alone Sanjel Personnel must follow Sanjel HSEP 024 for Working Alone.

10.3.2 Prior to off-loading cement Sanjel Personnel must ensure cement bin is at zero pressure, properly planked and is stable.

10.3.3 Prior to off-loading cement Sanjel Personnel must verify cement bin is empty or if existing cement is in bin verify that the cement is the same as on the cement transport and the storage room within the bin will accommodate the cement on the cement transport.

10.3.4 Prior to off-loading cement Sanjel Personnel must verify the bins are spotted to allow room for the pumper(s) and mixing equipment that is complaint with this standard.

10.3.5 Prior to off-loading cement Sanjel Personnel must test all bin and/or onsite storage valves and ensure the valves are fully functional, seal and have no debris behind them.

10.3.6 Sanjel Personnel must vent bins into an environmental bag when transferring product.

10.3.7 Sanjel Personnel must tag bin handles with date, amount, product, and additives.

10.3.8 A copy of the MTS must be left in the load tube.

10.4 Bulk Transfer to Pumping Unit

10.4.1 Sanjel Personnel must confirm location where transfer truck is to be spotted during crew briefing: rig-in.

10.4.2 Sanjel Personnel must verify all hose connections are secured prior to the commencement of product transfer.

10.4.3 Sanjel Personnel must rig up transfer lines in a manner that does not create restrictions.

10.4.4 A copy of the MTS must be provided to the Sanjel Supervisor prior to the commencement of product transfer. The Sanjel Supervisor must confirm the MTS states the correct product for the job is loaded on the bulk transfer unit prior to the commencement of product transfer.

10.4.5 An environmental bag must be used on all ground mixing jobs.

10.5 Low Pressure Rig-In – Connecting the Pumper to a Water Source

10.5.1 Mix water and displacement fluid can be from various sources, the Sanjel Supervisor must verify the supply source(s) operating parameters to ensure correct size, length and working pressure of the transfer hose.

10.5.2 There must be two independent methods of supplying water to the pump unit. The water source may be a single source but must have two supply lines and centrifugal pumps to move the water to the pump unit.

10.5.3 When spotting units Sanjel Personnel must optimize placement of mixing equipment to minimize the distance to all transfer sources.

10.6 Low Pressure Rig-In – Connecting the Pumper to a Rig Mud Source

10.6.1 The Sanjel Supervisor must determine the mud source operating parameters to ensure correct size, length and working pressure of the connecting hose and unit tie-in points. Mud may be supplied from the rig centrifugal pump, the rig triplex pump or Sanjel equipment.

10.6.2 There must be clear understanding of the safety procedures (e.g., shutting off c-pump or triplex feed into cementer and subsequent heating and potential high-pressure rupture) and radio communication between the Sanjel assigned Cement Pump Operator and the rig personnel operating the rig centrifugal or triplex pump.

10.6.3 If a rig triplex pump is to be used to transfer mud to the Sanjel pumper. The Sanjel Supervisor must review transfer protocols and safety measures with the on-site staff prior to commencement of operations.

10.7 High-Pressure Rig-In, Laying Treating Irons and Connecting to the Well

10.7.1 When laying out the treating iron to the rig, the wings on the treating iron must face towards the pumping unit (e.g. threads to the well).

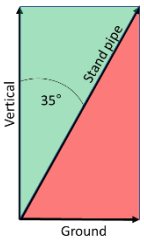
10.7.2 Sanjel Personnel must follow the standard Sanjel rig-in configuration from the discharge of the pumping unit down to ground level, consisting of two chicsans, a pup joint, and one chicsan.

10.7.3 Sanjel personnel must comply with all applicable SCS and HSE practices when rigging treating line from the pump unit to the wellhead.

10.7.4 A box configuration must be used on any change of direction or elevation between pump unit and the PLH.

10.7.5 Sanjel Personnel must secure the treating iron to an immobile structure (e.g. rig, pumper, etc. whenever an elevation change occurs.

10.7.6 The stand pipe must be secured at its top and at its base to prevent movement during the job and a minimum of one chicsan must be at each end of the standpipe. The stand pipe must never exceed 35° from vertical.



10.7.7 Chicsans and pup-joints connections must be configured to allow for the treating line movement above and below the standpipe.

10.7.8 Standpipe rig-ins that exceed the combined length of three long joints and a tee (7.9m = 26ft), must be rigged up on the v-door.

10.7.9 Jackknives must not be used in place of standpipe.

10.7.10 When casing reciprocation is required, the jackknifes must be hung and supported so as to allow free movement of the casing and not create binding of the treating line.

10.7.11 PLH and all treating lines on the rig floor must be slung in a manner that will prevent their uncontrolled fall if they become separated from the casing or the adjoining component during Sanjel or rig operations.

10.7.12 When a rotating PLH is being utilized Sanjel Personnel must have the rig crew complete one full rotation of the PLH prior to the commencement of operations to verify that no binding will occur.

10.7.13 When the casing is to be reciprocated during a cement job Sanjel Personnel must have the rig crew reciprocate the pipe up and down a full stroke checking for any line binding or interference prior to the commencement of operations. Additional slings or restraints may be required per local or client requirements.

10.7.14 When installing the PLH, swage or drill pipe nubbin, the OSR must be present.

10.7.15 Confirm with the OSR and document that the appropriate plugs have been loaded in the correct order.

10.8 High-Pressure Cementing Hose Usage

10.8.1 High-pressure cement hoses must only be used with water based fluids or cement (no air, nitrogen, foam cement, acid, or solvents).

10.8.2 Prior to use the Sanjel Supervisor must review the job parameters and the high-pressure cement hose rate and pressure ratings to ensure the cement hose ratings are not exceeded.

10.8.3 High-pressure cement hoses can only be used as standing iron if the hose is protected from wear at all points of contact and within Sanjel's usage guidelines.

10.8.4 Cementing hoses used on the rig floor must be slung properly to not interfere with the derrick when reciprocating casing.

10.8.5 Hoses must be rigged in with a minimum one chicsan at either end of hose to provide proper rotation of the hose and to prevent binding.

10.8.6 Hoses must be suspended to protect the hose from exceeding its minimum bend radius and to eliminate rub and wear points on sharp surfaces.

10.8.7 Cementing hoses must be slung at both ends of the hose to the hard line or end connection.

10.9 Pump Out Tee

10.9.1 The Sanjel pump out tee must be as close to the manifold as possible in order to limit cement ending up on the plug after the plug is dropped.

10.9.2 In cases where there is not enough room on the floor to safely put the pump out tee adjacent the PLH manifold it must be relocated to a location as agreed to by the OSR and the Sanjel Supervisor.

10.10 Treating Iron – Multiple Pumping Units

10.10.1 Common Line – Single Bottom Port PLH

- For jobs that utilize a single bottom port PLH with two or more pumps, separate lines must run from the pump units and be connected to a common treating line that will connect to the single PLH bottom port.
- A line from each pump unit to the main treating line must follow rig-in standards outlined in this SCS to allow the line to move. These swivel joints must be installed next to the lateral and at the rear of the pumping units.
- Each of the pump units must have an operating pressure transducer, a pressure relief valve and a full bore isolation valve.

10.10.2 Multiple Line – Dual Bottom Port PLH (preferred)

- For jobs that utilize a PLH with two bottom ports two separate lines must run from the pump units to the PLH.
- The dual lines from the pump units to the PLH must be rigged up to eliminate line interference and must follow rig-in standards outlined in this SCS to allow the line to move.
- Each of the pump units must have an operating pressure transducer, a pressure relief valve and a full bore isolation valve.

10.11 Cementing Data Monitoring

10.11.1 All cementing jobs must record pump rate, pump discharge fluid density, and treating line pressure. If job conditions dictate additional data collection is required ensure appropriate system is used to record the data.

10.11.2 Sanjel Personnel must confirm job setup parameters and data recording are functional prior to commencing operations. This applies to both FDAS and the PLC (if applicable).

10.11.3 If remote data transmission is required Sanjel Personnel must confirm data transmission is functional prior to commencing operations. This applies to Wellhead Information Transfer Standard (WITS) and satellite broadcasting.

10.11.4 FDAS must be used on every cementing service job to collect data generated. If FDAS fails to function correctly the backup data must be downloaded immediately to create the job chart.

10.12 Pre-Job Safety Meeting

10.12.1 A crew briefing: pre-job must be held prior to commencing pumping operations.

10.12.2 The following minimum points must be discussed with Sanjel, rig, support, and supervisory personnel present:

Situation

- Identify lead Sanjel Supervisor for the wellsite
- Contacts Rig and Support services like water hauler
- Review Local conditions (Visibility, Temperature, Obstacles, Hazards)
- Review equipment, materials, and people that will assist in job
- Review emergency vehicle location and escape routes
- Identity muster location in the event of evacuation

- Identify safe area for those individuals not involved in pumping operation
- Identify Red and Orange Zones
- Identify potential silica zones

Task
- Safely and Perfectly conduct (Size, Job Type) job for (Customer name) by (Time)

Execution
- General outline of job parameters and procedures in chronological order
- Outline contingency plans
- Tasks for everyone involved in the job, Operator, Supervisor, Bulker, Rig Crew, Vac Truck, Water hauler.
- Timings – When start and when anticipated shut down

Assistance
- Rig site personal names that may be helping and what they will be doing

Communication
- Site STARs number
- Ensure you are logged off driving inThinc
- Who is in charge if Supervisor is unavailable
- Using radios, hand signals, horns

Safety
- List all site hazards along with mitigation plans here
- Discuss emergency contacts
- Review stop work signals
- Lifting techniques and load limits one and two man
- Slip and Trip hazards known from local conditions or weather
- Hammering
- Detail emergency support equipment available at the wellsite
- Communicate chemical mixing hazards and location of SDS sheets
- SDS sheets for chemicals for the job review PPE requirements
- Moving equipment use of spotters as well as hand signals / headsets and radios

Questions
- From Crew
- To Crew to confirm understanding of key timings and tasks understood Document meeting

11.0 JOB EXECUTION

11.1 Pump Prime Up

11.1.1 Sanjel Personnel must prime up and circulate all pump units at the commencement of operations.

11.1.2 The Sanjel Pump Operator must ensure there is no line blockage prior to engaging the high-pressure triplex pump by:

a. Filling surface lines with the pressurizer and establishing flow with a minimum of 0.2m³ of fluid (volume may be larger if rig in is long).

b. Confirming the fluid pumped with the pressurizer has been pumped through the treating iron by visually confirming displacement tanks gauges, flow meters and other sources hooked up to the pumper.

c. If the pressurizer does not have enough force to move fluid in the well. The Supervisor must be notified and crew is to do a verbal MOC. The triplex can be used but Pressure Trips must be set to

a maximum of 7 MPa and pump is to come on at a dead idle until the above minimum volume has been pumped.

11.1.3 Sanjel Personnel must consider cold or hot weather conditions for the temperature effects on pressure pumping services equipment. Refer to Sanjel HSEP 026 for Weather Conditions and Wildlife Safety.

11.1.4 Between 0-C and -20-C any low or high-pressure plumbing component that is frozen will be steamed and thawed before commencing operations

11.1.5 Below -20-C the entire unit (Low and High-pressure plumbing) will be steamed and warmed up to prevent ice plugs forming when water is introduced to the pumper.

11.2 System Pressure Test

11.2.1 Pressure Testing Standards

- A successful pressure test, as outlined below, must be conducted before starting a job.
- All pumps must have a functioning over pressure shut down and mechanical PRV.
- The pressure test from the pump unit through the main line to the wellhead (PLH) must be done with a non-flammable fluid see SCS#14 Flammable fluids when working with hydrocarbon based fluids. For N2 lines, the pressure test from the pump to the tie-in point (tee) of main line must be done with N2.
- Before testing the lines, the Sanjel Supervisor must discuss the expected treating pressure, line test pressure and the pressure limits of components to be tested with the OSR.
- It must be clearly communicated that the maximum treating pressure will be changed only through agreement between the OSR and the Sanjel Supervisor. Sanjel Personnel must only implement the new maximum treating pressure after being instructed by the Sanjel Supervisor.
- Pressure tests must be done for Sanjel's treating line from the pumping unit(s) to the Sanjel valve closest to the client's equipment.
- The High-Pressure test must be 7 MPa (1,000 psi) or 11% above the MATP but never exceeding the Envelope WP (For example if the PRV setting in Sanjel iron is 4 MPa for a conductor barrel the High Pressure Test must not exceed the PRV setting of 4 MPa.).
- If the Element WP does not exceed the differential pressure it will be exposed to, the line configuration must be changed.
- The pressure recording must indicate the pressure has stabilized for a minimum of 1 minute and there is no significant decline in the reading indicating a slow leak.
- If local regulations are different than described above, they shall be followed as long as the working pressure of any component on location is not exceeded and the test pressure is above the maximum expected treating pressure.
- No treatment must ever commence if there is a leak in the treating iron connected to the client's equipment.
- If a leak is found in the treating line, the pressure must be bled to zero prior to repairing the leak.
- Only once Sanjel and the client are satisfied with the pressure test and that the accuracy of the recording is acceptable, can operations proceed.

11.2.2 The successful pressure test must be documented in the treatment report.

11.3 Pumping Operations

11.3.1 Pressure trips for the job are to be set a minimum 10% below the High-Pressure test value

11.3.2 For all areas that are identified as having exposure to silica Sanjel Personnel must follow Sanjel HSEP 012 for Crystalline Silica.

11.3.3 Samples (e.g. cement, water, slurry, etc.) must be collected, properly labeled and retained by Sanjel on every job.

11.3.4 The Sanjel Supervisor must measure the temperature of the bulk and mix water prior to the commencement of mixing. This information must be used to determine if the slurry temperature will fall within the acceptable temperature range as outlined in Sanjel's Technical Handbook. If the slurry temperature will fall outside of the acceptable range the Sanjel Supervisor must follow the MOC process. Refer to the Sanjel SPMS for Management of Change.

11.3.5 Sanjel equipment that is operating must never to be left unattended by Sanjel Personnel.

11.3.6 Sanjel Personnel should where possible mix and displace out of the pump unit's displacement tanks so that the mix water and displacement fluid are gauged on all jobs.

11.3.7 The Sanjel Supervisor must confirm slurry densities during the mixing operations through the use of a pressurized mud balance.

11.3.8 During job operations, the OEM maximums for flow rates and pressure for treating iron and hose must not be exceeded. Refer to Chart 1.

Description	Size	ID	Working Pressure	Max Flow Rate Slurry	Max Flow Rate Water
	inches	inches	MPa	(m^3/min)	(m^3/min)
Treatment Iron					
Figure 1502	1	⅞	103.4	0.3 [1]	0.5 [2]
	1½	1¼		0.6 [1]	1.0 [2]
	2	1¾		1.2 [1, 3]	2.0 [2]
	3	2⅝		2.8 [1]	2.8 [2]
Nutron Valve	2	1½	See Band	0.9 [1]	1.5 [2]
High Pressure Hoses					
Mud Hose	2	2	See Band	1.2 [6]	1.2 [6]
Black Eagle **Light** Cement Hose	2	2	34.5	1.2 [4]	1.5 [4]
Coalmaster Cement Hose	2	2		1.0 [4]	1.0 [4]
Selective Acid Hose	1	1	68.9	N/A	0.3 [4]
Suction Hoses					
Water Suction Hose (kanaflex)	3	3	Suction only	0.9 [5]	
	4	4		1.5 [5]	

Notes:
[1] Slurry - fluids that have light particles in thin fluids such as cement limit 42fps
[2] Water - fluids with no suspended particles limit 70fps
[3] 1 x 2 valves have ⅞" ID and follow the 1"Figure 1502 guidelines
[4] Max rates based on internal material and linear velocity
[5] Suction rates faster than this may cause cavitation
[6] Mud Hoses will not be used to pump fluids down the wellbore

Chart 1 – Sanjel Iron and Hose Max WP and Flow Rates

11.3.9 The Sanjel Supervisor must secure all floor valves in the correct orientation prior to commencing pumping operations.

11.3.10 Sanjel Personnel must not leave equipment unmanned if pressure is being held on the well even if the triplex is disengaged.

11.3.11 Job execution must follow the job procedure as outlined in the job program and Sanjel Operating Procedures (SOP). Deviation from these procedures must only happen after an MOC has been completed and approved. Refer to the Sanjel SPMS for Management of Change.

11.3.12 The Sanjel Supervisor and the Sanjel Cement Pump Operator must verbally confirm with each other that the PLH valves have been switched to drop the top plug and that the pin has been fully extracted prior to commencing displacement.

11.3.13 Sanjel Personnel must not access the rig floor during displacement if the casing has been chained down.

11.3.14 For displacements over 20 m^3 or displacement rates over 1.0 m^3/min two Sanjel Personnel must be on the pump unit to gauge displacement.

11.3.15 For two truck displacements. The displacement will have a minimum of 3 stages:

- The last stage will be a minimum of 1m^3 and pumped with only one truck at a rate of 0.5m^3/min.
- The second last stage will be the greater of 5% of the total displacement or 1m^3 whichever is greater and pumped with 1 truck at ½ the total displacement rate.
- The First stage will be Pumped with both trucks. The volume and rates when combined will equal the total desired pump rate and total displacement desired less stage 2 and 3.

Eg. 50m^3 Displacement at 2.4m^3/min

	Truck 1		Truck 2	
	Volume	Rate	Volume	Rate
Stage	(m^3)	(m^3/min)	(m^3)	(m^3/min)
Displacement 1	23	1.2	23	1.2
Displacement 2	3	1.2		
Displacement 3	1	0.5		

11.3.16 If the plug is not bumped at the expected displacement volume the Sanjel Supervisor must follow the instructions outlined in Sanjel's treatment program for the current well and operation being conducted as well as notifying the OSR prior to proceeding. The OSR and Sanjel District Management must be consulted if deviations from Sanjel's treatment program displacement instructions are requested, and the Sanjel Supervisor must follow Sanjel's SPMS for Management of change.

11.3.17 If flushing the stack is requested by the OSR a Sanjel Personnel must observe the casing bowl valve throughout the entire operation to ensure that it is not closed while pumping.

11.4 Controlled Shut Down

11.4.1 Controlled shut down shall be conducted in the event of equipment malfunction, unexpected pressure rise in the well, etc.

11.5 Emergencies

11.5.1 Operational Emergencies

- Situations may arise whereby actions may be required to deviate from original job design. Operational steps will require bringing the situation under control; these steps must be reviewed and agreed upon with close coordination by the OSR and Sanjel Supervisor. District management must be informed at the earliest safe moment following the start of the emergency to notify them of the emergency and to initiate the MOC process. Refer to the Sanjel SPMS for Management of Change.

11.5.2 In the event of a life and/or equipment threatening emergency at the wellsite:

- All equipment must be shut down (if nitrogen is at the wellsite the nitrogen pumpers must be shutdown first) at the Sanjel Supervisors' direction and all personnel shall immediately assemble in one of the designated safe areas for a head count.
- Once all personnel are accounted for, plans for handling the situation shall be developed by the OSR and Sanjel Supervisor.

12.0 POST-JOB PROCEDURES

12.1 Conduct Normal Shutdown

12.1.1 Upon completion of the pumping operation and at the direction of the Sanjel Supervisor the necessary steps shall be taken to stop and secure all cement pumping operations.

12.1.2 The Sanjel Supervisor must make all personnel on location aware of any MOCs made to the treatment throughout the operation as they may affect post cementing procedures.

12.1.3 The Sanjel Supervisor shall notify district management of the completion of operations and provide an estimate of time until personnel and equipment will be ready to depart location.

12.2 Observe Client Requirements, Monitor Well Pressure

12.2.1 The OSR may request that the wellhead pressure be monitored for a specified period of time after pumping has stopped. All personnel on location must be notified that the monitoring of the pressure is taking place and that no high-pressure lines are to be disassembled during this period.

12.2.2 During pressure monitoring, only general clean-up of wellsite outside of the Red Zone can take place.

12.2.3 Once pressure monitoring is complete, the Sanjel Supervisor shall advise the appropriate person on the ground to close in the well and release the pressure from the lines between the pumps and wellhead. Once completed the following operations shall take place:

- Secure well and PLH
- Bleed off lines and check for flowback
- Conduct rig-out meeting
- Wash-up as required

12.2.4 Sanjel Personnel must leave the PLH on the well with the valves locked in the closed position if the floats do not hold. The PLH shall only be removed from the casing after the working time of the cement has expired and one of the valves has been opened to confirm that no flowback is occurring.

12.3 Rig-Out Procedure

12.3.1 Each type of cementing operation requires a slightly different rig-out procedure. Sanjel Personnel must comply with all applicable SCS and HSE practices when completing the rig-out.

12.3.2 Sanjel Personnel must ensure all high and low-pressure lines are at zero pressure prior to commencing rig-out operations.

12.3.3 Sanjel Personnel must ensure that all lines are free of ice plugs and all pressure has been bled to zero prior to commencing rig-out activities.

12.3.4 All fluid must be drained off the pumper and all valves must be left open at the completion of the rig-out.

12.4 Job Documentation

12.4.1 The Sanjel Supervisor must complete the minimum requirements list below:

- Complete job package accurately
- Obtain OSR signature for invoice
- Supply OSR with all documentation required by client
- Submit eService package

12.4.2 Sanjel Personnel must complete the minimum service quality list below:

- Review overall job performance and document any variance to plan
- Address any customer concerns regarding the job
- Conduct an AAR
- Communicate job performance to district
- Communicate any client request

12.4.3 The Sanjel Supervisor and district management must complete SCORE documentation for any Safety or Quality non-conformances that occurred during the operation. Refer to Sanjel HSEP 005 for Incident Reporting, Investigation and Analysis.

12.5 Release of Sanjel Equipment and Personnel

12.5.1 A meeting with all remaining Sanjel Personnel must be held before departing from the location.

12.5.2 Any special instructions shall be given by the Sanjel Supervisor or as delegated by the Sanjel Supervisor.

12.6 Convoy Procedures

12.6.1 All Sanjel Personnel participating in the trip must comply with Sanjel HSEP 010 for Transport Safety. Of particular importance, the following items must be reviewed in detail as conditions may have changed since arrival at location.

- Road hazards
- Weather hazards

12.6.2 The Sanjel Supervisor must communicate the radio channel(s) to be used during travel.

12.6.3 The Sanjel Supervisor must evaluate Sanjel Personnel prior to commencing the trip for:

- Fitness for Duty (fatigue, physical capabilities, training, medical reporting etc.)
- Regulatory agency log hour compliance

13.0 OPERATIONS WITH SPECIALTY PUMPING EQUIPMENT

13.1 Cementing Through Coiled Tubing

13.1.1 Sanjel Personnel must follow the SCS 09A for Coiled Tubing Onshore Operations when conducting operations through coiled tubing.

- All iron for a coiled tubing job must be Figure 1502.
- The Cement blend must be designed to take into account long pump times and high friction pressures.
- There should be no restriction to flow going into the Coiled Tubing that may pack off eg CT High-Pressure Filter.

13.2 Nitrogen

13.2.1 When nitrogen is involved in cementing jobs, all the treating lines must be Figure 1502.

13.2.2 The energized fluid line must have minimal angles with as straight of line as possible to the wellhead.

13.2.3 There must be a minimum of 4.88m (16ft) of straight iron after the foam generator before inserting a chicsan in the treating line to allow for proper mixing of the nitrogen/cement and to avoid excessive treating iron wear.

13.2.4 The nitrogen treating line must be isolated from the cement pump unit tie-in.

13.2.5 Sanjel Personnel must follow the SCS for Nitrogen Oilfield Operations when conducting operations involving nitrogen.

13.3 N_2 General Rig-Out Procedures

13.3.1 N_2 rig-out procedures will vary, depending on the job. Sanjel Personnel must comply with all applicable SCS and HSE practices when completing the rig-out.

13.3.2 Sanjel Personnel must ensure the entire nitrogen line is at zero pressure prior to commencing rig-out activities.

13.3.3 Rig-out must be from the nitrogen pumper towards the cement pump unit tie-in due to wings to the well configuration. Be aware of the main line tie-in, as the pump unit treating tee/valve isolating the N_2 treating line could be pressurized.

13.4 Flowback of Fluids and Gases

13.4.1 The customer is responsible for the control and flowback of wellbore fluids and gasses through their surface production equipment.

13.4.2 If flowback unintentionally occurs or is requested as part of a job service, the following steps must be taken:

- In the event that unintentional flowback of wellbore fluids or gasses occurs, the affected treating iron must be taken out of service until it can be recertified, in accordance with the SCS for Treating Equipment Inspection and Testing.
- In the event that unintentional flowback of sour fluid containing H2S gas occurs, the treating iron must be taken out of service permanently, as the integrity of the iron cannot be determined except by destructive testing.

13.4.3 In the event that flowback (intentional or unintentional), line bleeding of fluids or co-mingled (nitrogen) fluids might or will occur through Sanjel treating lines, a separate MOC must be performed to mitigate the risk to the lowest possible level. This MOC shall review and address any possible issues with the laying, the tie-in point and the securing of the flowback lines, fluid bleed lines or co-mingled (nitrogen) fluid bleed lines. Refer to the Sanjel SPMS for Management of Change.

13.4.4 If intentional flowback is requested or required as part of a job design or service, client solutions or district management must follow the MOC process. Refer to the Sanjel SPMS for Management of Change.

13.4.5 If a situation occurs where the customer requests or requires flowback iron, the Sanjel Supervisor must follow the MOC process. Refer to Sanjel SPMS 021 for Management of Change.

13.5 Securing of Flowback or Bleed Line

13.5.1 If the intentional flowback MOC is approved the following procedures must be followed.

13.5.2 The Sanjel treating lines that bleeding of fluids or co-mingled (nitrogen) fluids might or will occur through must be identified and a separate JSA is to be performed for the purpose of mitigating the risk to the lowest possible level. This JSA shall review and address any possible issues with the laying, tie-in point and the securing of the flowback, fluid bleed lines or co-mingled (nitrogen) fluid bleed lines.

13.5.3 The preferred method for catching bleed fluids is to have a dedicated tank for the bleed line to flowback to. If this is the case, the fluid or co-mingled (nitrogen) fluid bleed line must be connected to the designated return tank with standard treating iron and unions following the standards set out in this document. Once connected to the tank, the end of the line must be secured to the tank or tank frame, in accordance with the results of the JSA performed for the purpose of mitigating the risk to the lowest level possible.

13.5.4 On some locations third-party flowback equipment (e.g., flowback lines, manifold, etc.) may be provided by the client and may require Sanjel to tie into the flowback equipment at a point that must be agreed on by the Sanjel Supervisor and the OSR. The results of the JSA will determine the best method for the Sanjel fluid bleed line or co-mingled (nitrogen) fluid bleed line to be secured to the flowback equipment to restrain and/or limit the swing radius of the bleed line.

13.5.5 In the event that neither flowback equipment or a flowback (returns tank) tank (e.g., open ended flowback line) is available, the JSA review must detail what restraint system will be used along the flowback bleed line (e.g., straps, anchors or stakes) to minimize the possibility of line movement or whipping.

13.5.6 Change in direction of flowback bleed lines must only be performed with tees and bull plugs. Chicsans, high-pressure hose(s), or swivel joints that will allow pivot points are not allowed in any flowback line configuration.

13.6 Foam Cement

13.6.1 Returned fluids

- Sanjel does allow for the return of fluids through Sanjel iron but Sanjel must have pumped these fluids in to the well and they must have remained in an over balance scenario for their duration in the well.

13.6.2 All iron used for energized lines to or from the wellhead for both on the pump side and the return side must be figure 1502.

13.6.3 Cement hoses must not be used during a foam cement operation on any high-pressure lines. This includes the pump-out tee and its discharge.

13.6.4 If it is not possible to connect to the casing bowl valves in order to control energized returns, the foam cement operation shall not take place.

13.6.5 The return line must be connected to both casing bowl valves and chained down.

13.6.6 All material and equipment required to complete the foam job must be physically confirmed to be on location prior to the commencement of operations or the job shall not be started.

13.6.7 During the pumping operation, cement can be pumped without N_2, but N_2 must not be pumped without cement.

13.6.8 It is imperative that the foaming agent be pumped continually through the pre-flush and all the foam cement stages as outlined in the program. The foam delivery system must be checked by the Sanjel Supervisor prior to commencing operations to verify that the system is functional.

13.6.9 Sanjel Personnel must verify that the foam generator and choke are free of obstructions before and after the job.

14.0 REFERENCES

14.1.1 Sanjel maintains a comprehensive Document Libraries of policies, standards, learning and training system, operating practices and procedures that work together and provides consistent detail and direction to all levels of management for implementing the required various operating performance requirements within their area of responsibility.

14.1.2 The following list includes documents and systems that are referenced within this document:

- Sanjel Corporate Standard (SCS)
- Health, Safety, Environmental Management System (HSEMS)
- Health, Safety, Environmental Practices (HSEP)
- Sanjel Performance Management System Procedures (SPMS)
- Sanjel Corporate Maintenance Program
- Pressure Pumping Services – Cementing Procedural Manuals
- Applicable Industry Standards and Practices

14.1.3 The complete Document Control Library may be accessed via the *SCORE Reporting Platform.*

Revision History

Version	Release Date	Description	Prepared by	Approved by
1.0	June 1, 2016	Initial release	Eng.	Jeff Spence
1.1	November 2, 2017	Complete document revised	James Gray	Jeff Spence
1.2	December 28, 2017	Equipment Function and Pressure test changed from weekly to every crew change (minimum twice every three weeks)	James Gray	Jeff Spence
1.3	June 18, 2018	Iron Securement system clarified as slings	James Gray	Jeff Spence