

Instruction Document w/ Hazard Assessment:

Blend Train Operation

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| Document Number: IDHA-QHSE-016 | Revision No: | Approval Date: |
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| Positions Considered: Bulk Plant Operator (BPO) | | |
| Name and Position of Document Approver: | | |

# Purpose & Scope

* This instruction document with hazard assessment (IDHA) provides guidance and direction for Sanjel operations to ensure that all work is completed safely and efficiently during the process of operating the blend train when preparing a cement blend.
* The hazard assessment component of this document is to be used in conjunction with field level STEACS/JSA documents.

**ROLES & RESPONSIBILITIES**

The instruction document activities described below must be completed by competent personnel. Every effort has been made to ensure the accuracy and reliability of this information.

1. Implementation

* The Operations Manager provides direction to district management and provides resources to allow consistent rollout, training, implementation, and evaluation of all procedures.
* The Team Lead(s), District Managers, and Coordinator(s) ensure implementation of this instruction document.

1. Participation

* Do you have feedback, questions or suggestions around this document? Contact the Training Department to help make this document better.

1. Supervision

* The Team Lead supervises the training and job activities while operating the blend train.

1. Risk Management

* The District Service Line Manager (DSLM) oversees requirements for the development, implementation and monitoring of this Instruction Document. Furthermore, it is the responsibility of the DSLM to audit operations against documented procedures.
* Employees report and document Corrective Actions in SCORE associated with this Instruction Document.

1. Other (if applicable)

* SCS 07A - Cementing
* Bulk Plant Operator Manual Version 1.0
* FRM-HSE-016 – Job Safety Analysis (JSA)
* HSEP 007 – Hazard Analysis and Risk Assessment
* HSEP 009 – Personal Protective Equipment (PPE)
* HSEP 011 – Respiratory Protection
* HSEP 012 – Crystalline Silica
* SPMS 006 – Verification of Purchased Service
* SPMS 008 – Identification and Traceability of Service-Related Products
* SPMS 009 – Identification of Service-Related Product Status
* SPMS 021 – Management of Change (MOC)
* Instruction Document
  + Bulk Plant Cement Sampling
  + Loading a Bulk Delivery Unit

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| before you begin | |
| How to Use this Document | This document contains two parts: **Part 1: Task Hazard Assessment** and **Part 2:** **Task Instructions**. Both parts should be used together by:   * Cross referencing the “Task #” and “Hazards” columns in Part 2 with the “Task #” and “Hazards” columns in Part 1; and * Ensuring controls required in Part 1 are used for each step listed in Part 2   Once this document has been reviewed, complete a STEACS/JSA to assign tasks and identify any hazards specific to your circumstances that are not included in this document. |
| PPE Required  C:\Users\mthomas\Desktop\HSEP DOCS\ICONS + LOGOS\PPE ICON.png | As per HSEP 009, 011 & 012, all PPE must be Sanjel approved and must include:   * Hard Hat, Steel Toe Boots, Fire Retardant Coveralls, Gloves, Safety Glasses, Hearing Protection * Respiratory Protection (full face respirator with particulate filter) |
| Safety Precautions  C:\Users\mthomas\Desktop\HSEP DOCS\ICONS + LOGOS\TRIANGLE ICON.png | Chemical Hazards, Biological Hazards and Harmful Substances   * Consult SDS’s prior to work commencing * STEACS briefing is completed prior to work commencing * Complete a visual inspection of the Respiratory Protective Equipment * Contaminated clothing must not be worn in a work environment that does not require respiratory protection. |
| Training Required  C:\Users\mthomas\Desktop\HSEP DOCS\ICONS + LOGOS\TRAINING ICON.jpg | Workers must have completed the following training/courses to perform this job:   * Sanjel New Employee Orientation * WHMIS * TDG * Bulk Plant Operator Course * Fork Lift Operator Certification |
| pre-job preparation | |
| Preparation  C:\Users\mthomas\Desktop\WORK INST\ICONS + LOGOS\PREPARE.jpg | * Complete a JSA/STEACS Briefing (pre-job meeting) with the entire team before commencing work * All parties participating in the blending and sampling process must be involved: Sanjel employees, client and 3rd party inspectors * Perform Sanjel FLEX to warm and stretch muscles prior to doing physical work * Whenever possible, work in pairs or as a team to control the hazards |
| Tools/Equipment Required  Description: Gartoon-Gnome-desktop-config | Ensure that you have the following items before you begin:   * Wire Brush * Rubber Mallet * Material transfer sheet (MTS) book * Bulk Plant Calculator with completed Bulk Plant Loading Page * Spring-loaded retractable knife tethered to admix bottle |

| Part 2 of 2: Task Instructions | | | |
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| Step # | INSTRUCTIONS | HAZARDS | notes /  comments |
| 1 | Verify blend, recipe, call sheet and Sanjel detailed program with Sanjel coordinator. Verify all Service-Related Products in the detailed job design match the blend recipe and call sheet. | * Deviation from job design |  |
| 2 | Verify the bulk blending equipment volume capacity.   |  |  |  |  | | --- | --- | --- | --- | | Name | Dimensions L x W x H (ft) | Volume (m3) 100 % | Volume (m3) 80 % | | 90 ton Silo | 10’ x 10’ x 32’11’’ | 59.47 | 47.58 | | 50 ton Silo | 10’ x 10’ x 24’1’’ | 33.98 | 27.18 | | 43 ton Silo | 10’ x 10’ x 21’8’’ | 29.73 | 23.78 | | 40ton P tank | 10’ x 10’ x 21’8’’ | 28.32 | 22.66 | | Blend Tank | 8’ x 8’ x 18’4’’ | 15.91 | 12.73 |   Do not exceed 80 % of the maximum volume capacity for the equipment to be loaded (see the far right column on the chart above).  Determine the bulk volume of each cement blend component, including additives, as follows:  To obtain the total bulk volume of the cement blend, add up all the bulk volumes of each component including additives.  The mass of each component is obtained from the Bulk Plant Loading Page generated by the Bulk Plant Calculator. The bulk density of each component and additive can be found in Table 3-1 and Table 3-2 of the Bulk Plant Training Manual (p. 3-5 & 3-6).  Example: Determine the bulk volume of 26 t of Thermal 40 + additives.    Repeat this process for each base blend component and additive:  Now we can calculate the total bulk volume of the cement blend:  Use this volume and the equipment volume capacity table above to verify if the whole blend will fit in one load or if it needs to be split up.  Example: Blend train has 40ton P-tanks.  In this case, the entire blend will fit in the blend train silos  Example: Blend train has blend tanks.  In this case, the blend will have to be split up.  If the blend has to be loaded in batches, remember that all blend components also have to be split up. In our example above, the total blend requires 18,564 kg of class G. When splitting this into two batches, each batch should have 18,564 kg/2 = 9,282 kg of class G. | * Plugging off product vessel * Deviation from job design (due to incorrect calculations) | Ensure the capacity of the blend train silos is not exceeded. Otherwise, the silos could be overloaded and plug off the vessel, vent line and dust collector  Do not confuse bulk density with blend slurry density. For volume calculations in the bulk plant, use bulk density. |
| 3 | Inspect bulk plant equipment. Verify pre-job maintenance has been performed and documented.   * Blower * Forklift * Pressure relief valves (15 psi and 18 psi) * Butterfly valves and handles * Flanges and bolts are secure * Hammer unions * Camlocks * Transfer hoses and ventilation (product and dust) * Dust collector is clean and ready for operation * Admix bottle is empty, clean, and ready for additives * Admix dust collector is clean and ready for operation | * Exposure to Noise over 85dBA * Slips, trips and falls (tripping on hoses while carrying, walking on uneven ground) * Exposure to Silica * Exposure to chemicals (dependent on blend) * Pinch points (where?) |  |
| 4 | Close all discharge lines, close all silo airlines and all air assist lines in the bulk plant. Open all silo vent lines. | * Slips, trips and falls (tripping on lines, uneven ground) * Pinch points (where?) |  |

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| 5 | Start plant blower to allow blower/engine to warm up.   * Follow the Lock Out Tag Out (LOTO) procedure * Turn the blower shaft by hand to ensure it is not seized or frozen * Verify the air bypass valve is open * Engage the blower engine at an idle * Allow the blower to warm up for 10 minutes * Pull back on the transmission engage lever to engage blower * Increase the RPM and partially close the air bypass valve to obtain a discharge pressure of 14.9 psi | * Exposure to Noise over 85dBA * Pressure * Energized lines * Pinch points (where?) | Refer to HSEP 015 – Lock Out Tag Out (LOTO) |
| 6 | Prepare the bulk silo(s) to move the product.   * Verify product discharge valve is closed * Close vent line valve * Verify purge valve is closed * Open top air and bottom air valves to pressure up the silo   Repeat this step for all required bulk product silos. | * Noise over 85 dBA * Pressure * Slips, trips and falls (tripping on lines, uneven ground) * Pinch points (where?) |  |
| 7 | Prepare BT1 (Blend Train 1) to receive the product.   * Confirm the bypass valve between BT1 and BT2 is closed * Close vent valves on BT2 and BT3 * Verify top air and bottom air valves in BT1 are closed * Verify purge valve in BT1 is closed * Open the vent line valve in BT1 * Open top fill valve on BT1 | * Noise over 85 dBA * Pressure * Slips, trips and falls (tripping on lines, uneven ground) * Pinch points (where?) |  |
| 8 | Add required chemicals for blend to admix bottle ensuring hood fan is operational throughout procedure.  (OH&S Code, Part 4, Section 28) | * Exposure to Silica * Exposure to chemicals (dependent on blend) * Physical lifting (awkward lifts, >30lb) * Pressure * Spill or Fluid Leak * Moving machinery (forklift) * Suspended load (elevated pallets) * Plugging off product vessel * Deviation from job design * Cuts/abrasion (while cutting bags) | If there are hazards identified, imminent danger or job issues, it is the responsibility of the BPO to stop the work. It could be a case where something has changed and it has to be managed effectively (Management of Change). |
| 9 | Loading into (Blend Train 1) BT1:   * Open the discharge valve on the desired bulk product silo * Load all crucial bulk material for blend (e.g. gypsum, spheres) * Load 1 metric ton of base cement * Load 100% of the admix bottle additives (see step 10) * Load remainder of the base cement   This creates a sandwich effect, and when transferring between silos by top loading and bottom exit, ensures the additives are evenly distributed. | * Pressure * Exposure to Noise over 85dBA * Exposure to Silica * Plugging off product vessel * Deviation form job design | Confirm scale in BT1 is at zero before loading  Critical bulk items like (Gypsum, Spheres, Flour) must be loaded first as this allows the critical product to be returned to the silo if too much is loaded.  Prior to the next step, check your weigh scale total. Ensure quantities match the blend calculations. |
| 10 | Purge the admix bottle by repeatedly closing the top fill valve on the weigh silo (BT1), which allows the pressure to build up in the plant (and the admix bottle). Next, re-open the valve to purge the admix contents. Purge the admix bottle at least two (2) times using maximum air pressure to ensure the admix bottle is clear. Confirm all admix contents are in BT1 by confirming weight has increased by the amount of product in the admix. | * Pressure * Exposure to Silica * Exposure to Noise over 85dBA * Deviation from job design * Pinch points (where?) | Visually confirm admix is empty while final product is loading. Admix bottle should be vented down and checked to ensure all additives have been added to the blend. If not, stop loading product and repeat this step. |
| 11 | Transfer product in BT1 to BT2:   * Open vent line valve on BT2 * Open top fill valve on BT2 (confirm the bypass valve between BT1 and BT2 is closed) * Close vent line valve in BT1 * Open top air valve in BT1 * Open bottom air valve to aeration pads on BT1 and pressure up to a maximum of 15 psi. * Open the discharge line valve on BT1 and initiate transfer of the entire contents of BT1 to BT2 through the top fill line * Confirm product is transferring to BT2. The weight in BT1 will decrease * When the entire product in BT1 has been transferred to BT2, the weight in BT1 will be zero. You may need to pressure up BT1 more than one time to move the entire volume from BT1 to BT2 * Close BT1 discharge line valve, close BT1 top and bottom air valves and open BT1 vent line valve * Purge the entire discharge line to BT2 | * Pressure * Exposure to Noise over 85dBA * Exposure to Silica * Plugging off product vessel * Deviation form job design * Pinch points (where?) * Slips, trips and falls (uneven ground) | Do not transfer product from BT1 to BT2 or BT2 to BT3 through the bottom of the BT silos. For the blend train process to be successful, the transfers need to be top loaded each time. |
| 12 | Transfer product in BT2 to BT3.   * Open vent line valve on BT3 * Open top fill valve on BT3 (confirm the bypass valve between BT2 and BT3 is closed) * Close vent line valve in BT2 * Open top air valve in BT2 * Open bottom air valve to aeration pads on BT2 and pressure up to 15 psi * Open the discharge line valve on BT2 and initiate transfer of the entire contents of BT2 to BT3 through the top fill line * Confirm product is transferring to BT3. The weight in BT3 will increase * When the entire product in BT2 has been transferred to BT3, the weight in BT3 will be equivalent to the weight that was initially in BT1. You may need to pressure up BT2 more than one time to move the entire volume from BT2 to BT3. * Close BT2 discharge line valve, close BT2 top and bottom air valves and open BT2 vent line valve * Purge the entire discharge line to BT3 | * Pressure * Exposure to Noise over 85dBA * Exposure to Silica * Plugging off product vessel * Deviation form job design * Pinch points (where?) * Slips, trips and falls (uneven ground) | Do not transfer product from BT1 to BT2 or BT2 to BT3 through the bottom of the BT silos. |
| 13 | Initiate transfer of product from BT3 to the bulk delivery unit as well as transfer from BT1 to BT2 (if required).   * Confirm bulker unit # to be loaded with coordinator * Verify the maximum loading capacity on the bulker. Refer to Figures 4-3, 4-4, 4-5 and 4-6 in the Bulk Plant Training Manual * Verify the maximum volume capacity in the bulker. Refer to Table 3-3 in the Bulk Plant Training Manual * Confirm load placement in the bulker pods with coordinator * Load bulker as per procedures in Instruction Document: Loading a Bulk Delivery Unit * Capture samples when loading the bulker unit as per the procedures in Instruction Document: Bulk Plant Cement Sampling * Purge the entire discharge line to bulk unit | * Pressure * Exposure to Noise over 85dBA * Exposure to Silica * Plugging off product vessel * Deviation form job design * Pinch points (where?) * See hazards in step 11 * See hazards in Instruction Document: Loading a Bulk Delivery Unit * See hazards in Instruction Document: Bulk Plant Cement Sampling |  |
| 14 | Continue to monitor the performance of the blower and transfer process to enable the identification of process problems that can be corrected on a continual basis. | * Exposure to Noise over 85dBA * Slips, trips and falls (uneven ground) |  |
| 15 | Perform preventive and predictive maintenance on the equipment at the end of the blending process. |  |  |