

Guideline

Prepare Equipment

to Restart

after a 2 to 8 Weeks Stop

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Introduction

The goal of this guideline is to provide a checklist to support plants in preparation for the restart of an equipment shutdown for 2 to 8 weeks for external purposes (not a kiln/mill shutdown for maintenance purposes). It is related to the document on [short term mothballing](#). This procedure was elaborated in collaboration with various people from different trades and specialities (see Annex).

General Remarks

The principal is to test/inspect the individual equipment (and do some sequence testing) before the restart. The startup team must have electrical and mechanical workers in addition to production people. Make use of sign off (handover) documents to production.

Your **existing procedure** shall be used for the start-up of the equipment! In this document some measures are described that may be additional to it due to the fact of the short term mothballing procedure applied before.

Remark: If special/additional measures were taken during the stoppage, use the documented actions in order to reestablish the desired condition.

1 Quarry

In some countries, reopening a mining site is a strictly regulated process as it represents an abnormal situation. Follow the governmental procedures and requirements, and also consider the following points:

- 1.1 Verify that all the necessary permits are still valid - incl. mining permit, environmental and water permit, equipment operation licenses, insurance policies, software licenses etc.
- 1.2 Cold restart of any equipment or activity is an abnormal situation:
 - Assume the the risks of re-starting any equipment or activity are at least one step higher than they normally are! Consult any existing risk assessments on equipment operation and activities and take mitigating actions to reduce the risk during start-up.
 - Consult the OEM manuals for Cold Startup of any mobile equipment and fixed plant.
- 1.3 Similar to a DSCQP Level 1 inspection / self-assessment: Inspect the quarry faces and active dumping area (crest and toes) as well as the surroundings of the quarry and critical infrastructure for any changes that may indicate slope or ground stability issues (e.g. tension cracks, subsiding or settling of terrain, overhanging and/or washed out conditions, water from benches, accumulation of debris in unusual places, leaning trees etc.).
- 1.4 Inspect all drainages along slopes, roads and dumps that they are properly functioning and dewatering. Inspect sumps, dewatering channels, spillways and water collectors for blockages.
- 1.5 Inspect the quarry roads and working platforms for changes, insatiable sections, major potholes and obstacles.
- 1.6 Inspect mobile and static equipment condition:
 - look for buildups in truck bodies and excavation equipment buckets,
 - look for buildups in hoppers, transfer points and belts.
 - check tyre pressures in accordance with the OEM's instructions and safety procedures.
 - look for hydraulic leaks and condition of hydraulic hoses and fittings
 - look for signs that may indicate structural instability and/or damage
- 1.7 Inspect the condition of stockpiles and surgepiles following the safety rules for such activities. Look for any changes that may indicate pile stability issues.

- 1.8 Inspect stockpiles (slope toes, slope crests, but only if it is safely possible or remotely eg. by drone) on slope deformations and overhanging conditions. Be aware of overly steep or overhanging slopes due to freezing conditions.
- 1.9 Inspect remaining muckpiles for signs of instability and liquefaction. Assume high humidity of the muckpile that will impact the natural angle of repose and the material handling properties.
- 1.10 Explosive Magazine:
treat the explosive magazine as a Confined Space and assume buildup of fumes and exudate - allow ample time for ventilation prior to enter. Follow the local regulations as a minimum, but also the Company procedures for a Confined Space entry and the guidelines in the [Standard Recommended Practices Drilling and Blasting operations](#).
- 1.11 Liquid fuel tanks and gas storage - follow the local regulations and the suppliers instructions for refilling the fuel and gas tanks. Assume buildup of flammable and toxic fumes.
- 1.12 Inspect the condition of emergency entrances and exits, and critical health & safety infrastructure (e.g. radios & communication devices, eye washing stations, medical room, first aid kits, fire extinguishers etc.).
- 1.13 Electrical equipment and power supply - see instructions below.
- 1.14 Tool box talk: Ensure all operators and contractors are aware of the (short-, medium- and long-term) mining plan, safe operating procedures, the emergency numbers and procedures as well as the previously identified site individual hazards and risks.

2 Production

- 2.1 Inspect for kiln and preheater build-ups which may have fallen during stop and prevent from proper re-commissioning. In case of SLC, clear all material below calciner (elbow)
- 2.2 Check position of all diverting gates in preheater prior to startup, in case of SLC, ensure kiln string bottom cyclone diverter position towards kiln side
- 2.3 Check all air blasters for proper function and that air lines are open
- 2.4 Drain water traps/pipes of pressure sensors
- 2.5 Check water spray nozzles for proper function; for compressed air supply, ensure that the supply valve is open
- 2.6 Inspect material handling transfer points for build-ups and clogging. Include pneumatic transport elbows with tendency for clogging.
- 2.7 Check that double tipping valves or other sealing devices in the bottom of the hoppers are working properly.
- 2.8 All airstide blowers should operate at least for 8 hrs for proper heating up
- 2.9 Silo that tends to block - if possible, recirculate/extract some small amounts of material to ensure flow
- 2.10 Execute trial of kiln feed recirculation system prior to take the kiln feed to kiln
- 2.11 Check function of fan inlet dampers of all major fans (fully close/open and actuate smoothly). Check that louvers are well functioning and open.
- 2.12 Perform bag filter precoating

The restart of the coal (TSF) grinding shop follows the normal startup SOP.

- 2.13 Since fine coal bin is empty, the strategy on using kiln heating up fuels (oil, gas, AF..) and start of the coal mill needs to be well balanced. Especially with high risk fuel, grinding process should not start before inert gas is available from the pre-heater.
- 2.14 In case raw meal was not fed to the system before the mill stopped, it is recommended (esp. for high risk fuel) to start the mill first grinding limestone in order to get the system heated and filter bags coated as well as remaining fine coal build ups to be covered by inert material.

2.15 The start up SOP should include following key elements:

1. Check all doors, including explosion relief flaps, are closed.
2. Check any spillages of coal and or coal dust have been cleaned
3. Lock gates for all no-go areas and clear coal mill shop building of personnel.
4. Ensure the requirement level for CO₂ in tank before starting (min 50%)
5. Ensure sufficient raw meal for emergency situation (raw meal blanket)
6. Ensure pre-heater oxygen is at a low enough level for the coal (TSF) type requirements
7. Follow normal start sequences - coal dust transport, bag filter purging, mill auxiliaries....
8. Open the hot gas damper and introduce some hot gas to preheat the mill.
9. Before starting the mill and the feed, ensure that the mill gasflow and temperature is in the normal range and all controllers and control loops are in automatic mode

2.16 Still follow the daily routines of the stockpiles, especially for high risk fuels (VM>35%)

- Visual inspection to identify any area of smoldering (smelling, smoke)
- Temp measurements to check if there is a temperature increase inside the pile

2.17 Make sure all fuel piping and tank with heat transfer fluid (or electrical heating) are working

Specific for cooler:

2.19 All undergrate compartments shall be checked and cleaned from material accumulations

2.20 Prior to operating the cooler, check if grates are free to move and the plate slots are open

2.21 Add cold clinker on the static inlet (first grates) to avoid temperature shock of grate plates by first hot material

2.22 For a cooler with stationary and deep bucket plates, extend the length covered with clinker material bed along the grate

3 Refractory

3.1 Case 1 - fresh refractory: Follow normal drying and heat up procedure for new refractory

3.2 Case 2 - used refractory: Follow normal heat up procedure for used refractory - optimize procedure to 24 hours

4 Electrical

4.0 Follow electrical safety requirements when switching on power of switchgear and MCCs - wear the proper PPE required for the arc flash energy level of the equipment!

4.1 Check functionality of air condition in electrical rooms, in case it failed check thoroughly for condensation in electrical cabinets - set temperature to operating condition

4.2 MV motors: switch off heating systems

4.3 Check slip ring compartment for condensation - just in case heating failed - clean slip ring compartment from carbon dust and re-install brushes of slip ring motors

4.4 Check VSD cabinets for condensation and signs of capacitor leakages, switch off heating of cabinets for VSD

4.5 Verify TIS, PCS, subcontrol system (e.g. Reclaimer, hydraulic system, analyzer, weighing system), VSD parameter settings are still operational - use back-ups if required

4.6 Check functioning of UPS system

4.7 Continue standard maintenance tasks on emergency power systems - make a restart trial if one would be scheduled soon anyway

4.8 Connect battery loading stations and load associated equipment such as forklifts at dispatch, warehouse, etc.

5 Lubrication

- 5.1 Switch on oil preheating on lubrication systems ahead of time to reach operating temperature before start-up of the main equipment is required - stop oil cooling during that period!
- 5.2 Lubrication storage room: open all drums and recipients that were temporarily closed

6 Hydraulic Systems

- 6.1 Check that breathing systems (desiccant) is working
- 6.2 Position and connect piston rod
- 6.3 Switch on oil preheating on hydraulic systems ahead of time to reach operating temperature before start-up of the main equipment is required - stop oil cooling during that period!

7 Compressors and Air System

- 7.1 De-isolate system - open valves (register to be closed)
- 7.2 Open the air system valves closed during stoppage - the register becomes helpful now.
- 7.3 Start compressors, fill circuits, drain tanks, any other part of the system (consider your usual pain points)

8 Industrial Water Distribution

- 8.1 Check water treatment circuit for blockage or material settling
- 8.2 Close the water drain valves opened during stoppage - the register becomes helpful now.

Annex 1: Contributors

For any clarification and suggestions please contact the respective specialist or the coordinator of this document:

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