



PSB Single Tower Natural Gas Dryers Energy Control Procedure (ECP)

General Information			
Location		Asset Number(s)/ Equipment ID(s)	All Single Tower Natural Gas Dryer Models
Manufacturer or Equipment Name	PSB		
Hazardous Energy Identification			
<input checked="" type="checkbox"/> Chemical	<input checked="" type="checkbox"/> Electrical	<input type="checkbox"/> Gravitational potential	<input type="checkbox"/> Hydraulic potential <input type="checkbox"/> Kinetic
<input checked="" type="checkbox"/> Mechanical	<input checked="" type="checkbox"/> Pneumatic potential	<input type="checkbox"/> Radiation	<input checked="" type="checkbox"/> Thermal
Personal Protective Equipment Required (Beyond Basic PPE)			
Hard Hat, Gloves, Eye Protection, Hearing Protection, Safety Toe Boots, and High Vis Vest.			
ONLY TRAINED AND AUTHORIZED PERSONNEL SHALL CONDUCT LOCKOUT/TAGOUT.			
Shutdown Overview (Isolation Overview)			
<p>The Energy Control Procedure (ECP) for all Single Tower PSB Natural Gas Dryer provides a systematic approach to safely isolate, control, and verify hazardous energy sources—including electrical, pneumatic, mechanical, and thermal—during installation, maintenance, and shutdown. It details required PPE, step-by-step shutdown and isolation actions (such as lockout/tagout, valve sequencing, and depressurization), verification methods, and startup instructions, all designed to prevent accidental energy release and ensure compliance with safety standards. The procedure emphasizes thorough documentation, regular maintenance, and strict adherence to manufacturer warnings to protect personnel and equipment.</p>			

Depressurization and De-energization ECP for Service Instructions

1. Preparation & Safety

- Notify all affected personnel of the intended work and energy isolation.
- Review the system's operating status and ensure all maintenance is scheduled during safe conditions.
- Always Contact Chevron Call Center (**877-872-3966**) before starting work and when finishing work.
- Inspect the dryer for any damage before starting work.
- Wear protective clothing when working in and around unit due to burn hazard.
- Never open a high voltage panel if natural gas is detectable in the atmosphere.
- Gather required PPE and verify all tools and LOTO devices are available.
- Complete Chevron Start Work Check.
- Loosen heater supports bolts before regeneration to prevent thermal stress.
- Always refer to Manufacturers Manual or call PSB at (**814**)-453-3651 for assistance with troubleshooting.

CAUTION: when draining the blower motor and sump, as they may contain condensate fluid resulting from the regeneration process. This waste material poses risks to the eyes and skin and emits a notably strong odor.

2. De-energizing

Electrical Isolation

- 2.1 Turn Dryer Power Switch to **OFF**.
- 2.2 Disconnect power at main breaker at the MCC
- 2.3 Open the MCC door and locate the dryer breaker. Turn the dryer breaker **OFF**
- 2.4 Close the MCC doors. Turn **ON** power at main breaker at the MCC
- 2.5 **Verify zero voltage at the Dryer electrical panel.**
- 2.6 Lock/tag MCC/control panel doors to restrict access to the dryer breaker while servicing.

3. Depressurizing

Close Process Valves – refer to Fig 1 diagram

- 3.1 **Close** V1 (Inlet Isolation Valve).
- 3.2 **Close** V6 (Outlet Isolation Valve).
- 3.3 **Open** V7 (Bypass Valve).
 - Bypass the dryer if process flow is required during maintenance (NOTE: moisture will not be removed while bypass is open).
- 3.4 **Close** V2 (Pre-filter Isolation Valve).
- 3.5 **Close** V5 (After-filter Isolation Valve).
- 3.6 **Close** V3 (Regeneration Loop Isolation Valve).

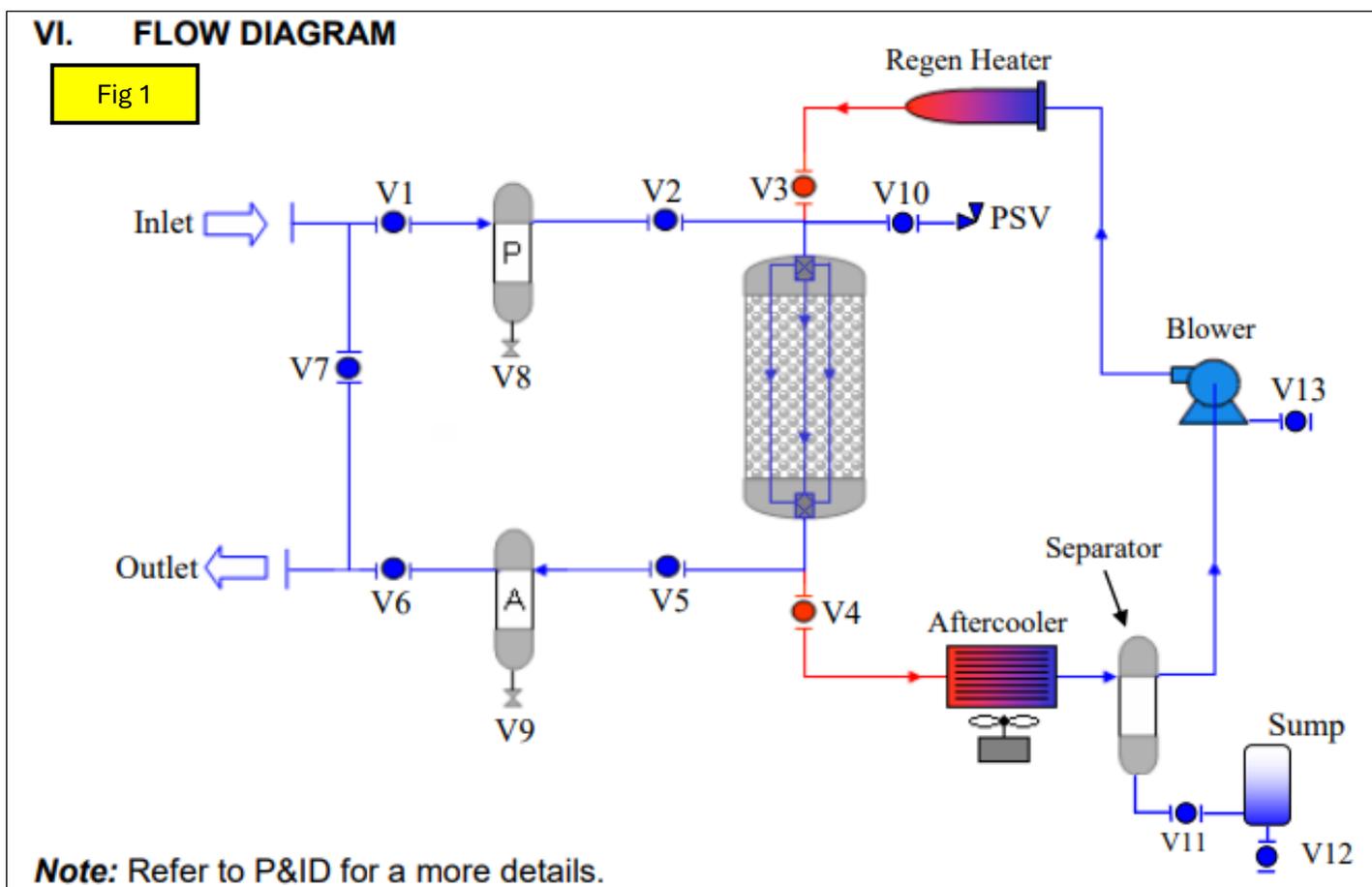
- 3.7 **Close** V4 (Regeneration Loop Isolation Valve).
- 3.8 **Close** V8 (Pre-filter Housing Vent).
- 3.9 **Close** V9 (Dryer Chamber/After-filter Housing Vent).
- 3.10 **Close** V12 (Separator Sump Tank Drain/Depressurization Valve).
- 3.11 **Close** V13 (blower motor vessel drain).
- 3.12 **Close** any instrument valves open to atmosphere.
- 3.13 Ensure the block valve at inlet of PRV (V10) is locked open.

Drain and Vent to (0 PSI)

NOTE: Slowly Drain Pressure. Do Not Exceed 30 PSIG per minute. Draining gas too quickly could result in equipment damage.

CAUTION: Residual condensate may remain from prior to regenerations. Connect a chemical grade drain hose to V12 and V13 and use an approved container to drain the blower motor and sump vessel.

- 3.14 **Open** V8 to vent pre-filter housing; close when complete.
- 3.15 **Open** V9 to vent dryer chamber and after-filter housing; close when complete.
- 3.16 **Open** V11 (Sump Tank Valve)
- 3.17 **Open** V12 and V13 to drain sump tank and blower motor vessel; close when complete.



4. Lockout/Tagout (LOTO)

- 4.1 Apply LOTO devices to all energy isolation points (electrical disconnect, all closed valves).
- 4.2 Attach warning tags indicating maintenance is in progress.

Required LOTO Valves

- 4.3 **Close V1:** Process Inlet Isolation Valve
- 4.4 **Close V2:** Pre-filter Isolation Valve
- 4.5 **Open V3:** Regeneration Loop Isolation Valve
- 4.6 **Open V4:** Regeneration Loop Isolation Valve
- 4.7 **Close V5:** After-filter Isolation Valve
- 4.8 **Close V6:** Process Outlet Isolation Valve
- 4.9 **Open V7:** Bypass Valve (if used for flow diversion during isolation)
- 4.10 **Open V11:** Sump Tank Valve
- 4.11 **Close V12:** Separator Sump Drain Valve (once depressurization is complete, close and lock out)
- 4.12 **Close V13** – Blower Housing Valve (used for regeneration circuit pressurization; lock out if not needed)
- 4.13 **Open Block Valve at Pressure Relief Valve (PRV) Inlet** – Must be locked open at all times for safety

5. Verification

- 5.1 Confirm all pressure gauges read **zero** or safe level.
- 5.2 Attempt to operate controls to verify no residual energy remains.
- 5.3 Attempt to start the dryer (should not operate).
- 5.4 Contact Supervisor or Chevron Reliability Engineer to video verify that lockout tag out procedure has properly been applied, and safe work practices are being performed. Once verification has been approved, work can start.

NOTE: If any issues or pressure are still present, stop working and contact your supervisor or Chevron Reliability Engineer to discuss the next steps.

6. Maintenance or Service Work

- 6.1 Proceed with required maintenance or inspection only after verifying all energy is controlled, and the system is safe.
- 6.2 Replace filter elements as needed (see maintenance section in the manufacturer's manual).
- 6.3 **If replacing desiccant:**
 - Remove pressure and power.
 - **Open** drain port to remove desiccant.
 - Dispose of desiccant per regulations.

NOTE: Desiccant change will require 2 people and the correct volume of waste barrels for the size of the Dryer Desiccant Tank. This is a continuous process. Refer to the Manufacturer’s Manual for detailed instructions.

NOTE: Consult Safety Data Sheet (SDS) and all applicable regulations for disposal of desiccant. Disposal of desiccant contaminated with oil or other substances may require different procedures than desiccant replaced strictly due to aging. Always report any waste removed from the site on the Chevron AP Renewables Waste Reporting Log. **Link:** [AP Renewables - Waste Reporting Log](#)

Re-energization (After Service)

7. Re-energizing & Re-energizing

Pre-Start Checks

- Ensure all maintenance is complete, and all tools/materials are removed.
- Verify that all components are reassembled, and all personnel are clear.
- Remove LOTO devices and warning tags.

Valve Sequence for Startup

Leak Check

- 7.1 **Open** V2, V3, V4, V5, V11 for leak check—all other valves closed.
- 7.2 **Slowly open** V1 (gas inlet) to pressurize the dryer.

CAUTION: Opening the Inlet Valve too quickly may result in equipment damage.

- 7.3 Leak check the dryer assembly with soap and water mixture
- 7.4 If leaks are discovered, follow steps 2-5 to depressurize, lockout tagout, and verify. Repair any leaks.

Purge System

- 7.5 **Open** V8 to purge pre-filter housing; **close** when complete.
- 7.6 **Open** V9 to purge dryer chamber and after-filter housing; close when complete.
- 7.7 **Close** V4 and V3 to isolate regeneration system.
- 7.8 Slowly **open** V6 to place dryer into service.
- 7.9 **Close and Lock** V7 (Bypass Valve)

Set Valves for Operation

- 7.10 **Open** V1, V2, V5, V6
- 7.11 **Close** V3, V4,
- 7.12 **Close and Lock** V7 (Bypass Valve)

Restore Power

- 7.13 Reconnect power at the main disconnect.
- 7.14 Set Dryer Power Switch (SS1) to ON

Note: Do not start the dryer. This ECP is for General De-energization only. If regeneration is required, follow the regeneration procedure (see Chevron’s PSB Gas Dyer Regeneration ECP and refer to the Manufacturer’s Manual).

8. System Startup

- 8.1 Contact colleague / supervisor that energy isolation controls are being removed and document their verification (in person or video) required name of verifier and phone number.
- 8.2 Start the dryer according to standard operating procedure.
- 8.3 Monitor system parameters (pressure, temperature, alarms) during normal non-regeneration operation.

9. Documentation

- Contact Chevron Call Center (**877-872-3966**) to notify personnel of the status of work on-site before leaving.
- Report any abnormal findings or incidents.
- Always refer to Manufacturers Manual or call PSB at (**814**)-**453-3651** for assistance with troubleshooting.

NOTICE: Consult Safety Data Sheet (**SDS**) and all applicable regulations for disposal of desiccant or condensate. Disposal of desiccant contaminated with oil or other substances may require different procedures than desiccant replaced strictly due to aging. Always report any waste removed from the site on the Chevron AP Renewables Waste Reporting Log. **Link:** [AP Renewables - Waste Reporting Log](#)

10. Reference

- The Manufacturers Manual can be found in the Files Section on Aetos.
- In the search bar enter, “PSB” and select the model number associated with the PSB Dryer being serviced.
- For example: [PSB NG-SR-21-3-500 S-N- 331147 Manual.pdf](#)

Troubleshooting Quick Guide Chart – Natural Gas Dryer

NOTE: Always refer to Manufacturers Manual or call PSB at (814)-453-3651 for assistance with troubleshooting.

Symptom	Probable Cause	Remedy
No or Low heater outlet temperature	Fuses blown	Test and replace
	Contactors not energized	Check voltage on coil. Replace as required
	Regeneration Cycle in cooling	Reset control by pressing and holding "ALARM RESET" pushbutton. Then press "REGEN START".
Heater failure	Check resistance	Replace if open
Too much flow	Open blower bypass valve	Adjust as necessary to control flow
Blower Overload alarm	Overloads tripped	Reset
	Contactors not energized	Check voltage on coil. Replace as required
Blower mechanical problem	Depressurize and remove blower housing	Check blower freely rotates
Heater outlet temperature high alarm	Regeneration pressure low	Raise to 10–15 PSIG
	Contactors malfunction	Check for welded together contacts
Thermocouple problem	Test and replace as needed	
Blower failure	Refer to symptom "Blower overload alarm"	
Cooler Overload alarm	Overloads tripped	Reset
	Contactors not energized	Check voltage on coil. Replace as required
Motor failure	Check windings	Replace as needed
Excessive process pressure drops	Excessive process flow	Reduce to design
Valves not in correct position for regeneration	Open valves "V3" and "V4"	
Filters plugged	Replace filter elements	
Poor dew point	Dew point sensor isolated	Open ¼" valves to flow gas across sensor
	No flow across sensor for long period of time	Pass flow through dryer. Then monitor. Slightly close V-6 to create flow across sensor.
Excessive inlet moisture	Regenerate the unit with greater frequency or reduce moisture input or flow	Run Regeneration
Regeneration problem	Restart regeneration and monitor heater output and cooler temperature	
Cooler Outlet Temperature High Alarm	Cooler fan not running	Refer to symptom "Cooler overload alarm"
Ambient temperature high	Regenerate when air temperature is < 100°F	

Symptom	Probable Cause	Remedy
After-cooler dirty	Clean dirt and debris from fins	
Thermocouple failure	Test and replace as needed	
Heater Sheath Over Temperature Alarm	Blower failure	Refer to symptom "Blower overload alarm"
Flow blocked	Open valve "V3" to increase flow	
Heater thermocouple failure	Test and replace as needed	
Low regen flow	Close blower bypass	
Heater Chamber Alarm	Heater contactor mechanical problem	Verify contactor operation and replace as needed
Valve closed	Verify that V3 and V4 valves are open during regeneration	
Blower problem	Blower mechanical issue (coupling or blower internal binding)	
Blower fuse blown	Check and replace as necessary	
Thermocouple Failure Alarm	Wiring problem	Check for loose connections
Thermocouple bad	Remove and replace	
PLC problem	Check power to thermocouple	
Check thermocouple module		
TE4 or TE5 No response Alarm	T/C wiring problem	Check for shorted wiring
Heater not producing heat	Determine if other alarms are active	
	Verify that power is applied to heater	
	Verify heater amperage is correct	
False positive detection	Reset alarm and monitor temperature for increase above 150°F in 5 minutes	
RS-485 Communication problem Alarm	Cable unplugged	Reconnect and verify
	Termination resistor problem	Verify resistance is 120 ohms and connected between RX/TX at thermocouple module
	Verify middle DIP switch on PLC is ON	
	Baud rate problem	Verify that baud rate between PLC and thermocouple module is same

Version History and Approvals			
Version #	Date:	Name and Position:	Status: (Created/Approved/Annual Review*)
1.0	11/21/25	Harlan Brodie, Reliability Engineer	Created
1.0	12/2/2025	Brent Tesla, Renewables Project Manager	Approved
1.0			

*Procedure must be annually reviewed