

Carbon Storage Solutions

Front Range #1 Pad
Operations Safety Management Plan

Front Range #1 Pad

NWSE Sec 26 T6N R67W

Town of Windsor, CO

Operations Safety Management: Management of Change

Carbon Storage Solutions, LLC

1.0 SUMMARY AND KEY POINTS

Minimization BMPs

Carbon Storage Solutions (CSS) will implement an Operations Safety Management Program at the Front Range #1 Pad including the Management of Change (MOC) Procedures below. The Pre-Startup Safety Review (PSSR), MOC Form, and PSSR Form outline the procedures, approvals requirements, and documentation requirements for the MOC procedures.

Key Points

MOC is required when there are:

- *Changes in equipment design (i.e. pipe, bracing, valves, etc).*
- *Changes in operating procedures.*
- *Changes in inspection and test maintenance procedures.*
- *Changes to facilities.*

You must not:

- *Make equipment, facility, technical or procedural changes without getting prior approval.*

You must:

- *Perform a Process Hazard Analysis and apply mitigation measures.*
- *Perform a PSSR to ensure safety measures are in place.*
- *Give workers appropriate training and update all relevant documentation.*

2.0 PURPOSE

The purpose of this procedure is to define the requirements for the MOC process within CSS and satisfy the requirements of Colorado Oil and Gas Conservation Commission (COGCC) Rule 602.d.(1) and (2).

This MOC procedure is intended to ensure proposed changes to CSS procedures, facilities, processes, services, and activities are identified, evaluated by knowledgeable personnel, conform to acceptable industry standards, and approved before they are implemented. This key points of the MOC are:

- Initiate an MOC: Define the problem/opportunity, the proposed change, and why the change is necessary. Identify the potential impacts to Public Health, Safety, Welfare, Wildlife, and the Environment.
- Review/Approve the MOC: Ensure engineering / risk / operability / cost / schedule assessments and implementation planning is properly completed, and formally approve the change by the proper staff.
- Close Out the MOC: Ensure implementation of MOC scope through field verification by a responsible party.

3.0 SCOPE

This procedure will be applicable to all CSS personnel and facilities. It outlines the procedures used to manage any temporary or permanent alterations, modifications, or substitutions to equipment, facilities, procedures, raw materials, chemicals, processing conditions, or technology that is outside the design specifications or operating procedures other than a “Replacement in Kind”.

4.0 MANAGEMENT OF CHANGE PROCESS

Any CSS employee may propose a change to an existing CSS procedure, equipment, technology, or process where the situation warrants. When a potential MOC is identified, the individual identifying the MOC (the Originator) shall define the proposed change.

A Replacement in Kind is not a change; therefore, an MOC is not required. However, the personnel making the modification should confirm with their Supervisor that an MOC is not required.

If the change is to be a Temporary Change or Emergency Change, the form is completed as outlined below. However, refer to the sections of this procedure for the requirements associated with those types of changes.

The following sections refer to the MOC Form in [Attachment A](#)

SECTION 1: Initiate

This section of the MOC Form is to be completed by the Originator to define and provide justification for the change. The Originator should provide as much information as possible about the proposed change.

SECTION 2: Approval To Execute

The intent of the “Approval to Execute” section of the MOC Form is to develop detailed knowledge of the issue associated with the MOC, define the recommended solution, and outline the estimated cost and/or schedule to implement the proposed change. The Responsible Person (RP) will be the individual responsible for all aspects of the MOC and shall ensure completion of the final recommendation satisfies the intent of the MOC.

The Final Recommendation should typically include development or modification of the following deliverables:

- Scope of Work
- Engineering Analysis
- Engineering Documents
- Process Hazard Analysis (PHA) – CSS shall perform an initial PHA (hazard evaluation) on all MOCs. The PHA shall be appropriate to the complexity of the process and shall identify, evaluate, and control the hazards involved. CSS shall use one or more of the following methodologies that are appropriate to determine and evaluate the hazards of the MOC.
 - What-if
 - Checklist
 - Hazard and Operability Study (HAZOP)
 - Failure Mode and Effects Analysis (FMEA)
 - Fault Tree Analysis
- Health, Safety, and Environmental (HSE) Impacts
- Operability Review
- Cost Estimate/Benefit Analysis
- Schedule
- Regulatory, Technical, etc. reviews as needed
- PSSR
 - The RP ensures that the change is implemented as designed and ready for service. The RP is responsible for involving others, as needed, to complete the appropriate PSSR and document all findings and follow-up work required. Assigned RPs shall verify that findings from the PHA, HSE, and other reviews are resolved and ensures the engineering drawings reflect “as-built” status by performing field verification. As the above review can only be completed on an individual basis, a separate PSSR will be required for each location when utilizing one MOC for multiple locations. If a PSSR or another approved checklist is used, it shall be attached to the MOC.
 - On a temporary change, a PSSR is required to commission the change. A separate PSSR is required when the change is put back to the original state.
 - Simplified PSSR should be used for single discipline / trade changes that are minor in nature except for electrical changes.
 - Detailed PSSR should be used for more complex projects that involve more than one discipline / trade or electrical changes.
 - The PSSR must confirm the following:
 - Construction and equipment are in accordance with design specifications.

- Safety, operating, maintenance, and emergency procedures are in place and adequate.
- A PHA has been performed for new facilities and recommendations have been resolved or implemented before startup, and modified facilities meet the management of change requirements.
- Training of each employee involved in operating a process has been completed.

SECTION 3: MOC Close Out

The MOC will be considered closed when the RP ensures that the following items have been completed.

For MOC's requiring a HAZOP, all action items have been fully addressed and resolved.

- The changes outlined within the MOC have been verified to have been implemented accurately on the most recent revision(s) of all the document(s) impacted by the change.
- All required and relevant documentation regarding engineering and risk assessments have been completed. This is any documentation the MOC procedure, RP, Responsible Team Lead (RTL), or Approver has deemed necessary for full documentation of the proposed change.
- All required signatures and approvals have been obtained from the necessary parties.
- The MOC and PSSR forms will be maintained for three years on company servers and/or in the field office. CSS will coordinate closely with the COGCC in the event of a records request. Records to be provided within 15 business days of request.

5.0 TRAINING AND NOTIFICATION

As part of Section 2.6 Approval to Execute, once the RTL has endorsed the MOC, the RTL and RP will identify which workgroups require extensive (working knowledge) training versus those that only need awareness training of the change.

The RTL will communicate the change via a Management of Change Notice (MOCN) to ensure affected personnel are notified of the change.

6.0 TEMPORARY CHANGES

The procedure for completing a Temporary MOC is the same as permanent MOC's EXCEPT:

- The "Permanent Change" box is marked NO, and the duration of the change is filled in.
- All temporary MOC's must state an intended duration for the change. This date is at most 60 days from approval of the MOC.
- Temporary MOC's that remain in service past the change duration must obtain an extension approval in writing. This approval must be included in the MOC file. A temporary MOC without an extension is considered expired and must be removed.
- Extended Temporary MOC's must get extension approval every 60 days past the original extension date.

To Receive an Extension:

- Use the Cover Page and Approval Page from a blank MOC, but number this MOC the same as the Temporary MOC.
- Check the Extension Request box in the Title.
- Complete Section 1.3 of the form and describe why another extension is needed.
- Attach a copy of the original MOC Title and Section 2.0 Approval page.
- Obtain approvals from all original approvers and document same.
- Once approved, return the extension paperwork to the MOC Coordinator.

7.0 EMERGENCY CHANGES

There are occasions when changes are required quickly to prevent an unsafe condition, an environmental event, or some other event. The changes cannot wait for the permanent MOC procedure. Therefore, an Emergency MOC can be obtained. It is followed with a full MOC to ensure the change has a full review, is implemented safely, and no new hazards have been introduced. A full MOC must be prepared using the existing MOC information and completed within 2 working days.

The procedure for completing an Emergency MOC is the same as permanent MOC EXCEPT:

- The scope of the change is determined by the operator and Supervisor and is approved by the Supervisor.
- The Supervisor obtains verbal approval from the Engineer and the Superintendent/Manager.
- It is the Supervisor's responsibility to:
 - Write any needed procedures to cover the change.
 - Ensure that any required training, formal or informal, is completed.
 - Ensure that the change matches the approved scope.
 - Give final approval that the change is ready for service.
- Once approved, the change can be put into service.

8.0 DEFINITIONS

Approver - The supervisor, manager, or person who is accountable to approve the change and who has the functional authority in the area where the change is being implemented.

Change – Any change in physical means of operation, method of operation, equipment, or procedure.

Engineering Assessment - Formal review carried out by the Responsible Person which incorporates development of the Scope of Work, Risk Assessment, Cost Estimate, and Benefits Analysis.

Emergency Change – A change that is performed in response to urgent conditions because of unforeseen circumstances or events to continue safe operations or alleviate an unsafe condition. It is followed with a full MOC to ensure no new hazards have been introduced.

Facility Change - A facility change includes a revision, rearrangement, addition, or deletion of an asset at an existing facility, as well as the installation of any new equipment.

HAZOP - Hazard and Operability Study.

HAZID - Hazard Identification Study.

MOC Coordinator – oversees MOC program, assigns MOC number, maintains MOC register, and sets up MOC folders.

Operations Change - An operations change is any facility change that could result in changes in operations, facility changes, and/or a pipeline utilization change.

Originator - Any person who identifies the need for a change and initiates the MOC process.

Pre-Startup Safety Review – PSSR - The PSSR is a thorough review of equipment and its related processes to ensure that safety measures are in place.

Process – Any activity involving plumbing, repairing, constructing, repurposing, or major modifications to oil and gas equipment. This equipment may include, but is not limited to, surface wellhead equipment, flowlines, pipelines, process piping, compressors, separation equipment and tanks.

Process Hazard Analysis – PHA – organized and systematic evaluation to identify and analyze the significance of potential hazards.

Replacement in Kind - Replacement of an item with a direct substitute that satisfies the design specifications and does not alter the process conditions.

Responsible Person – RP - Individual responsible for all aspects of the MOC, to include Close Out.

Responsible Team Lead – RTL - Team Leader or Manager/Supervisor within the Division with primary responsibility for the MOC.

Temporary Change – A change that will only be used for a short, predetermined time to accommodate an abnormal situation or until a final, or permanent change can be implemented.

APPENDIX A

MANAGEMENT OF CHANGE FORM

Management of Change Form

MOC Title:

Extension Request

Project: <If applicable, list the site(s) affected.>

Originator:

Date Initiated:

Permanent Change?

Yes

No

Duration of Change:

Section 1 – Initiate

1.1 Issue *to be filled out by Originator*

<Briefly describe the issue.>

1.2 Change *to be filled out by Originator*

<Detail the proposed solution and provide supporting documentation.>

1.3 Justification *to be filled out by Originator*

HSE Regulatory Operability Cost Schedule Maintenance Other

<Justify why the change is necessary.>

1.4 Impacts *to be filled out by Originator*

Consider if the proposed change has impacts to the following categories and explain the impacts.

Impact	Yes/No	Comments
Process Conditions (changes in conditions or settings for pressure, temperature, flow, level, composition, new chemicals, well fluids changes)		
Equipment (adding or removing equipment, modifications to existing, change of service, modification to a relief or blow down systems or shutdown systems)		
Communications (changes or modifications to data transfer methods between remote devices and/or SCADA infrastructure)		
Operation and Maintenance (start-up, routine ops, shutdown, emergency ops, abnormal ops, isolation for operation or maintenance new or existing maintenance procedures, inspection procedures)		
Identify the Potential Impacts to Public Health, Safety, Welfare, and the Environment (1. that may occur from implementing the change; or 2. that may occur from no implementing the change)		
Drilling and Completions (hydrostatic barrier, well head, casing, drill string, or well control equipment integrity, pumping systems)		
Rig (spacing, layout, stability)		
Other		

1.5 Approval to Proceed with MOC Process						
<i>to be filled out by Responsible Team Lead (appropriate Supervisor, Engineer, or MOC coordinator)</i>						
Approval Granted to Proceed with Detailed Analysis of Change				<input type="checkbox"/> Yes	<input type="checkbox"/> No	
<If no, describe why the MOC was cancelled.>						
Considering the above responses in section 1.4, are any of the following needed: Risk Assessment, HAZOP/Consequence Modelling, Constructability Risk Assessment (e.g. HAZID), Engineering Review, Fabrication Review, Construction Review, Operations Review, Maintenance Review, or Training?				<input type="checkbox"/> Yes	<input type="checkbox"/> No	
<If yes, describe what specifically will be conducted.>						
Discipline Approving Detailed Analysis		<input type="checkbox"/> Engineering	<input type="checkbox"/> Operations	<input type="checkbox"/> HSE	<input type="checkbox"/> D&C	<input type="checkbox"/> Other
Name:		Date:		Signature:		
Assigned Responsible Person:						
Section 2 – Approval to Execute						
2.1 Final Recommendation <i>to be filled out by Responsible Person</i>						
<Provide a final recommended change to resolve the issue and justification for the decision.>						
2.2 Cost and Schedule Assessment <i>to be filled out by Responsible Person</i>						
Cost Estimate Complete		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A		
<Provide refined cost estimate.>						
Schedule Modified		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A		
<Provide schedule impact.>						
2.3 Pre-Implementation Items and Responsible Parties <i>Add more rows if necessary</i>						
<i>Action</i>	<i>Responsible</i>	<i>Complete</i>				
2.4 Documents to be Updated <i>to be filled out by Responsible Person</i>						
<List all documents that require updating.>						
2.5 Approval to Proceed with Implementation <i>to be filled out by Responsible Team Lead</i>				<input type="checkbox"/> Yes	<input type="checkbox"/> No	
<If no, describe why the MOC was cancelled.>						
Signature:				Date:		

2.6 Approval to Execute	
Engineer Signature and Date:	Engineering Manager Signature and Date:
Operations Representative Signature and Date:	Operations Supervisor Signature and Date:

Section 3 – MOC Close Out			
3.1 Revisions <i>to be filled out by Responsible Person</i>			
Does the MOC change a purchase order, contract agreement, or other...?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
<If yes, list the PO/CA which was revised.>			
Are all reviews, risk assessments, and action items listed in Section 1.4 complete?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Have all documents listed in Sections 2.4 and 3.1 been revised?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
3.2 Vendors/Personnel/Sites Affected <i>to be filled out by Responsible Person</i>			
<List which vendors, personnel, and sites are affected by the change, and confirm the change has been communicated to them.>			
3.3 Close Out <i>to be completed by the Responsible Team Lead</i>			
Name: <Responsible Team Lead>	Signature and Date:		

Management of Change Notice (MOCN) Description of Change (As Implemented):

<Provide a description of what was done to resolve the issue and the justification for the change including cost and schedule impacts.>

APPENDIX B

PSSR FORM

Pre-Startup Safety Review (PSSR) Form

Original to be filed

Sect	
Date:	Area / Department Number:
MOC Number:	
Facility / Process / Equipment:	
Project / Work Order Number:	
Equipment Service Number:	
Type of Startup:	<input type="checkbox"/> New Construction <input type="checkbox"/> Modified Process
PSSR Team Leader:	

Section 2 - Itemized Checklist						
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No	Category	N/A	Complete? Yes / No <small>If no, target date required.</small>	NOT Required for Start-Up	Required for Start-Up	Inspected By / Date
1	Construction is in accordance with design specifications?					
2	Equipment is in accordance with design specifications?					
3	Safety procedures are in place and adequate?					
4	Operating procedures are in place and adequate?					
5	Maintenance procedures are in place and adequate?					
6	Emergency procedures are in place and adequate?					
7	For new facilities, a PHA has been performed and recommendations have been resolved or implemented before startup?					
8	For modified facilities or equipment, have the requirements for the Management of Change policy been met?					
9	Training of each maintenance employee impacted by the change completed?					
10	Training of each employee involved in operating the process has been completed?					

Section 3 - Deficiencies

3.1 Deficiencies To Be Corrected - Required Before Startup

Deficiencies / Comments	Responsibility	Date Completed
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

3.2 Deficiencies To Be Corrected - NOT Required Before Startup

Deficiencies / Comments	Responsibility	Date Completed
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Section 4 - Checklist

Category	Responsibility	Initials	Date Inspection Completed
Documentation Items			
Piping and Equipment			
Instrumentation			
Mechanical Equipment			
Electrical Equipment			
Structures			
Procedures			
Labeling			
Training – Operations			
Training – Maintenance			
General Items			

Section 5 - Itemized Checklist

Section 5.1 - Documentation

Documentation Items	N/A	Complete? Yes / No If no, target date required.	NOT Required for Start-Up	Required for Start-Up	Inspected By / Date
Is Environmentally Hazardous Substance (EHS) Documentation Complete & Approved?					
Vent Permit Approved					
"DO NOT TOUCH" Exception Required					
Vent Permit Testing					
P&ID's Available/Design Documentation Complete					
Process Hazards Review Required & Completed Prior to Startup					
PHR/Process Hazards Analysis Startup Recommendations Complete					

Section 5.2 - Piping and Equipment

Piping and Equipment	N/A	Complete? Yes / No If no, target date required.	NOT Required for Start-Up	Required for Start-Up	Inspected By / Date
Proper Piping & Flanges					
Correct Gaskets/Bolting					
Supports/Vibration					
Correct Insulation for Intended Service					
Tracing Completed, Tagged, & Identified					
Isolation Valves/Handles/Stored Energy Sources Labeled/Tagged & Identified					
Low Point Drains, Flushes, Purge Connections Adequate for Maintenance					
Process/Service Connections Correct					
Pressure Test Completed					
Relief Device Installed/Directed Properly PRD Sheet Filed with Maintenance					
Shielding - Flanges Valves					
3-Way Valve Orientation					
Correct Materials of Construction					
Critical Service Documentation					
Makeshift Devices Eliminated, Extension Cords, Ropes, Hoses, Etc.					

Section 5.3 - Instrumentation					
Instrumentation	N/A	Complete? Yes / No If no, target date required.	NOT Required for Start-Up	Required for Start-Up	Inspected By / Date
Instrument Loop Books Updated					
Pressure Gauges as Required					
Temperature Gauges as Required					
Fail Safe Valve Position Indicated					
Loop Check Completed					
Analyzer Check Completed					
Spare Parts Available					
DCS Process Control Changes Documented					
PLC Ladder Logic Changes Documented					
Section 5.4 - Mechanical Equipment - Guards Installed Modified for Vibration Readings, if Applicable					
Mechanical Equipment	N/A	Complete? Yes / No If no, target date required.	NOT Required for Start-Up	Required for Start-Up	Inspected By / Date
Lubrication and Alignment Complete					
Correct Rotation					
P.M. Records in Place					
Spare Parts Available					
Hydraulic Systems Installed Per Design and Checked Prior to Startup					
Section 5.5 - Electrical Equipment - Conformance to Hazard Classification					
Electrical Equipment	N/A	Complete? Yes / No If no, target date required.	NOT Required for Start-Up	Required for Start-Up	Inspected By / Date
Grounding, Bonding/Lightning (Surge) Protection					
Safety or Process Interlocks/Alarms					
Out-of-Service Equipment De-Energized					
Electrical Inspection Complete					
Emergency Switches Required? Conduits and Boxes Sealed?					
Evacuation Alarms Available P.M. Records in Place					

Section 5.6 - Structures - Doors - Ramps - Fire Doors - Walls

Structures	N/A	Complete? Yes / No If no, target date required.	NOT Required for Start-Up	Required for Start-Up	Inspected By / Date
Exits (Traffic Flow, Door Swings, Emergency Escape)/Route Posted/Exit Signs					
Safety Chains/Handrails/Guard Rails					
Walks, Ladders, Stairs, Emergency Lights					
Floor Drainage/Curbs/Dikes					
Overhead Hazards Removed					
Operations/Maintenance Platforms Provided Where Needed					

Section 5.7 - Procedures - Equipment Description

Procedures	N/A	Complete? Yes / No If no, target date required.	NOT Required for Start-Up	Required for Start-Up	Inspected By / Date
Alarm & Interlock Check					
Alarm & Interlock Listing					
Analyzer Maintenance/Calibration					
Job Hazard Analysis (JHA's)					
Maintenance (SMP's)					
Operating (SOP's)					
Spill Control Procedures					
Emergency Procedures					
MSDS Updated & On File					

Section 5.8 - Labeling

Labeling	N/A	Complete? Yes / No If no, target date required.	NOT Required for Start-Up	Required for Start-Up	Inspected By / Date
Lines Properly Labeled with Material & Flow Direction					
Instrument (Transmitters, Gauges, Panelboards, DCS)					
Electrical (Switches, MCC's, Buttons, Local Disconnects)					
Hi Voltages Labeled					
Hot Surfaces Marked					
Equipment (Tanks, Pumps, Condensers, Exchangers, Feeders, Monorails, Hoists, Etc.)					
"DO NOT TOUCH" Labels					
Other (Nitrogen, Air, Oxygen, etc.)					

Section 5.9.0 - General Items

General Items	N/A	Complete? Yes / No If no, target date required.	NOT Required for Start-Up	Required for Start-Up	Inspected By / Date
Accessibility for Maintenance/Operations					
Equipment Lockout Sheets in Place					
Confined Spaces Identified					
Any Tripping Hazards or Pinch Points					
Spill Containment Facilities					
Fire Protection Equipment/Sprinklers					
Extinguishers, Procedures Updated					
Safety Shower/Eye Washes Procedures Updated					

Section 5.9.1 - General Items (Cont.) - Accessibility for Maintenance/Operations

General Items	N/A	Complete? Yes / No If no, target date required.	NOT Required for Start-Up	Required for Start-Up	Inspected By / Date
Painting/Safety Painting					
Safety Rules or Signs Installed					
Area & Spot Ventilation Adequate					
Noise Level Measured					
Lighting Adequate/Emergency Lights Adequate					
Special Operating Tools Provided Where Needed					
Equipment Run-In					
Hidden/Stored Energy Sources Identified					
Mechanical/Contractor Cleaned Up Area					
Employee Communication Prepared					

Section 8 - Inspected and Approved By:			
Title	Print Name	Signature	Date
Supervisor			
Superintendent			
Engineer			
HSE			
Responsible Person			
Section 8.1 - Reviewed By:			
Title	Print Name	Signature	Date
Operations Shift			
Section 8.2 - Authorization For Startup			
Title	Print Name	Signature	Date
Department Superintendent			
Section 9 - Approved For Closing			
Title	Print Name	Signature	Date
PSSR Team Leader			