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What Makes a Good Operation & Maintenance (O&M) Manual

Dale Golemon

Executive Consultant, RCP Inc.

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Code Requirements

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- §§ 192.605 and 195.402 - Procedural Manual for Operations, Maintenance and Emergencies.
- General - Each operator shall prepare and follow, for each pipeline, a manual of written procedures for conducting operations and maintenance activities, as well as for emergency response.

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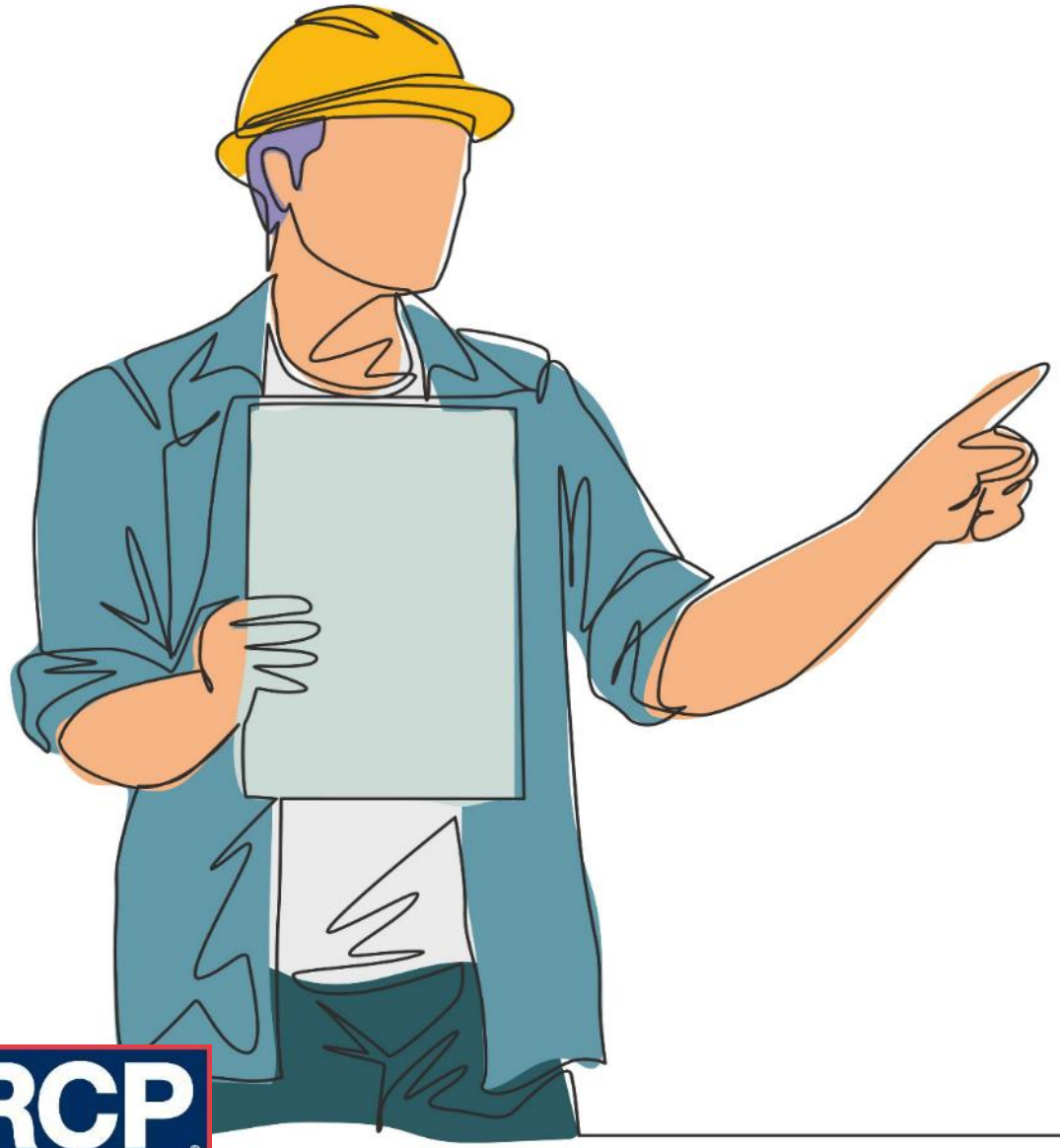

How does my O&M compare against others?

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O&M In The Past

- Hard copies on a shelf.
- Procedures were mostly just a regurgitation of the regulations.

Electronic and Shared Folders

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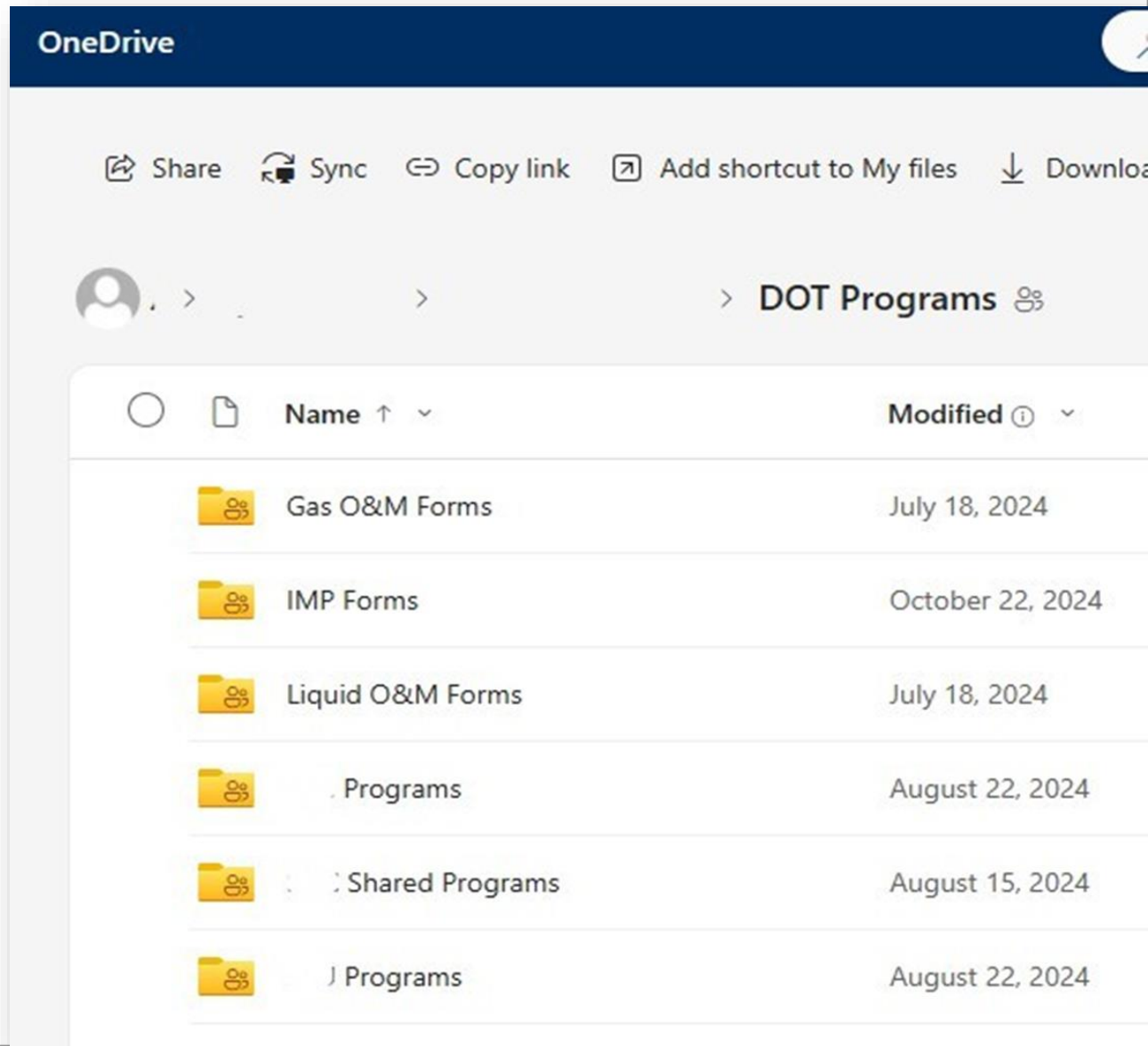
- OneDrive
- SharePoint
- Network Drive
- Etc.



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Single Document

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Pros

- Single document reduces confusion.
- Contains links for easy navigation.

Cons

- Large files can be slow to load, especially when accessing certain field locations.

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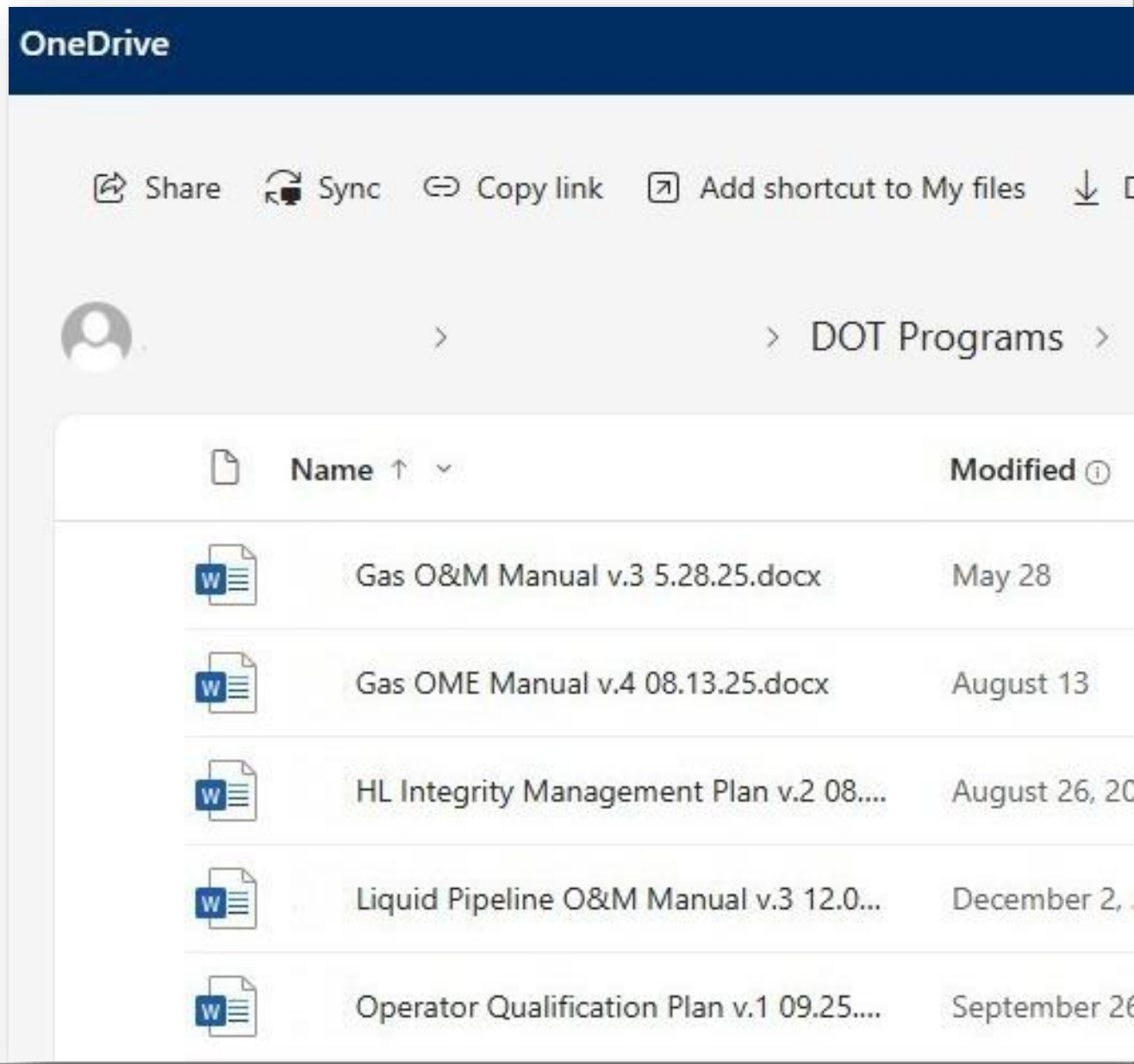

Multiple Documents By Sections

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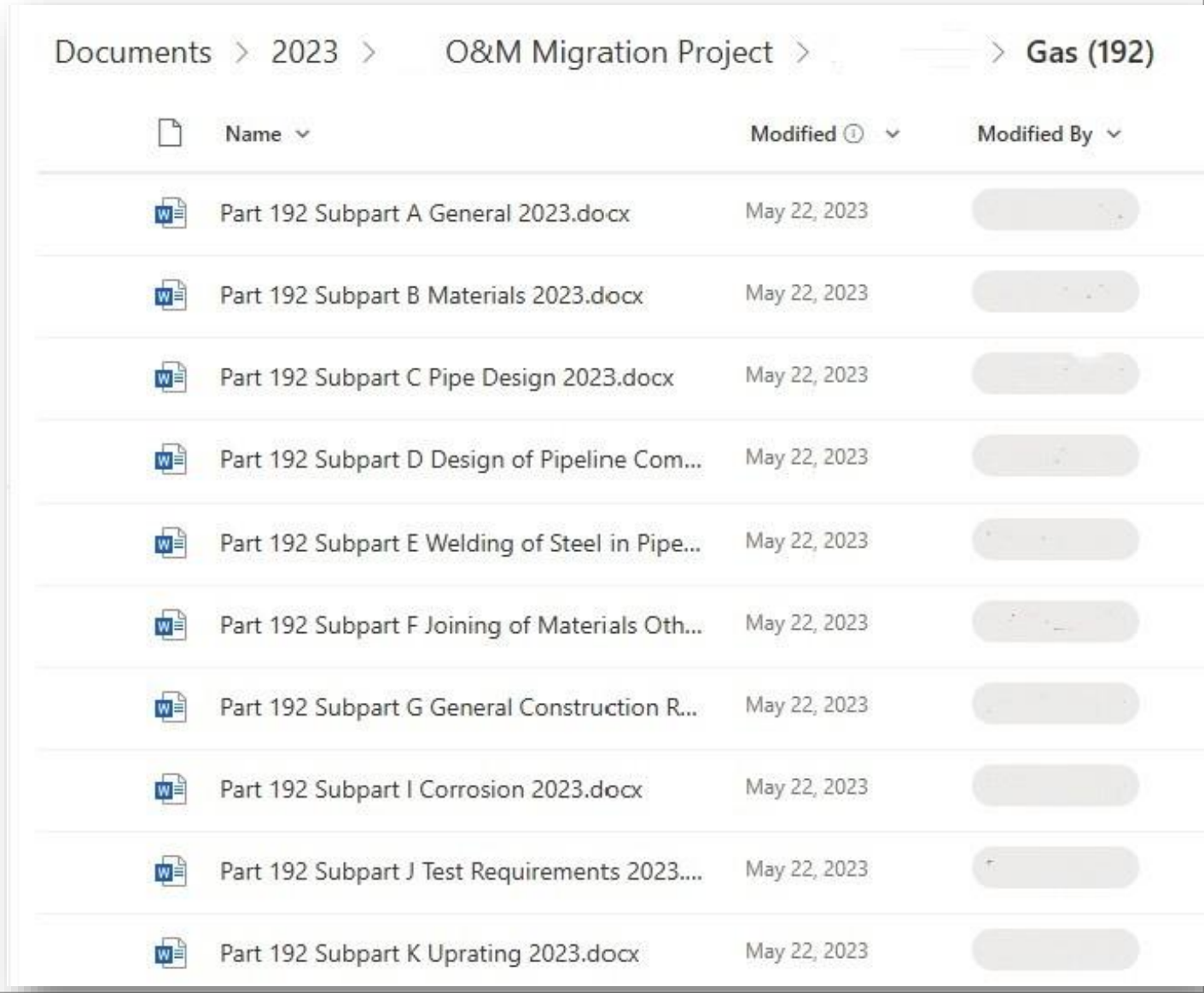
Pros

- Smaller file size
- Focused on a single topic.

Cons

- More difficult to link documents.



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Individual Operating Procedures

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Pros

- Focused on a single topic.

Cons

- Can be overwhelming.
- Very difficult for new employees to follow.
- Easy to miss important items.

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Natural Gas Operating Procedures and Standards

Operating Procedures

Home
Operating Procedures
LNG Procedures
Safety Procedures
Engineering Standards
Environmental Procedures

	Title	Revision Date	Guide Material
010.000 Administration			
010.100 Audits and Regulatory Requirements			
010.101	Reporting and Notification of Pipeline and LNG Events	11/05/24	Guide Material
010.101b	Appendix B: Telephone Report	07/26/13	
010.101c	Appendix C: Media Communications	07/26/13	
010.101d	Appendix D: Typical Response Protocols	10/17/23	
010.102	Emergencies	11/14/24	Guide Material
010.102a	Appendix A: EMRT Organization	01/20/21	
010.102b	Appendix B: EMRT Definitions	01/20/21	
010.102e	Appendix E: Evacuation Plan Template	07/26/13	
010.103	Investigation of Accidents and Failures	12/04/24	Guide Material
010.104	Reporting of Safety-Related Conditions	12/04/24	Guide Material
010.104a	Appendix A: Safety-Related Conditions Report	06/17/20	
010.104b	Appendix B: Federal Holidays	04/15/98	
010.105	Manual for Emergency Operations	11/26/24	Guide Material
010.105a	Appendix A: Mock Emergency or Incident Review Form	01/04/23	
010.105b	Appendix B: Emergency Plan Review	11/14/24	
010.106	Event Investigation Reporting Process	12/04/24	Guide Material
010.106a	Appendix A: Event Investigation Report	12/04/24	
010.106b	Appendix B: Post Incident Investigation Report Template	09/26/22	
010.106c	Appendix C: Measurement Event Investigation Report	12/04/24	
010.108	Procedure Review	09/05/24	Guide Material
010.109	DOT Compliance Certification For HUD Development Near Natural Gas Pipelines	12/04/24	
010.110	DOT Annual Mileage Reporting	03/12/25	
010.112	DOT & State Reporting and Notifications	06/07/25	
010.114	DOT Notification for Other Technology	01/22/24	
010.116	Event Metallurgical and Failure Examination	12/04/24	
010.116a	Appendix A: Metallurgical Laboratory Failure Protocol	09/03/09	
010.120	Odorization Special Permits	12/04/24	
010.120a	Appendix A: PHMSA Odorization Special Permits (2015)	04/06/20	
010.125	Additional State Requirements - Texas	07/02/25	
010.300 Regulatory Plans			
010.301	Administration of Drug and Alcohol Plans	03/29/22	Guide Material
010.302	Veriforce Operator Qualification Program	06/07/25	Guide Material
010.310	Management of Change	12/18/24	Guide Material
010.310a	Appendix A: Management of Change Template	01/22/25	
010.700 Procedures			
010.701	Policies and Procedures Format System	12/04/24	
010.701a	Appendix A: Policy and Procedure Format	06/20/12	
010.701b	Appendix B: P8 Approval Lists	12/04/24	
010.702	Waivers to Procedures and Standards	12/04/24	
010.800 Property Items			
010.801	Property Damage to Company Facilities	11/27/18	
010.801a	Appendix A: Sample Letters to Responsible Party (First and Second Notices	10/02/00	
010.802	Property Losses, Fraud and Theft	11/27/18	
010.802a	Security Incident/Property Loss Report	06/24/04	
010.900 Reports and Records			
010.901	DOT Record Keeping	11/04/20	
010.902	Maintenance & Record Keeping Systems	09/05/24	
010.905	Maintenance Control System	01/10/18	
020.000 Communication			

Traditional Layout

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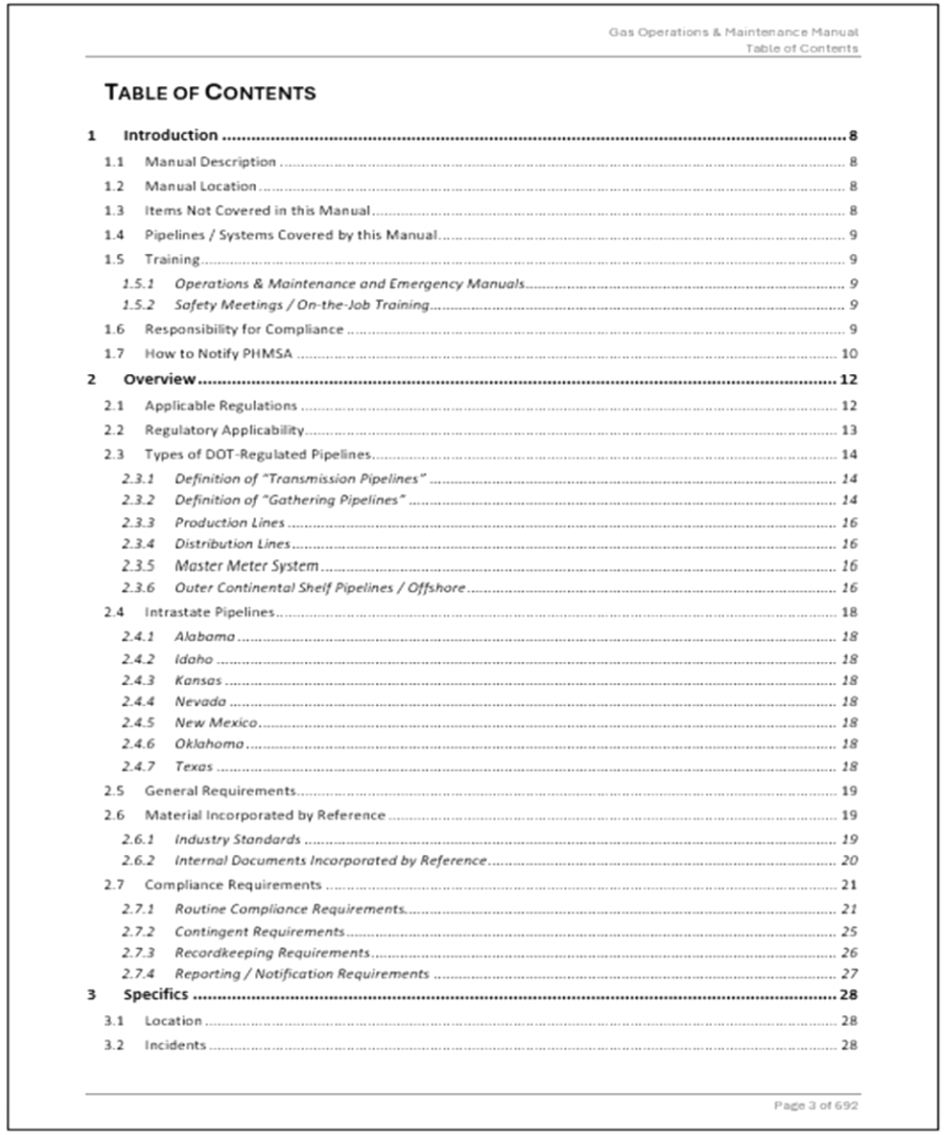
- Introduction
- Normal Operations
- Abnormal Operations
- Emergency Response
- Design
- Repair / Construction



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Old Versions of a Procedures

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2.14.6 VALVE INSPECTION §192.745

Pipeline valves that might be required during an emergency, such as those for isolation or blow down of facilities, shall be inspected at intervals not exceeding 15 months, but at least once each calendar year, to determine that they are functioning properly. *Form 07, Pipeline Block Valve Inspection Record* will be utilized for documenting these inspections.

All electrically operated valves shall be checked both for electrical and manual operation. The Pipeline Supervisor or designee will prepare a list of those valves required for isolation or blow down and identify those valves on Appendix A.

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Updated

2.14.6 VALVE INSPECTION [§192.745]

Pipeline valves that might be required during an emergency, such as those for isolation or blow down of facilities shall be inspected at intervals not exceeding 15 months, but at least once each calendar year, to determine that they are functioning properly. **Form 07 *Pipeline Block Valve Inspection Record*** will be utilized for documenting these inspections.

All electrically operated valves shall be checked both for electrical and manual operation. The Pipeline Supervisor or designee will prepare a list of those valves required for isolation or blow down and identify those valves on Appendix A. These valves will be inspected using the following procedure:

1. Remove any locking devices presently on the valve being inspected.
2. Inspect the valve for product leakage at flanges, bonnet, stem seals, or packing.
3. If leakage is found note in "remarks" column and attempt to correct by tightening flange bolts, injecting stem sealant, etc., depending on source of leakage. Note any corrective action taken in "repairs" column.
4. Operate the valve from its fully open position to approximately 10% of its closed position, noting especially the ease of operation of the hand wheel or other operator. If the operator exhibits excessive resistance, attempt to correct by lubrication or other methods as required, depending on the type of valve being inspected. Note these facts in the "remarks" and "greased" columns.
5. Return the valve to its original position prior to beginning the inspection, and install any locking devices removed previously.
6. Record all information on **Form 07 *Pipeline Block Valve Inspection Record*** which will be reviewed by the Pipeline Supervisor or designee and become part of the system's permanent records.

Valves that are found to be inoperable shall be repaired or replaced promptly or an alternate valve will be designated as the emergency valve.

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What makes a Good Written Procedures?

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A Good Written Procedure

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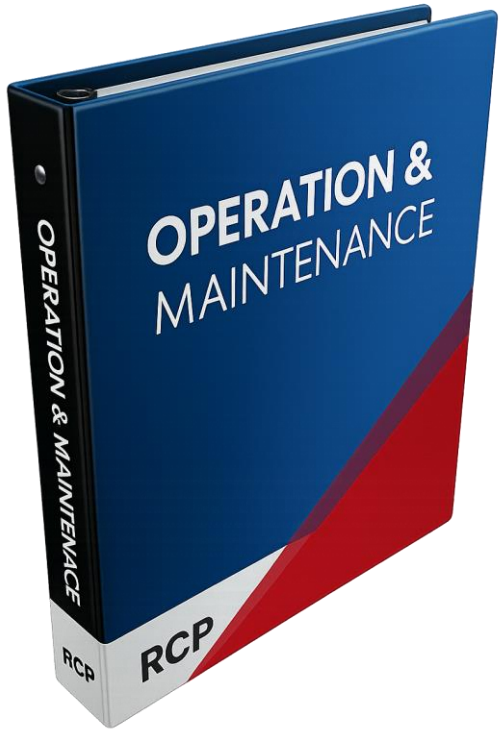
- Introduction
- Process Frequency and Triggers
- Responsibilities
- Process Overview
- Process Detail – sufficient enough to facilitate consistent implementation
- Communications
- Documentation



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ACME CORPORATION	Operations and Maintenance Procedures Manual Liquids	Section No. 2	Procedure No. 420
		Revision No: 1.0	Revision Date: 09/02/2021
Procedure: Valve Maintenance			

Section 2.13 [420] Valve Maintenance

1. **Scope**
   This Procedure contains guidelines for inspecting and maintaining Department of Transportation (DOT) regulated mainline block valves (MLV) and other DOT pipeline valves that are necessary for the safe operation of the pipeline system (Other Safety Valves) (OSV).

2. **Regulatory Reference**
   §195.420 Valve maintenance
   a) Each operator shall maintain each valve that is necessary for the safe operation of its pipeline systems in good working order at all times.
   (b) Each operator shall, at intervals not exceeding 7 1/2 months, but at least twice each calendar year, inspect each mainline valve to determine that it is functioning properly.
   (c) Each operator shall provide protection for each valve from unauthorized operation and from vandalism.

3. **Responsibilities**
   Crude Field, & Logistics Supervisor
   Field Gauger

4. **General Information**
   Each MLV must be inspected to ensure it is functioning correctly twice each calendar years at intervals not exceeding 7 ½ months.

Mainline valves include valves:

(a) On the suction end and the discharge end of a pump station in a manner that permits isolation of the pump station equipment in the event of an emergency.
(b) On each line entering or leaving a breakout storage tank area in a manner that permits isolation of the tank area from other facilities.
(c) On each mainline at locations along the pipeline system that will minimize damage or pollution from accidental hazardous liquid discharge, as appropriate for the terrain in open country, for offshore areas, or for populated areas.
(d) On each lateral takeoff from a trunk line in a manner that permits shutting off the lateral without interrupting the flow in the trunk line.
(e) On each side of a water crossing that is more than 100 feet (30 meters) wide from high-water mark to high-water mark unless the Administrator finds in a particular case that valves are not justified.
(f) On each side of a reservoir holding water for human consumption.

OSVs, are valves other than mainline valves, necessary for the safe operation of the pipeline, such as station inlet valves, outlet valves, tank fill line valves, meters station isolation valves and pig trap valves. While not held to a specific inspection frequency by regulation, OSVs are inspected annually to ensure they are in good working order.

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ACME CORPORATION	Operations and Maintenance Procedures Manual Liquids	Section No. 2	Procedure No. 420
		Revision No: 1.0	Revision Date: 09/02/2021
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It is the responsibility of the Crude Field and Logistics Supervisor to ensure that all valves needed for the safe operation of the system are identified and included on the ***Valve Maintenance Inspection Record Form*** (*Attachment 1*). Consideration should be given to the proximity, accessibility, and redundancy of individual valves to determine which valves could reasonably be needed to protect people, property, and the environment during an emergency.

5. **The Procedure**

Mainline biannual valve Inspection includes:

- Checking to see that the valve body is free of corrosion, leakage, or other apparent damage.
- Servicing the valve by greasing valve stems and cleaning/painting as needed.
- Operating the valve to confirm functionality.
- Confirming the adequacy of valve locks and chains.
- Confirming valve sites are cleared of vegetation.
- Confirm accessibility and adequate security.

OSVs needed for the safe operation of the system are inspected annually and include ensuring that the valves are:

- In good working order (lubricated, easily operated, functions as required)
- Free of visible mechanical damage
- Free of visible Leakage

Service the valve by greasing valve stems and cleaning/painting as needed

6. **Qualification**

Inspecting valves is an OQ Covered Task and must be performed by personnel in possession of a current qualification under Acme's Operator Qualification Program or directed and observed by an individual that is OQ qualified for the task.

7. **Documentation**

The ***Valve Maintenance Inspection Record Form*** (*Attachment 1*) will be used to document the valve inspections. Any findings requiring remedial action are to be noted in the comment section of the form, as well as other items of note. The completed form will be maintained on the Pipeline Drive for a period of 3 years.

8. **Additional References**

§195.258 Valves: General.
§195.260 Valves: Location

9. **Form**

Attachment 1 – Valve Maintenance Inspection Record Form

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Valve Maintenance
Inspection Record

Each mainline valve shall be inspected to determine that it is operating properly and protected from unauthorized operation and vandalism at intervals not to exceed 7½ months, but at least twice per calendar

Valve #	Description	MLV or OSV *	Vault Secure & locked	Valve secure & locked	Liquid Present in Vault	Valve Operate Freely	valve body is free of corrosion, leakage, damage	Comments	Notes
1	Manifold west of ship pumps at Ten Section	MLV	Y/N	Y/N	Y/N	Y/N	Y/N		
2	DRA Injection Point	MLV	Y/N	Y/N	Y/N	Y/N			
3	Box at Ten Section & Panama Lane (old)	MLV	Y/N	Y/N	Y/N	Y/N			
4	Panama at Allen Road		Y/N	Y/N	Y/N	Y/N			
5	Panama at Progress Road	MLV	Y/N	Y/N	Y/N	Y/N			
6	Panama at Phyllis Street		Y/N	Y/N	Y/N	Y/N			
7	Panama and Colony Street, O'Reilly Auto Store		Y/N	Y/N	Y/N	Y/N			
8	Panama Lane at H Street Entrance to Vallarta Market		Y/N	Y/N	Y/N	Y/N			
9	Panama Lane at Union Avenue, East of Intersection		Y/N	Y/N	Y/N	Y/N			
10	Shell Meter	MLV	Y/N	Y/N	Y/N	Y/N			
11	Crude Unload @ Crude Storage Area	MLV	Y/N	Y/N	Y/N	Y/N			

Mainline Valve (MLV) / Other Safety Valve (OSV)

Inspection Date _____

Inspector Name (Please Print): _____ _ Inspector Signature: _____

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P-195.420: Inspecting and Maintaining Valves

Description	This procedure gives steps to inspect and maintain DOT valves and valve actuators / operators in good working condition. In addition, it covers specific requirements for operating and testing rupture mitigation valves or alternative equivalent technologies.
Responsible Personnel	Pipeline Operation Supervisor
Regulatory Applicability	☒ Regulated Transmission Pipelines ☒ Regulated Gathering Pipelines – Non-rural ☐ Regulated Gathering Pipelines – Rural (Constructed, replaced, relocated or otherwise changed after July 3, 2009) ☒ Regulated Low Stress Pipelines in Rural Areas
Frequency	• Valve inspection - Twice each calendar year at intervals not to exceed 7½ months. • 30-minute-total response time validation drill for alternative equivalent technology – Annually at intervals not to exceed 15 months. • Confirm automatic shutdown valve pressures – once each calendar year not to exceed 15 months.
Reference	The following regulatory reference(s) are covered in this procedure: • 49 CFR 195.401: General Requirements • 49 CFR 195.420: Valve Maintenance • 16 TAC 8.1: General Applicability and Standards
Forms	Activities required by this procedure are documented using the form below. A contractor's report or other equivalent form may be used for documentation as long as it contains all relevant information required to show compliance with regulations. • F-195.420(b): *Mainline Valve Inspection* • F-195.420(d): *Remote Operating Valve Point-to-Point Verification* • F-195.420(e): *Time Response Drill* • F-195.420(g): *Automatic Shutdown Valve Pressure Confirmation* Retain this completed documentation and any supporting materials per Procedure P-195.402(c)(1): *Making Information Available*.
Related Specifications	None
OQ Covered Task	When performing the tasks listed below, an Individual must either be qualified for the task under the Acme Operator Qualification (OQ) Manual or directed and observed by someone who is qualified. Note in the Operator Qualification Manual the span of control for each task dictating how many non-qualified individuals can be directed and observed by a qualified individual. • 202 Inspect, Maintain, and Operate Valves • 203 Valve (Electric) Actuator / Operator Inspection, Testing and Maintenance

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Procedure / Process

Note: Individuals need to be aware of the potential of discovering a safety-related condition during this activity. If there is suspicion that a safety-related condition exists, contact the Operations Manager who will determine if a reportable safety-related condition exists.

Notify Control Center prior to entering a location that is not normally manned and before inspecting or maintaining valves.

Contractors are provided a copy of this procedure as applicable to the work they are performing. If the Contractor has additional procedures they will use for the job, a copy is to be provided to Acme prior to the job for review and approval.

Whenever a condition that could adversely affect the safe operation of the pipeline system is discovered, it shall be corrected or addressed promptly, as the situation dictates the risk to people, property, and environment in prioritizing the correction of any conditions. If the condition presents an immediate hazard to persons or property, Acme will shut down the affected pipeline segment until the unsafe condition has been corrected.

General Information

Note: A list of mainline valves and station valves necessary for safe isolation of the pipeline is maintained in the PSOP.

Valve maintenance shall be ongoing activity with major repairs conducted as operation and line scheduling permits, as long as the issue requiring repair is not detrimental to worker or employee safety or the environment. Routine maintenance also shall be performed during the required valve inspection, or more frequently as conditions dictate, to ensure valves are in good working order at all times.

Valves are routinely inspected for leaks, damage, corrosion and workability.

Inspection / Maintenance

1. Coordinate maintenance activities with Operations / Control Room.
2. Verify location of valve to be inspected.
3. Have proper equipment and traffic plan if necessary.
4. Verify the accessibility of the valve. Determine if this is a confined space.
5. Review safety procedures and check air quality.
6. Verify the valve number and nameplate data.
7. Verify the valve type and manufacturer. (Types of valves include gate valves, butterfly valves, ball valves, etc.).
8. Check all external moving parts of valves and operators for condition, lubrication, and freedom of movement.
9. Check valve body for leaks, damage, and corrosion.
10. Check packing glands on valve stems for leakage and adjust or add packing if required.

11. Inspect valve and components.
    a. Check valve body for visible leaks - be sure that inspection includes main body, packing area, plugs, reliefs, and flange areas (Employee will visually inspect top, bottom, left and right).
    b. Check paint condition. Paint blistering could hide corrosion.
    c. Check for operator damage.
    d. Check components to ensure they are not bent or broken.
    e. Check valve for correct open / close position per PSOP.
    f. Ensure valve is locked as appropriate.
    g. Check for corrosion. If corrosion is found, initiate further investigation and remediation if necessary.
    h. Ensure valve is protected from unauthorized operation and vandalism.
12. Operate valve fully when possible; however, partial operation is acceptable. If bypass piping and valves are present, open them before closing a normally open valve. If the valve is motor operated, stroke using the power actuator.

    Note: If the valve is a rupture mitigation valve or an alternative equivalent technology, operate the valve at least 25% unless there is operational information that requires an additional closure percentage for maintaining reliability.

    a. Ensure position indicators are correct.
    b. Ensure control room sees valve operation.
    c. Have control room remotely operate valve.
    d. If valve is fully closed, check for leak-by and leak-through sealing of valve.
13. Adjust operator / actuator as necessary per manufacturer's procedure.
14. Inspect exterior of operator for any damage.
15. Inspect switch compartment for corrosion.
16. Lubricate the valve as needed using appropriate injection products / tools per manufacturer's / company specifications including stem, seat, bearings, etc. with appropriate product per manufacturer's procedure.
17. Spray threads and shaft with a dry lubricant.
18. Ensure valve is protected from unauthorized operation and vandalism.
    a. If in a fenced area, verify fencing is intact with no damage.
    b. Check that lock is easy to operate weather on valve or gate.
    c. Ensure identification and emergency phone numbers are posted.
    d. Ensure area is free of hazard-producing vegetation.
19. Winterize valve when necessary.
    a. Blowdown (depressurize) valve body.
    b. Drain non-petroleum liquids (such as water) from valve body.
    c. Operate injection equipment and inject appropriate antifreeze.
20. If valve is disassembled, internally inspect:

a. Disassemble actuator.
b. Inspect worm gear.
c. Set limit switch.
d. Set torque switch.
e. Disassemble soft clutches and inspect.
f. Assemble gear section.

21. Notify the Control Center before and after valve servicing or repair if:
    a. Difficulties occur when operating a valve.
    b. Automatic or remote control valves are left out of automatic position following service for any reason.
    c. Performing valve maintenance where servicing procedure involves completely shutting off product flow (temporarily or otherwise).
22. After completing valve service:
    a. Return the valve to normal position and close the bypass valve(s) if installed.
    b. Place all automatic and meter station valves in proper position for automatic service and verify that they are completely operational.
    c. At remote sites, secure valve and / or site prior to leaving.
23. Perform prompt remedial action to correct any valve that is found inoperable according to manufacturer's procedures or designate another valve to use in case of an emergency until the inoperable valve is repaired.
24. Complete Form F-195.420(b): *Mainline Valve Inspection*.

Remote Control Valves (RCVs)

If an RCV is installed as a rupture mitigation valve, visually inspect it and maintain it as described above. In addition to the inspection and maintenance completed above, perform a point-to-point verification between the SCADA system displays and the installed valves, sensors, and communications equipment when equipment is added, moved or other changes are made to the field equipment or SCADA display that may affect pipeline safety according to the following procedure:

1. Verify the correct setpoint based on current operations and that needed to ensure the valve can be closed within 30 minutes of rupture detection.
2. Contact the Controller and request he initiate closing the valve from the SCADA system.
3. When the valve begins moving, communicate this to the Controller and ensure he sees the movement in the SCADA display.
4. Have the Controller communicate when the valve is showing 25% closed and determine if the same is shown in the field.
5. Manually open the valve 100% and ensure the Controller saw the valve operating on the SCADA display.
6. If there are any alarms associated with the closing of the valve, ensure the Controller received the alarm.
7. Document the time it took to close the valve the 25% from the time the signal was initiated.

8. Determine if there are any deficiencies in operating the valve and perform remediation as described in the *Remedial Measures* section below.
9. Document this inspection on Form F-195.420(d): *Remote Operating Valve Point-to-Point Verification*.

Alternative Equivalent Technology

When a manually or locally operated alternative equivalent technology is installed in lieu of a rupture mitigation valve, conduct an initial drill to ensure a response time of 30 minutes or less. Periodically validate the response time according to the following procedure.

1. Randomly select an authorized rupture mitigation valve alternative equivalent technology device within each pipeline system and within each operating or maintenance field work unit, using a random number generator if there is more than one device per pipeline system in each operating or maintenance field work unit.
2. Determine the worst-case conditions for the location based on the following:
    a. That calculated within the Facility Response Plan if the pipeline is subject to 49 CFR 194;
    b. As determined through spill analysis to determine potential to affect an HCA; or
    c. As calculated using other Engineering means based on maximum operating pressure and maximum flow rate.
3. Initiate the drill by telling the Controller or Field Operator this is a drill and notification of a potential rupture has been received and its location. If this could lead to more than one device being activated, inform him of the device to close.
4. Have him or her demonstrate the process to identify the rupture and document how long this took.
5. Instruct him or her to follow procedures for contacting the appropriate individual to close the valve and have the valve operated at least 25% unless there is operational information that requires an additional closure percentage to maintain reliability.
6. Document the time the individual is instructed to begin notification, the time he/she arrives at the valve and begins closing, and the time the valve is reported as being 25% closed.
7. Multiply the time it takes to partially close the valve by 4 and add to the time to the time elapsed before he began closing the valve.
8. If the time is greater than 30 minutes, take remedial steps as described below:
    a. Take remedial actions as described below to designate an alternative valve shut-off measure within seven days of the drill.
    b. Based on a review of the drill and lessons learned, take steps to revise response efforts to achieve the 30-minute response time no more than 12 months after the drill.
9. Based on the results of the drill, determine lessons learned in the following areas that may improve response time:
    a. Training and qualifications programs
    b. Design, construction, testing, maintenance, operating, and emergency procedures manuals
    c. Other areas identified by the operator as needing improvement
10. Complete Form F-195.420(e): *Time Response Drill*.

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Thank You!

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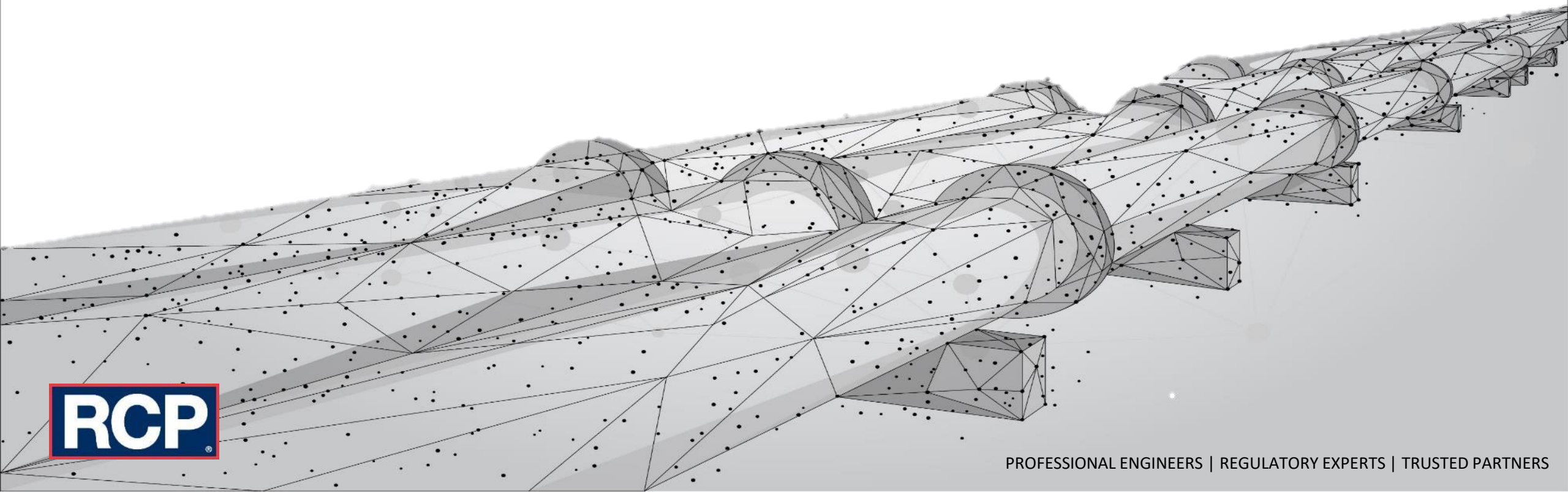

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