

Recommended practice for basic inspection requirements – new pipeline construction API RP

2014-September

My Self Study Exam Preparatory Notes- Part 3



7.10 Pipe Alignment and Welding Requirements

7.10.1 General

Since this phase of pipeline construction, both on production and tie-ins, is critically important to the long-term integrity of the pipeline, all inspectors should know the basics of proper lineup and welding and its inspection.

Qualified welding inspectors with specialized training and experience would be expected to know more in depth inspection requirements (see Annex D). All mainline pipeline welding, whether manual or automatic, follow the same codes, standards, industry practices, and specification parameters.

7.10.2 Pipe Laying Operation

Inspectors should check the following per specifications and drawings;

- ensure pup joints meet specified minimum length restrictions consistent with pipe diameter and owner/operator requirements;
- for proper installation/placement of transition nipples for changes in pipe wall thickness;
- for proper location/placement of the correct type, grade, and wall thickness of pipe and other mainline appurtenances, such as hot bends, block valves, scraper traps, any pump station piping, and other fabrications per drawings. Mark changes (red line) on drawings to facilitate completion of as-built drawings.

7.10.3 Mainline Component Assembly

Inspectors should be knowledgeable in the following areas of mainline component assembly:

- bolting procedures, including but not limited to: proper bolt/nut size and condition, placement, tightening sequence, torque requirements, and use of correct tools;
- proper gasket material and use;
- installation and isolation testing of any insulating flanges;
- verify that all concrete support structures are constructed in accordance with American Concrete Institute (ACI) standards and owner/operator requirements;
- ensure proper coating and application requirements are met for the component being installed.

7.10.4 Other Pipe Laying Inspections

Inspectors should ensure open pipeline is protected with night caps or other devices to keep debris, water, and wildlife out of the welded up pipeline.

Main Spread- Welding Stations



Main Spread- Welding Stations



Main Spread- Welding Stations



Main Spread- Welding Stations



Main Spread- Welding Stations



Main Spread- Pipe Alignment



Main Spread- Pipe Alignment



Main Spread- Pipe Alignment



Main Spread- Pipe Alignment



Main Spread- Pipe Alignment



Main Spread- Preheating



Main Spread- Preheating

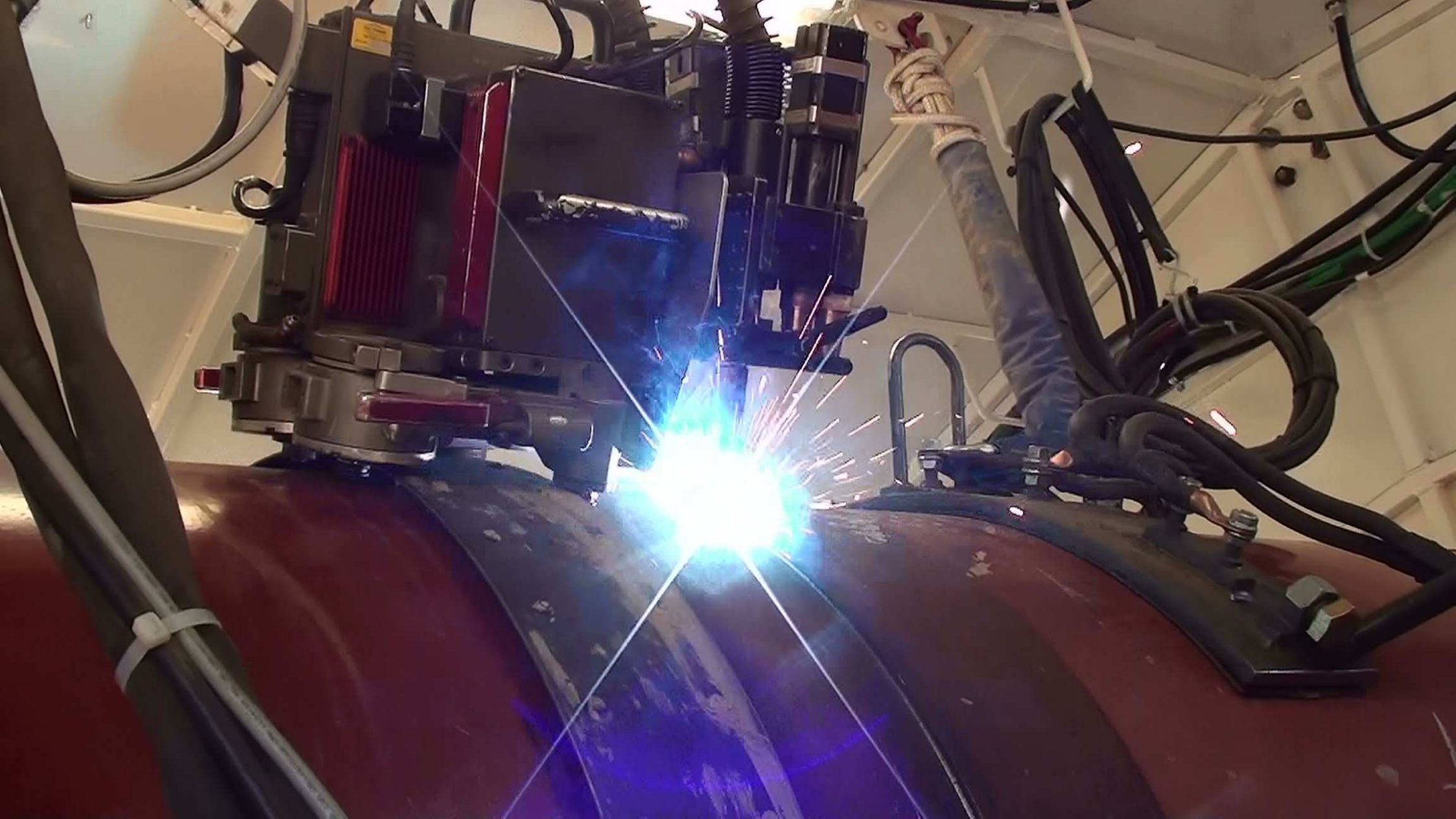


Main Spread- Welding (Root/Hot pass station & Fill/Cap Station)





Charlie Chong/ Fion Zhang



www.youtube.com/embed/f2tRO0-_xlo

http://www.youtube.com/watch?v=f2tRO0-_xlo

Main Spread- Welding Stations



Main Spread- Welding Stations



Main Spread- Welding Stations



Night Cap



Mainline Welding- Hot Pass



www.youtube.com/embed/u_EzniXp3-A

Following are Tie-In Welding, Repair Welding, Metering Station and Appurtenances Welding

Tie-In Welding, Repair Welding, Metering Station and Appurtenances Welding



Tie-In Joint



Tie-In Joint



Tie-In Joint



Metering Station Welding



Root Repairs



7.11 Roadway, Railroad, and Other Crossings

7.11.1 General

Inspectors should monitor, assess, and verify the activities and requirements in the following sections to ensure compliance with regulations, permits, industry practice, and owner/operator specifications (see API 1102 Sections 4, 5, and 6; ASME B31.4 Sections 434.13, 434.13.1, 434.13.2, 434.13.3, and 434.13.4; and ASME B31.8 Sections 802.2.5, 806, and 841.2.2).

7.11.2 Safety

Inspectors should ensure safety precautions are in place, including markers, signs, traffic control devices, and other related activities, including flagmen, as required, near pipe laying operations, excavations, and other locations, especially where machinery and trucks are operating and other construction activity is taking place.

7.11.3 Permits

Inspectors should be knowledgeable of different types of crossing permits, their provisions, and the governmental agency issuing the permit(s) (e.g. state and county road and city street crossing permits and railroad crossing permits).

7.11.4 Installation Activities

Inspectors should be knowledgeable of installation methods, machinery/equipment condition, and operator performance involved in completing the crossing, including wet or dry boring, HDD, ditching, or other approved method. ensure that the pipe has been surveyed and proper documentation collected prior to installation and that tie-in points had been surveyed after installation.

River Crossing – HDD Pull Head



River Crossing – HDD Pull Head



7.11.5 Cased Crossings

Inspectors should be knowledgeable of cased crossings:

- casing installation methods, equipment used, operator performance, and completeness/acceptability, including the correct pipe, wall thickness, and coating, if any, versus specifications (see 49 *CFR* 192.323 and 49 *CFR* 195);
- mainline welding is inspected and acceptable along with the pipe coating and/or pipe jacketing;
- verify that mainline pipe insertion procedures are followed to ensure that no damage occurs to pipe and its coating, visually inspect spacers/insulators during and after installation, and check installation of seals and vents;
- verification that the completed cased crossing is not electrically shorted and testing methods are correct, that depth profile specifications are met, and the required documentation is completed.

Cased Crossing



HDD- Horizontal Directional Drilling



HDD- Horizontal Directional Drilling



HDD- Horizontal Directional Drilling



Cased Crossing



Note the concrete coating and piggy back smaller tube underneath the main pipe

7.11.6 Uncased Crossings

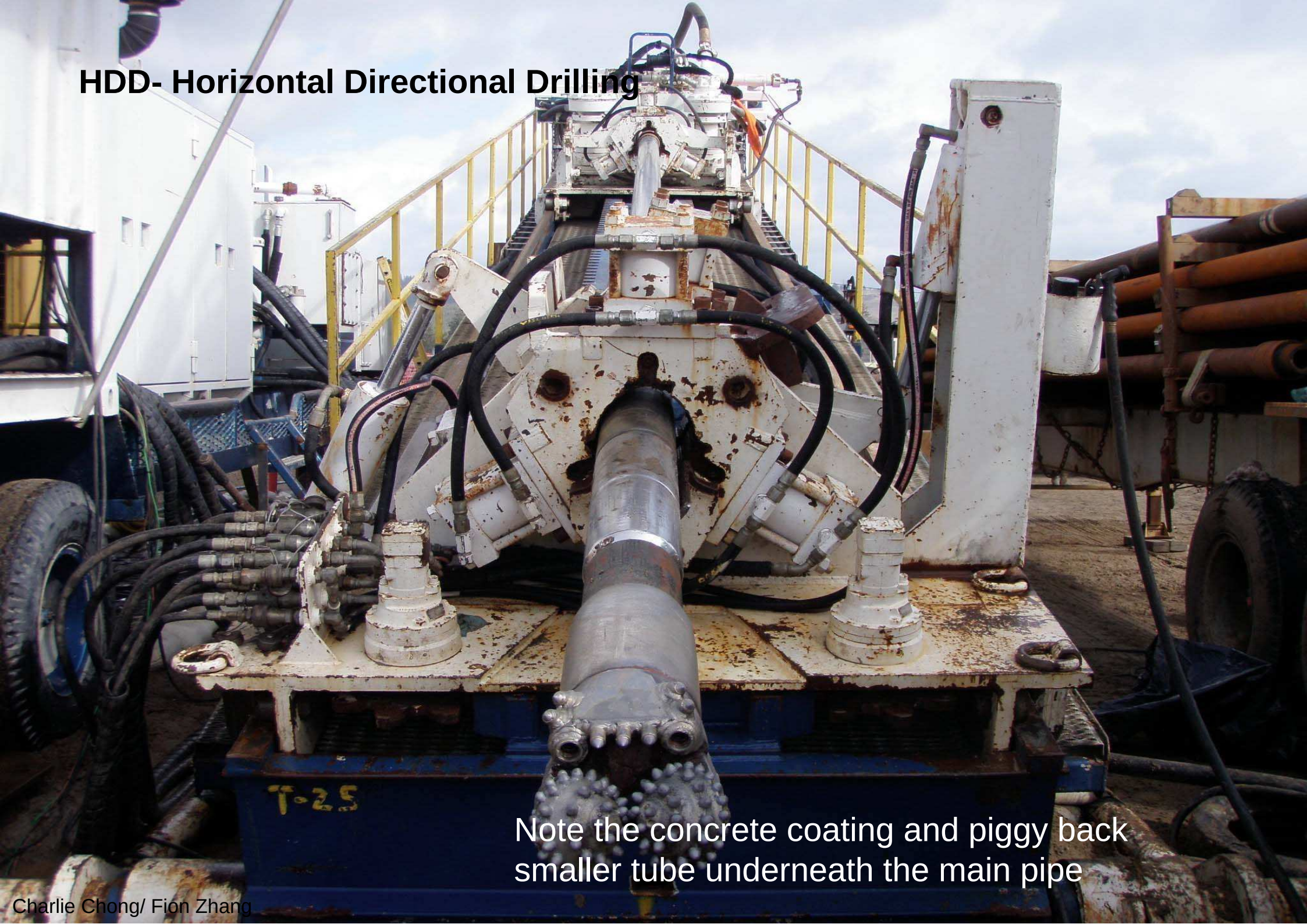
Inspectors should be knowledgeable of uncased crossings:

- method of crossing (boring, HDD, ditching, or other approved methods), equipment used, and operator performance, including use of heavier wall pipe and special coating, if required, is in accordance with drawings, specifications, and permit provisions;
- mainline welding is inspected and acceptable along with coating and/or jacket condition after insertion of the pipe;
- mainline crossing pipe on each side is ready for tie-in.

7.11.7 Documentation

Inspectors must make sure that all required documentation, including permits, owner/operator records and requirements for marked-up drawings as needed, and any special provisions in permits, such as railroad, highway, and local or other permit requirements, are completed.

HDD- Horizontal Directional Drilling



Note the concrete coating and piggy back smaller tube underneath the main pipe

HDD- Horizontal Directional Drilling



R/Cam

Note the concrete coating and piggy back smaller tube underneath the main pipe

HDD- Horizontal Directional Drilling



HDD- Horizontal Directional Drilling



HDD- Horizontal Directional Drilling



HDD- Horizontal Directional Drilling



HDD- Horizontal Directional Drilling



HDD- Horizontal Directional Drilling



HDD- Horizontal Directional Drilling



HDD- Horizontal Directional Drilling



https://www.youtube.com/watch?v=xoG8rNCO_Dk

7.12 Waterway and Water Body Crossings

7.12.1 General

Inspectors should monitor, assess, and verify the following activities and requirements to ensure compliance with codes, regulations, permits, industry practices, and specifications. These crossings may include swamp, wetland, river, lake, and similar water feature crossings. (See ASME B31.4 Section 434.13.4.)

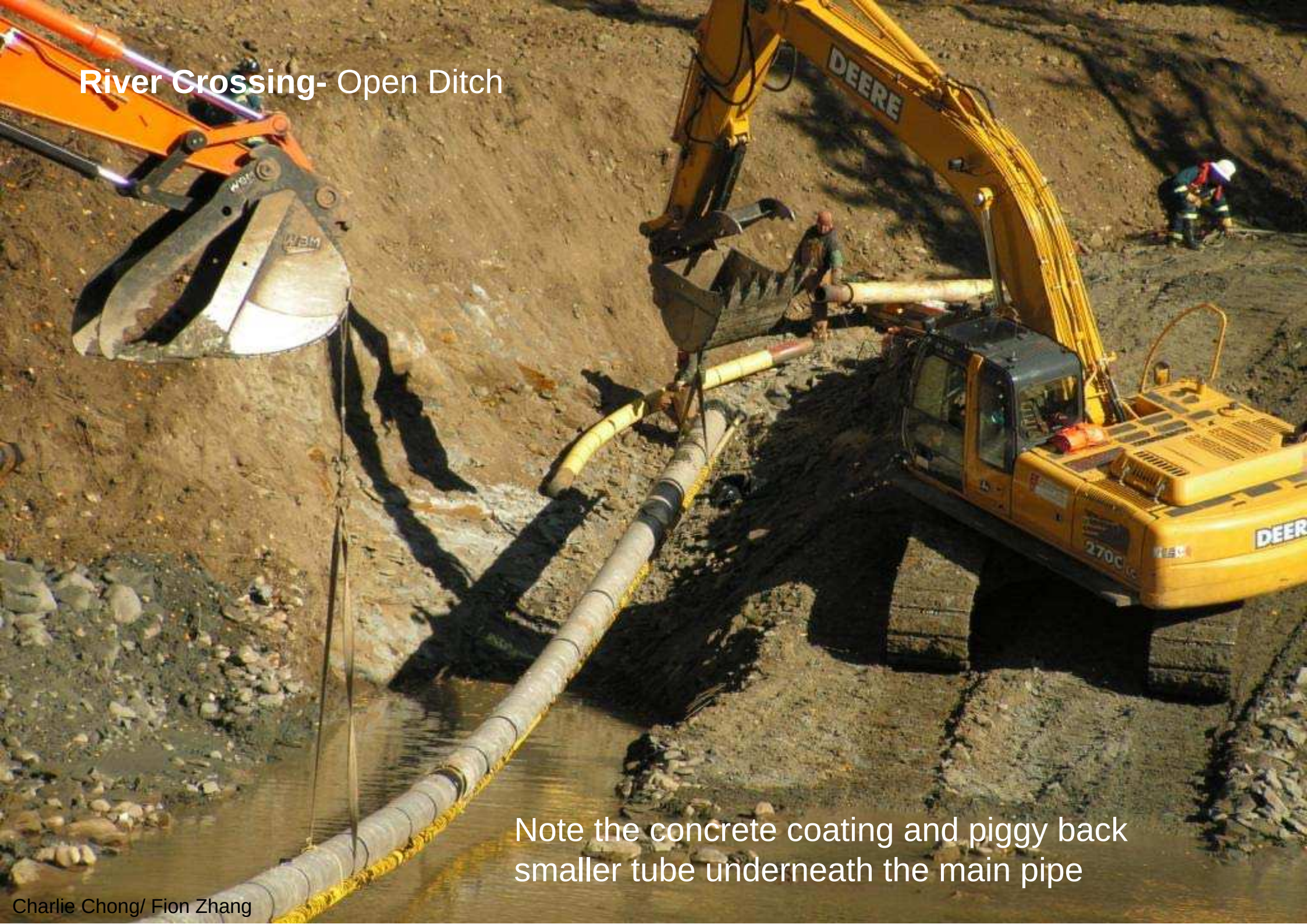
7.12.2 Other Types of Crossings

Inspectors should monitor and inspect overhead crossings, such as spans and bridge attachments that should be inspected to ensure compliance with specifications, drawings, and permit provisions (see ASME B31.4 Sections 434.13.2 and 434.13.3).

7.12.3 Precautions

Inspectors should be knowledgeable of safety and environmental precautions, including equipment used, excavations, markers/signs, waterway traffic, if any, pipe laying operations, and minimization of environment damage.

River Crossing- Open Ditch



Note the concrete coating and piggy back smaller tube underneath the main pipe

River Crossing- Open Ditch



River Crossing- Open Ditch



10/07/2011 10:35

Road & Rail Crossing - Jack & Bore



Road & Rail Crossing - Jack & Bore



<http://www.coluccio.com/services/tunnels-microtunnels/jack-bore-tunneling/>

Road & Rail Crossing - Jack & Bore



Road & Rail Crossing - Jack & Bore



Road & Rail Crossing - Jack & Bore



Road & Rail Crossing - Jack & Bore



Road & Rail Crossing - Rotary





<http://www.thiess.com.au/projects/the-narrows-marine-crossing>

Charlie Chong/ Fion Zhang

Road & Rail Crossing – Rotary



7.12.4 Permits

Inspectors should be knowledgeable of different types of crossing permits, their provisions, and the governmental authority with oversight over the permit. For example, most major water crossings must be permitted by the U.S. Army Corps of Engineers with their NWP12 permit.

7.12.5 Survey Requirements

Inspectors should ensure compliance with survey requirements as to alignment and depth, including how these requirements are determined, verified, and accepted in accordance with specifications and drawings.

7.12.6 Installation Activities

Inspectors should make sure that the use of accepted/specified pipe installation methods, bank stabilization and restoration methods, extra ROW requirements, buoyancy control, heavy wall thickness pipe, and installation and/or use of concrete jacketed pipe comply with permit provisions and specifications.

7.12.7 Positioning and Buoyancy

Inspectors should verify that crossing pipe position and stability is in accordance with owner operator specifications, especially negative buoyancy requirements to prevent flotation.

7.12.8 Documentation

Inspectors should ensure that all required documentation, including pipe details, permits, and owner/operator records and markup drawings to reflect as-built conditions, are completed.

7.13 Corrosion Control Requirements

7.13.1 General

Inspectors should have a basic knowledge of corrosion control, including pipe coating and cathodic protection (CP). Qualified/certified corrosion control coating inspectors with specialized training and experience would be expected to know more in depth inspection requirements (see Annex E).

7.13.2 Cathodic Protection Test Lead Requirements

Inspectors should make sure that all test leads for CP monitoring are attached to the pipeline with a low temperature welding process, such as cadweld. The welds and bare wires should be properly coated with properly applied, specified coating, and lead wires should have ample slack between the pipe and aboveground test stations to prevent damage. Leads, test station installations, and lead wire terminations should follow job specifications. Adequate testing, usually by a corrosion control specialist, should be performed to ensure these installations are functioning properly.

7.13.3 Above ground/ Below ground Coating Requirements

Inspectors should be aware of the requirements for surface preparation and application methods (see SSPC Volume 1).

7.13.4 Final Coating Inspection

Inspectors should monitor, assess, and take corrective action where necessary for all coated pipe to ensure it is inspected immediately before lowering in with a holiday detector that has an output consistent with NACE recommended voltage for the type of coating and thickness being inspected.

Inspectors should verify the detector setting at least twice per day. Inspectors must make certain all coating anomalies or damaged areas are marked and properly repaired per manufacturer's recommendations and job specifications before the pipe is allowed to be lowered into the ditch.

Coated Pipe- 3LPE



Coated Pipe- FBE



Coated Pipe- Spray Application



Coated Pipe- Spray Application



Coated Pipe- LPE Site Wrap



Pipe Joint - Heat Shrink Sleeve



热收缩带 (套)

适应管径: $\Phi 351-355.6$ mm

规格: RK-RS 7410/200

青岛瑞凯热缩材料有限公司

100

Pipe Joint - Heat Shrink Sleeve



Pipe Joint - Heat Shrink Sleeve





Pipe Joint - Heat Shrink Sleeve

Pipe Joint - Heat Shrink Sleeve



Pipe Joint - Surface Preparation



Pipe Joint - Induction Heating



Pipe Joint - FBE Coating Application



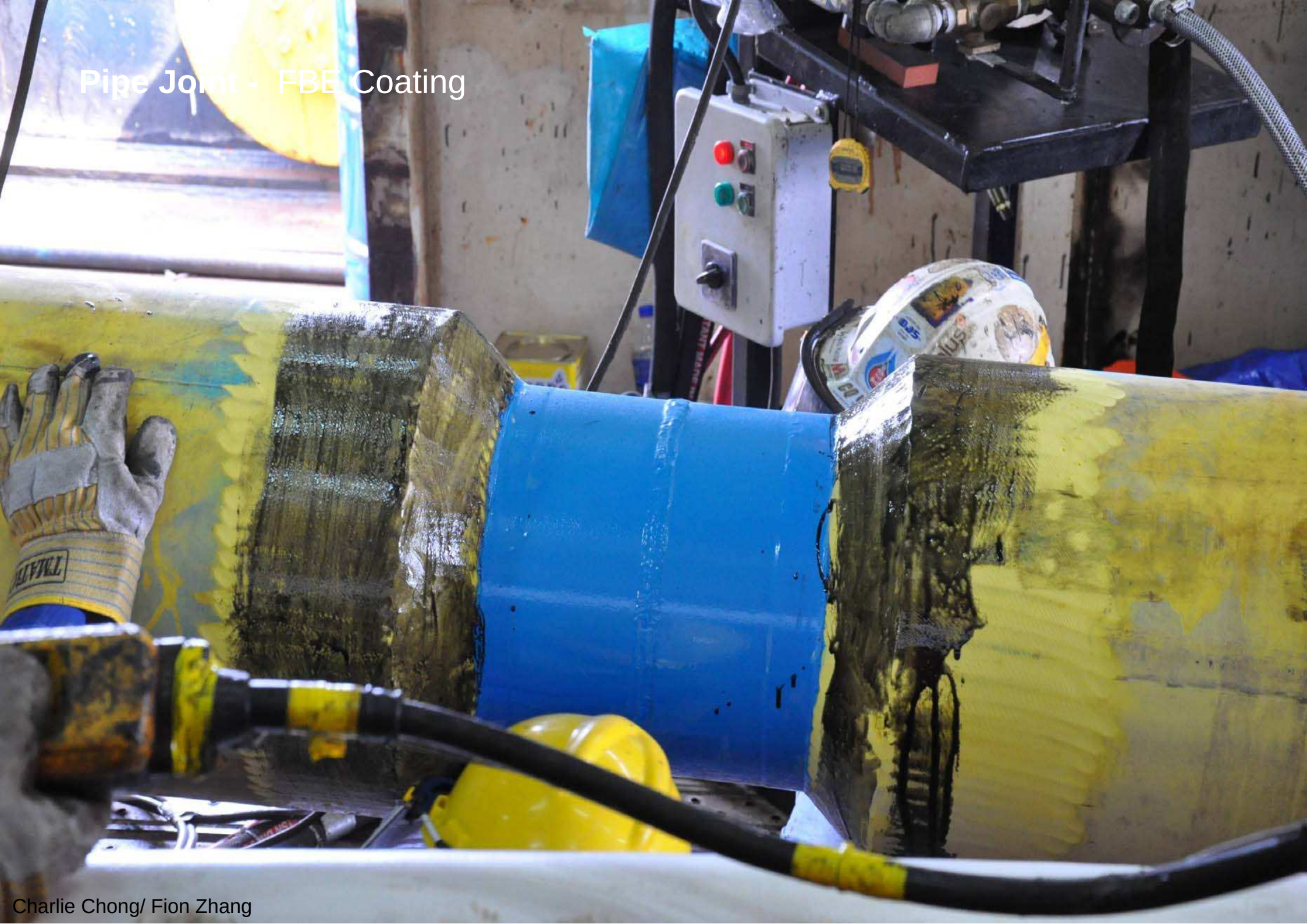
Pipe Joint - FBE Coating Application



Pipe Joint - FBE Coating



Pipe Joint - FBE Coating



Pipe Joint - Polyurethane injection molding



Pipe Joint Polyurethane injection molding



Pipe Joint - Flame Injection molding



Pipe Joint - Polyurethane injection molding



Holiday Learning



Holiday Testing



Holiday Testing



Coated Pipe- Melt Stick Repair Kits



<http://www.proline-global.com/OurProducts/CoatingProducts/CanusaMeltStick.aspx>

Coated Pipe- Melt Sticks



7.14 Lowering in Requirements

7.14.1 General

Inspectors should monitor, assess, and take corrective action where necessary in the following areas prior to and during installation of the pipe in the ditch (see 49 *CFR* 192.319, 49 *CFR* 195.246, and ASME B31.4 Section 434.10).

7.14.2 Condition of Bottom of the Ditch

Inspectors should ensure that there is no water, rocks, hard clods, roots, or other debris in the ditch and that any padding material or rock shield is in place. Lower the line with proper slack in the line so it fits the profile of the ditch (i.e. sags and over-bends are properly positioned to prevent pushing the pipeline ahead of the lowering in process).

7.14.3 Lifting and Lower Equipment

Inspectors should monitor, assess, and take corrective action, where necessary, for: slings, padded calipers, rollers, and other pipe carrying devices to prevent coating or pipe damage and assess the suitability of lifting machines as to size, type, and condition. Inspectors should review the design considerations in the lowering in plan and the equipment spacing and maximum lifting height to prevent excessive stresses.

7.14.4 Erosion Control

Inspectors should check that ditch plugs, sack breakers, retards, and water diversion features are in place and built in accordance with specifications to prevent washouts.

7.14.5 Land Drains

Inspectors should check to ensure land drainage reinstallation is correct and in agreement with specifications

Question?

Why the “Land Drains” item appear in the Lowering activities?

7.14.5 Land Drains

Inspectors should check to ensure land drainage reinstallation is correct and in agreement with specifications

Lowering



Lowering



Lowering



Lowering



Expert at Works



Expert at Works



Pipe Lowering-in Video

<https://www.youtube.com/embed/PdKK7Khf5bw>

7.15 Backfill and Cleanup Requirements

Inspectors should monitor, assess, and take corrective action as needed in the following areas during backfill operations to prevent damage to the pipe and/or its coating and ensure support is provided under the pipe (see 49 *CFR* 192.327, 49 *CFR* 195.248, 49 *CFR* 195.252, and ASME B31.4 Section 434.11).

- Inspectors should check suitability of backfill material (no rocks or other hard objects to be placed on the pipe) and equipment used for backfilling and ensure the pipe is properly supported and padded (see 49 *CFR* 192.319). The inspector must also ensure that owner/operator specifications are met.
- Inspectors should verify depth requirements as stipulated for each location and type of terrain in accordance with 49 *CFR* 195.248, 49 *CFR* 192.327, and the job specifications.
- Inspectors should ensure compaction meets job specifications and settlement is considered for the ditch cover, including water pack requirements.

- Inspectors should check rock shield or other soft earth padding (at least 12-in. thick) is in place in rocky terrain in accordance with job specifications.
- Inspectors should monitor the following cleanup operations that involve restoring the land to its agreed upon condition prior to construction:
 - removal of waste materials, rocks, and other debris resulting from construction;
 - repair all damaged land by filling holes, ruts, and other land disturbances;
 - plow, disc, or drag ROW to dress the land and remediate excessively compacted areas, especially in cultivated areas;
 - remove temporary structures and ROW access roads/trails per agreed upon requirements;
 - repair fences with new posts, braces, and fencing material and tighten to satisfy landowner expectations;

- ensure that proper seeding, where required, has been applied in accordance with design and permit conditions and/or the landowner agreements;
- check that pipeline warning markers, milepost and aerial markers, and river crossing signs are placed and installed in accordance with drawings, specifications, and API 1109 (see 49 *CFR* 195.410 and ASME B31.4 Section 434.18).

Backfilling



Backfilling



Backfilling



Backfilling



Backfilling



Expert at works



Reinstatement



7.16 Pipeline Cleaning Requirements

Inspectors should monitor the areas below in the use of pipeline cleaning devices.

- Inspectors should check launching and receiving traps for proper configuration and suitability for the operation, including pressure relief provisions and mainline valve positioning.
- Inspectors should ensure cleaning devices are constructed per specifications to properly gauge the internal condition of the new pipeline.
- Inspectors should monitor cleaning device location and speed.
- Inspectors should be knowledgeable in cases of damage to the gauging plate, if a **swab** becomes stuck, or anomalies are indicated by other devices. Such defects or obstructions must be located and repaired in accordance with job specifications.

Pipeline Cleaning & Gauging



Temporary Launcher & Receiver Equipment



Launcher & Receiver Equipment



Pipeline Cleaning & Gauging



Pipeline Cleaning & Gauging



Pipeline Cleaning & Gauging



Pipeline Cleaning & Gauging



Pipeline Cleaning & Gauging



7.17 Internal Line Inspection Requirements

Inspectors should be knowledgeable of owner/operator requirements for internal line inspection. Owner/operators often run internal line inspection devices following construction to establish their baseline assessments as part of their integrity management programs. Inspectors should monitor the following areas when these devices are used (see 49 *CFR* 195.450 to 195.452).

- Inspectors should check launching and receiving facilities for proper configuration and suitability for using these inspection tools, including pressure relief provisions and mainline block valve positioning.
- Inspectors should be knowledgeable of tool run activities and monitor tool run activities. If the inspection device becomes lodged in the pipeline, coordinate activities with contractors in order to locate the tool, perform extraction work, and make pipeline repairs.

Pipeline Gauging & Monitoring



<https://www.nord-stream.com/press-info/images/arrival-of-the-inline-inspection-tool-in-lubmin-3505/>

Pipeline Gauging & Monitoring



Pipeline Gauging & Monitoring

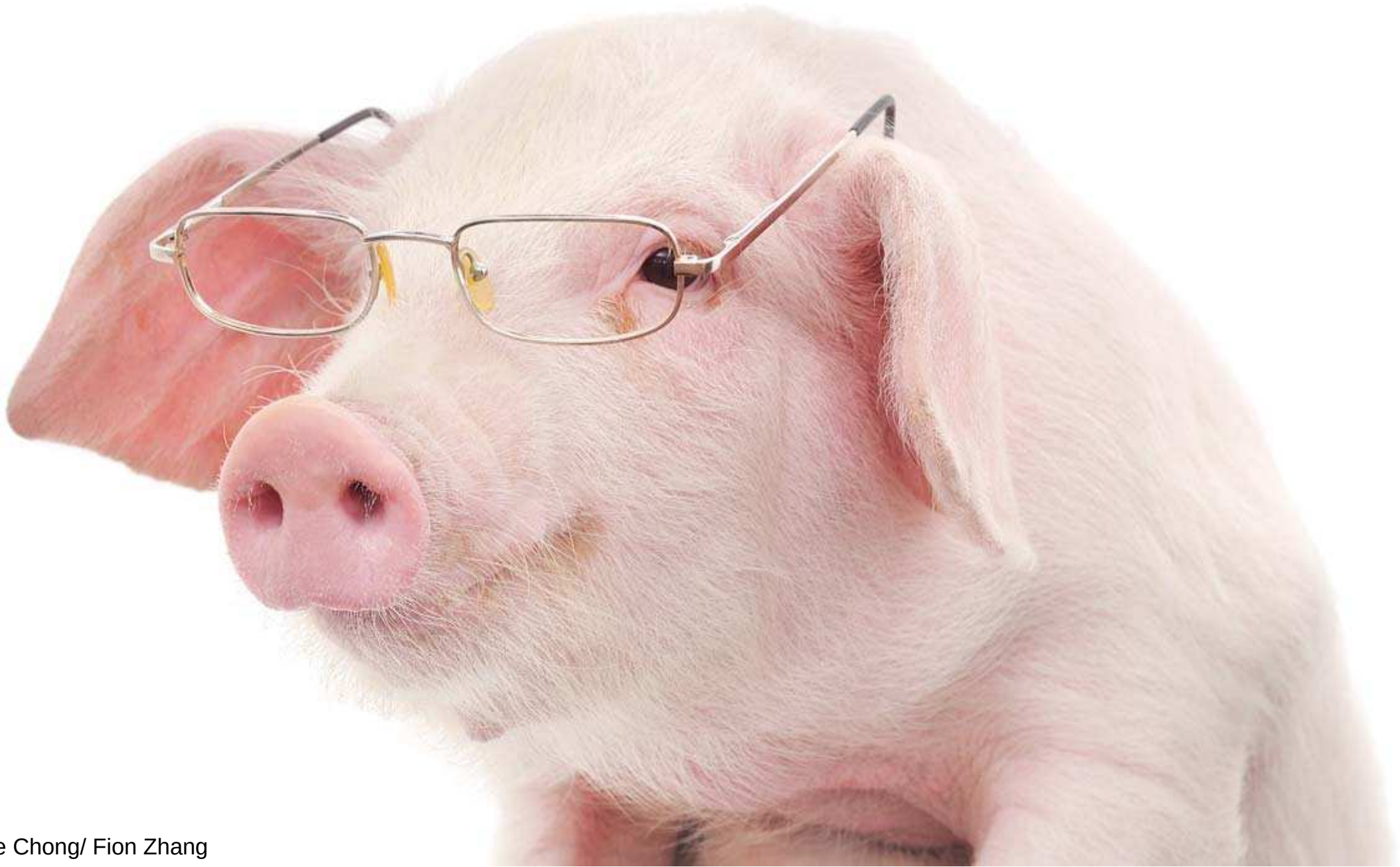


<https://www.nord-stream.com/press-info/images/arrival-of-the-inline-inspection-tool-in-lubmin-3505/>

Pipeline Gauging & Monitoring



Intelligence Pigging



Intelligence Piging



Intelligence Pigging



7.18 Hydrostatic Pressure Testing Requirements

7.18.1 General

Inspectors should be knowledgeable of **API 1110** provisions, 49 *CFR* 192 Subpart J, and 49 *CFR* 195 Subpart E. Ensure the owner/operator test plan is implemented and then monitor, assess, and report on the hydrostatic pressure testing process steps listed below (see also ASME B31.4 Chapter VI).

7.18.2 Permit Requirements

Inspectors should review permits, if any, to obtain test water from local sources (i.e. municipal, river, streams, or other sources) and plans to treat test water (filtration, chemical treatment, or use of other conditioning means) to ensure specified quality before it enters the new pipeline. Review disposal plans and requirements following test completion to ensure that the discharged water meets permit and/or specified quality parameters.

Water Quality Check- H₂S Test Kit



7.18.3 Check Test Equipment

Inspectors should check the following to ensure that the test equipment is compatible with testing requirements.

- Filling equipment condition and suitability for service (e.g. high volume, low pressure pumping equipment, piping, scrapers, and test manifold and blinds and/or plugs are in place on all side connections and other small piping not to be included in the mainline test).
- Test equipment, including low volume, high pressure pump, dead weight tester, thermometers, recording instruments, associated piping, and other appurtenances to ensure all equipment is properly connected and suitable for the test. All test equipment must meet industry calibration standards.

Pipeline Hydrotesting



Pipeline Hydrotesting



Pipeline Hydrotesting



Pipeline Hydrotesting



http://joyce-road.blogspot.com/2012/05/pipeline-construction_19.html

Pipeline Hydrotesting



Pipeline Hydrotesting



7.18.4 Conduct of the Test

As required by owner/operator, inspectors should observe the performance of the test and verify the results, report any temperature/pressure variations, and verify test report completeness. Owner/operator defines roles of the inspectors in regards to the witnessing, sign off on, and recording the completed test plan. Test reports should include:

- company name, testing company, and **person responsible**;
- date and time of test;
- description of facility tested;
- test medium;
- deadweight tester and gauge certification including unique identifiers (serial numbers);
- temperature/pressure records including unique identifiers (serial numbers);
- minimum test pressure;

- weather conditions and explanation of any pressure deviations or other pressure discontinuities;
- records of any failures and repairs;
- PV plots;
- unique test identifier (i.e. test number);
- duration of the test.

7.18.5 Precautions During the Test

Inspectors should confirm safety precautions are in place to protect against hazards, such as sudden unexpected pressure release from piping and/or appurtenances under test.

7.18.6 Test Documentation

Inspectors should review, report, and document any failures and subsequent repairs. Confirm and acknowledge the test plan.

7.18.7 Displacement Activities

Inspectors should check **displacement methods** (usually with nitrogen or air) and disposal of test medium in accordance with permits and job specifications and removal of blinds/plugs and open valves to prepare the line for commissioning the completed pipeline.

Keywords:

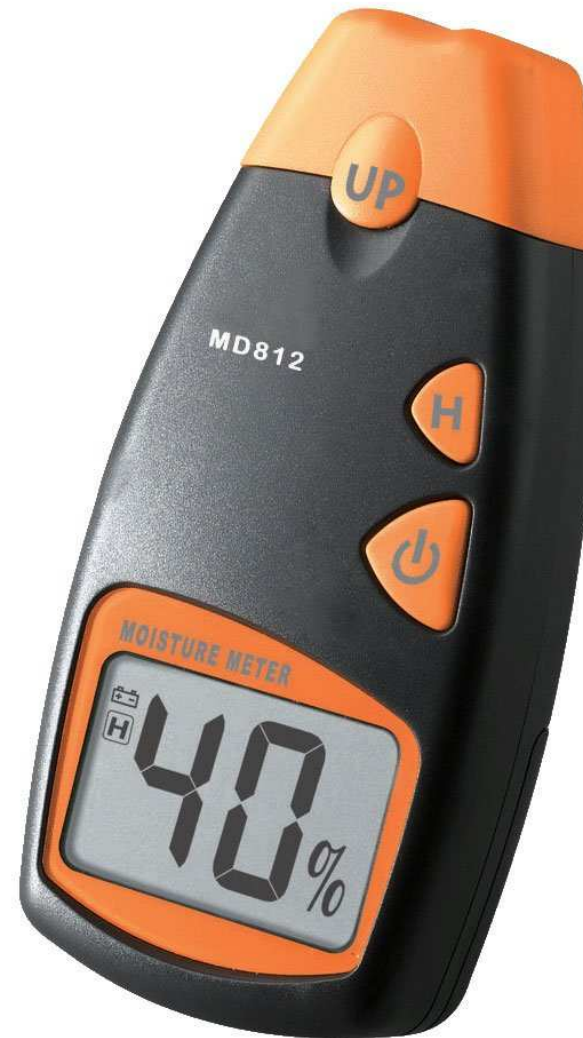
Displacement Activities

Removal of testing medium (s)

7.19 Commissioning Requirements

Inspectors should monitor purging/cleaning practices, ensure safe disconnection procedures are followed, check dew point (moisture in the line) as necessary, following dewatering/dehydration activities, and ensure owner/operator commissioning procedures are followed.

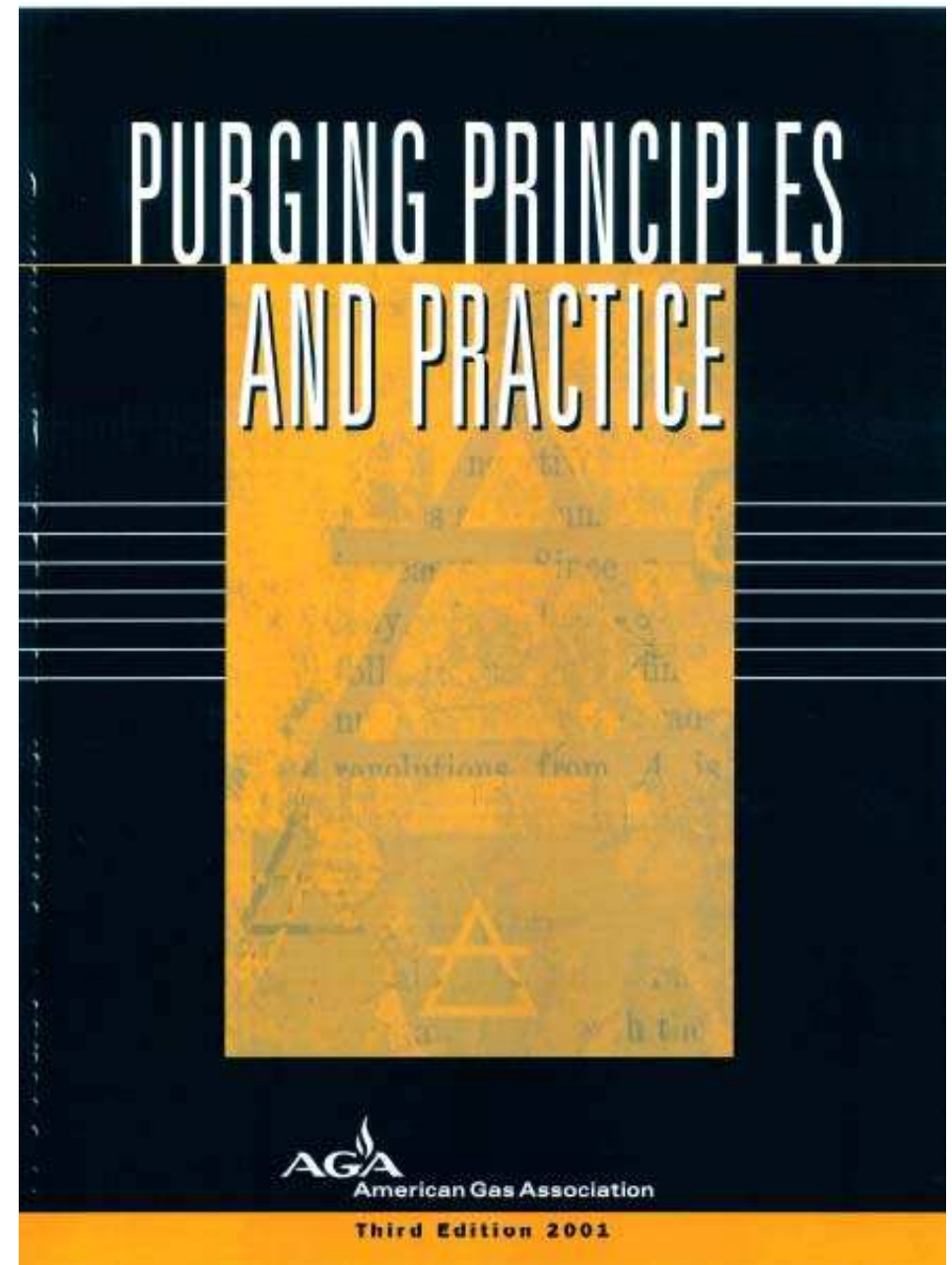
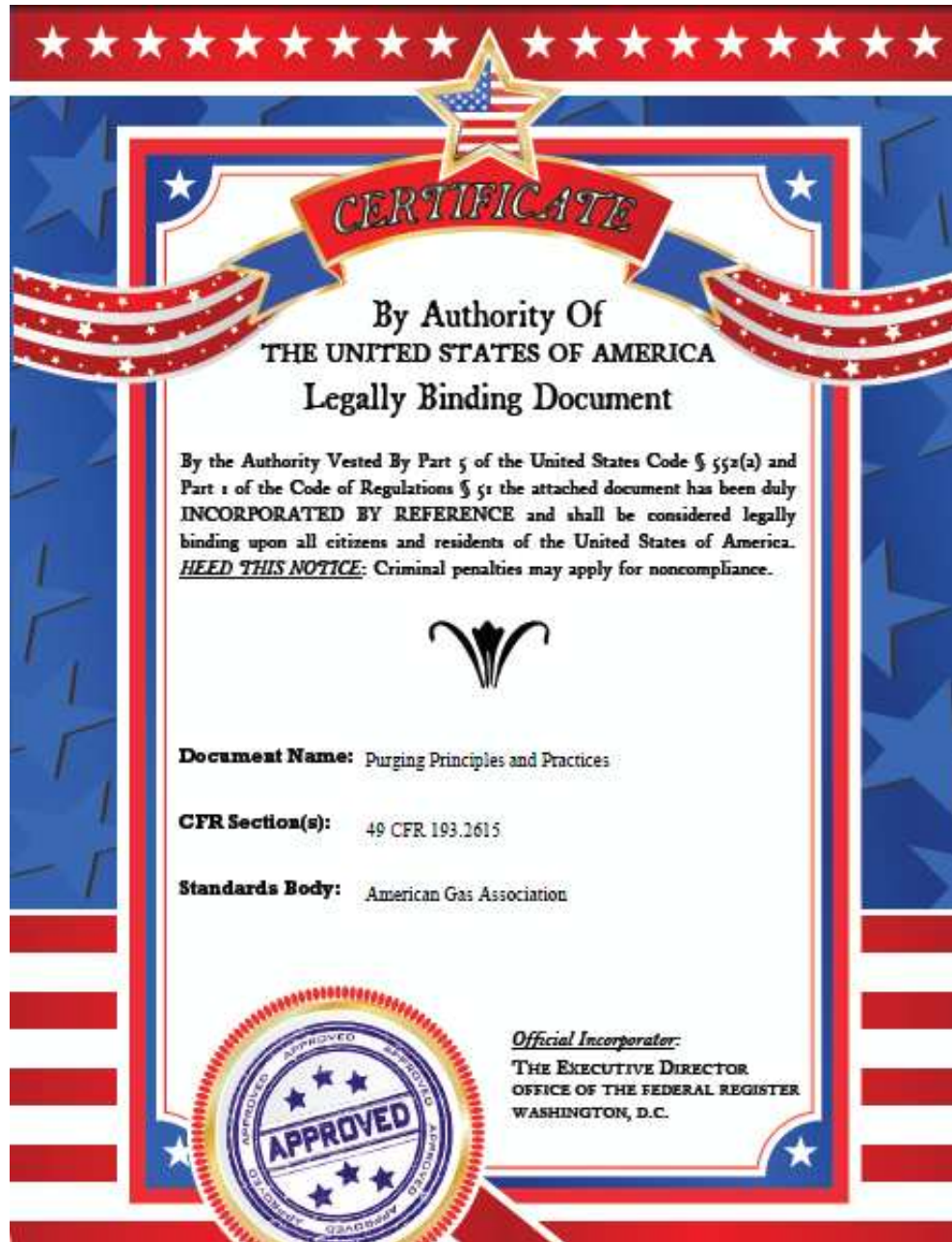
Commissioning: Humidity Check Dew Point Tester



Commissioning: Nitrogen Purging



Commissioning: Purging Principles & Practices



7.20 Documentation Requirements

Inspectors are expected to complete all documents required by 49 *CFR* 195.266 or 49 *CFR* 192 and owner/operator requirements, including but not limited to:

- daily logs/reports;
- extra work memoranda;
- work shutdown/move around reports;
- completion of paperwork requirements of permits to close them out;
- drawing markups for as-built records, including location of crossing pipelines and other utilities, valves, CP units, test station locations, and other connections installed in the new pipeline;
- amount, size, wall thickness, grade, heat number, other pipe nomenclature and coating of pipe laid, its location, and depth of cover;
- number of welds, welds tested, rejection rates, and repairs made;
- weld logs to include weld numbers and unique identifiers (i.e. pipeline number);
- as-built surveys to include weld identifiers, location, depth of pipe, and other information per the owner/operator specifications;
- hydrostatic tests and any test failures.

7.21 Inspector Tools for Communication and Documentation Requirements

Inspectors should be able to competently use the following tools and devices to aid in communication, recording data, and recordkeeping for safety/hazard observations, construction problems, logs, and other required records and documentation, including but not limited to:

- laptop computer,
- radios,
- GPS devices,
- digital cameras,
- air cards (for internet access),
- mobile devices.

Annexes

Annex A

(normative)

Chief Inspector

A.1 Scope

Individuals assigned as chief inspectors are typically highly skilled and experienced in pipeline construction and have served in a number of different inspection classifications. Chief inspectors must be capable of managing, directing, and overseeing all pipeline construction inspection personnel involved in each construction activity, including:

- welding inspectors,
- corrosion control inspectors,
- utility inspectors, and
- specialized inspectors, such as blasting and HDD.

Chief inspectors usually report to an owner/operator project manager or other management personnel charged with completing a pipeline project.

A.2 Qualifications

A.2.1 General

Chief inspectors must be knowledgeable in each of the major requirement areas of pipeline construction. The basic requirements are detailed herein and include:

- pipeline construction inspector responsibilities,
- personnel and general pipeline safety,
- environmental and pollution control,
- general construction inspection.

A.2.2 Special Inspection Requirements

Chief inspectors must have in depth knowledge of welding inspection, corrosion control inspection, and specialty inspection, such as blasting, HDD, and other specialty inspection that may be required by the project.

A.2.3 Other Knowledge and Skill Requirements

A.2.3.1 Principles of Project Management

Project management is responsible for designing and constructing a safe, maintainable facility that operates efficiently within design conditions, complies with laws, regulations, and industry standards, and is completed on time and within budget. Chief inspectors must be knowledgeable and capable of implementing this management process, which includes, but is not limited to: understanding project objectives, staffing and supervising the inspection organization, contract administration, planning and scheduling tasks, controlling costs, measuring and controlling job progress, managing quality assurance, and completing documentation requirements, all within the requirements of the owner/operator.

A.2.3.2 Fundamentals of Project Accounting

Chief inspectors must understand proper pipeline accounting requirements, including but not limited to: receipt of materials/supplies, verification of materials versus specifications, capital and operating expense booking processes, and timely communication with the accounting staff using the proper forms and procedures.

A.2.3.3 Contract Administration

Chief inspectors must be knowledgeable about the details of the contract governing the assigned project, including but not limited to: contract performance provisions, each parties' contractual obligations, terms and conditions, terminology, restrictions, bid and extra work provisions, and contract dispute resolution processes.

A.2.3.4 Project Materials Tracking/Traceability

Chief inspectors must be familiar with the processes and procedures used in supply management systems, including but not limited to: tracking and tracing materials and supplies using identifiers, such as serial numbers, mill numbers, and heat numbers, verifying adherence to specifications, and resolving delivery timing issues and their influence on job progress.

A.2.3.5 Elements of Public Relations

Chief inspectors must have experience and training in how to deal openly and honestly with the general public, including landowners, regulatory and law enforcement officials, mass media representatives, and other individuals who may interface with the project construction. Inspectors should also know owner/operator requirements as to what is pertinent and appropriate in providing information, answering questions, and resolving issues

Annex B

(normative)

Blasting Inspector

B.1 Scope

Individuals assigned as blasting inspectors are recognized as specialists in this activity and typically have additional schooling from explosive suppliers and other sources or have gained experience while actively involved in the use of explosives. Inspectors assigned to blasting operations report to the chief inspector and may handle other inspection duties depending on their training and experience.

B.2 Qualifications

B.2.1 General

Blasting inspectors should be knowledgeable of the basic requirements included in **API 1169** and be knowledgeable in the following areas related to use of explosives and pipeline construction blasting operations.

B.2.2 Transportation, Handling, and Storage of Explosives

Inspectors should be familiar with OSHA and DOT regulations as to the safe movement, storage, and handling of explosives (see OSHA 1910.109, OSHA 1926.900 to 1926.914, and 49 *CFR* 177).

B.2.3 Blasting Plan

Inspectors must be familiar with the contractor's blasting plan and ensure all safety precautions are implemented per the plan.

B.2.4 Permit

Inspectors should be knowledgeable of pertinent permits and their issuing agencies and ensure the provisions of the permits are properly addressed by the contractor.

B.2.5 Safety Precautions

Inspectors must be knowledgeable of safety precautions to be taken during blasting operations, including but not limited to: notifications, warning signage, use of two-way radios, barriers, and safe distance parameters from the blast zone.

B.2.6 Blasting Preparation

Inspectors must be familiar with charge placement drilling operations, including configurations and depth of charge holes, charge placement procedures, charge padding activities using earth or blast mats, proper fusing techniques, use of correct wiring, and blasting machines, and ensure each of these activities follow accepted practices and owner/operator procedures.

B.2.7 Blasting

Inspectors should monitor the results of the blasting to ensure its effectiveness and measure and record, if required, the area blasted in the event of extra work authorization or special bid pricing.

B.2.8 Cleanup

Inspectors should monitor cleanup activities to ensure minimal collateral damage ([Unintended damage](#)) for excess heaving or debris scatter.

Annex C

(normative)

Horizontal Directional Drilling Inspector

C.1 Scope

Individuals assigned to carry out the inspection duties related to horizontal directional drilling (HDD) are recognized as specialists due to the nature and complexity of these operations. Thorough monitoring and documentation by qualified inspection personnel is crucial since a drilled installation is typically buried with deep cover under inaccessible terrain or infrastructure features and its installed condition cannot be verified by visual examination. HDD inspectors will usually have completed training provided by HDD contractors or other sources and they have experience in this crossing methodology. HDD inspectors report to the chief inspector and may handle other inspection duties as directed by the chief inspector.

C.2 Qualifications

C.2.1 General

HDD inspectors should be knowledgeable of the basic inspection requirements included herein and be knowledgeable about the characteristics, features, and work performance activities of HDD operations, including but not limited to the following:

drill path, pilot hole, downhole survey systems/surface - tracking systems, course length, inclination, azimuth, stationing,	elevation, entry/exit angles, radius of curvature, pull section, reaming, buoyancy control, coating integrity, drilling fluid, documentation requirements.
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C.2.2 Construction Staking and Marking

Inspector should be familiar with staking and marking of the drilled segment, particularly the entry and exit points, including the distance between the points, their elevations, and how each of these is determined. Inspector should understand the importance of these accurately located points that provide a benchmark for the down-hole survey and the orientation of the survey measuring instruments.

C.2.3 HDD Equipment

Inspector should be familiar with HDD equipment of various sizes and types suitable for different jobs, machinery condition, and suitability for the intended work.

C.2.4 HDD Personnel

Inspector should observe the functioning of the HDD equipment operating personnel and their supervision as to their competence and proficiency and how they handle the HDD equipment and its associated gear, including the surface monitoring system used to determine the downhole probe location.

C.2.5 Drilled Path

Inspectors should monitor the drilled path during pilot hole drilling and assess if the drilling is on the proper inclination and azimuth to ensure the vertical and horizontal positioning, including the drilled length, depth of cover, and entry/ exit angles required by the owner/operator specifications. Inspectors should also assess if the exit location is within limits set forth by the specifications.

C.2.6 Pipe Installation

C.2.6.1 General

Inspector should review the pipe installation operation to ensure owner/operator specifications are met, including the following.

C.2.6.2 Pull Section

Inspector should ensure that the welds, pipe, and joint coating of the carrier pipe string to be pulled into the drilled crossing have been properly inspected and the pull section is ready for placement.

C.2.6.3 Reaming

Inspector should be knowledgeable of the equipment and its appurtenances used to enlarge the drill hole to accommodate the pull back operation and be able to assess the effectiveness of this operation.

C.2.6.4 Pull Section Handling

Inspector should monitor and assess the adequacy of support of the pull section during pull back. Roller stands or other support mechanisms as well as the lifting equipment should be checked to ensure satisfactory movement of the pipe string into its drilled crossing.

C.2.6.5 Buoyancy Control

Inspector should be knowledgeable of buoyancy control processes that may be used to lessen pulling loads.

C.2.6.6 Pipe Coating

Inspector should ensure the pipe coating is inspected with a properly calibrated holiday detector just prior to the pipe entering the reamed drill hole and that any needed coating repairs meet owner/operator specifications.

C.2.7 Drilling Fluid

Inspector should be familiar with types of drilling mud and its proper use, monitor the ROW for potential drilling mud migration or intrusion, and ensure the containment and disposal of the drilling mud follow accepted procedures.

C.2.8 Documentation

Inspector should understand requirements established by the owner/operator and any permitting agencies and complete needed documentation in a timely and complete manner.

Annex D

(normative)

Welding Inspector

D.1 Scope

Individuals assigned as welding inspectors shall be qualified as welding inspectors to ensure the inspection of this critical activity is carried out in strict accordance with codes, regulations, and owner/operator specifications. Qualification and certification in this function requires additional schooling and usually a significant amount of on the job experience. Welding inspectors report to the chief inspector and may function as backup for the **chief**.

Guinean Chief



Guinean Chief, Conakry (Guinée Française)

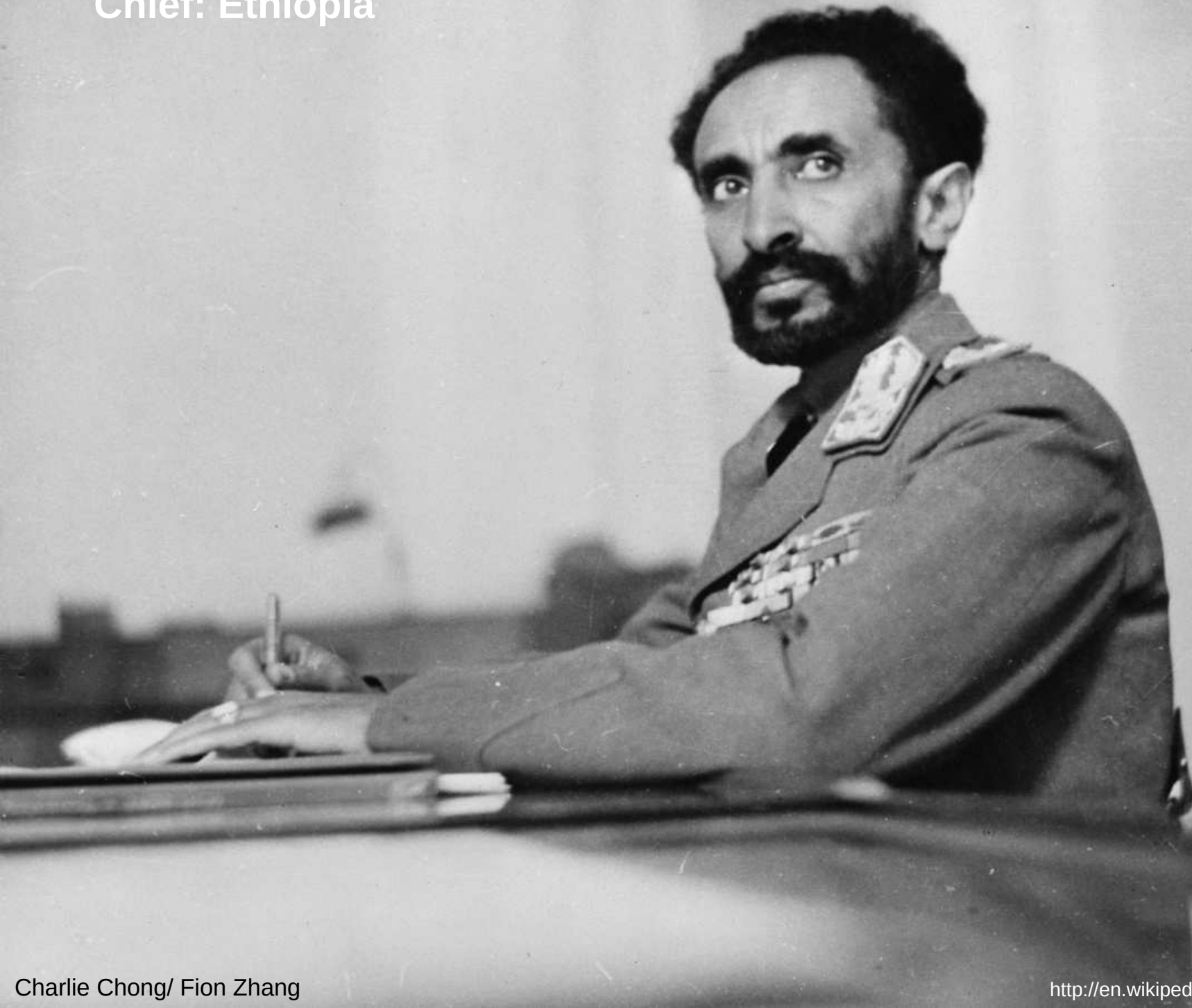
Red Indian Chief



Guinea military Chief



Chief: Ethiopia



Chief: Colonel Gaddafi



Chief of Havana: Fidel Castro

Fidel Castro

by marrett

The Chief : Che Guevara



D.2 Qualifications

D.2.1 General

Welding inspectors should be knowledgeable of the basic requirements included in API 1169, have completed training in API 1104, AWS, or other industry welding schooling, and be skilled in the following areas related to pipeline welding.

D.2.2 Certification and Qualification Verification

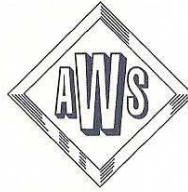
The welding inspectors should be familiar with both welder and NDT technician qualification and certification documentation provided by the contractor or individual and be capable of verifying the documents' authenticity. Any AWS certifications should be carefully reviewed to ensure they cover pipeline welding and not an unrelated type welding such as structural steel welding.

Keywords:

Welding Inspector Qualifications

Any AWS certifications should be carefully reviewed to ensure they cover pipeline welding and not an unrelated type welding such as structural steel welding.

American Welding Society



Certifies that Welding Inspector

Luis Chirinos

*has complied with the requirements of AWS QC1,
Standard for AWS Certification of Welding Inspectors*

11111551

CERTIFICATE NUMBER

November 1 2014

EXPIRATION DATE



AWS PRESIDENT

AWS QUALIFICATION COMMITTEE CHAIR

AWS CERTIFICATION COMMITTEE CHAIR

Certified Expert at Works

Structural Welding Inspector



Structural Welding Inspector



Structural Welding Inspector



Structural Welding Inspector



Structural Welding Inspector



Structural Welding Inspector



Structural Welding Inspector



The Pipeline Welding Inspector



The Pipeline Welding Inspector



The Pipeline Welding Inspector



D.2.3 Testing Welders

All mainline pipeline welding strictly follows owner/operator approved and qualified welding procedures, which consistently produces sound welds with correct mechanical properties and meet the requirements of API 1104. Every welder, welding on the pipeline, must be tested and qualified by making an acceptable weld using the approved/ qualified procedure to be used in the construction. The welding inspectors must be capable of monitoring and assessing these tests and the determining acceptability of the welds by visual examination, NDT, and destructive testing using the standards of acceptability in API 1104. Inspectors ensure that each welder passing the qualification test is issued and uses an identification number to identify his welds during construction.

Experts at Work



Experts at Work



Experts at Works



D.2.4 Welding Equipment

Inspectors check the following for compliance with welding procedures and specifications:

- suitability of welding machines (minimum 200 amp NEMA rating), electrode holders, grounding clamps, and cables and their proper use;
- welding rod, including AWS classification and size;
- storage/handling procedures for welding rod and other welding supplies;
- other equipment, such as cutting/beveling machines, any preheat equipment, brushes, and grinders.

D.2.5 Alignment of Pipe for Welding

Inspectors monitor the following pipe gang and line up activities:

- Swabbing of the pipe before fit up to remove foreign debris and/or wildlife.
- Pipe gang proficiency to ensure proper handling, fit up, and bevel alignment.
- Clamping procedures and proper support of pipe during and after welding, including padded skids for coated pipe.
- Clamp Holding time—100 % of stringer bead for internal line up clamps (larger than 6-in. O.D. pipe). Check specifications for permissible use of external line up clamps and holding times on smaller diameter pipe and at tie-ins.
- Seam alignment, if any, to ensure pipe seams are rolled off top center per specifications,
- Potential magnetism [near high voltage alternating current (HVAC) lines or where there is evidence of residual magnetism] that could adversely affect welding (arc blow) and take steps to degauss the pipe. (If the pipe is being laid under HVAC lines, verify that the pipe section is grounded.)

Keywords:

- pipe gang
- line up activities
- proper support of pipe during and after welding
- padded skids

Alignment of Pipe



HT Transmission Tower



Gauss Meter



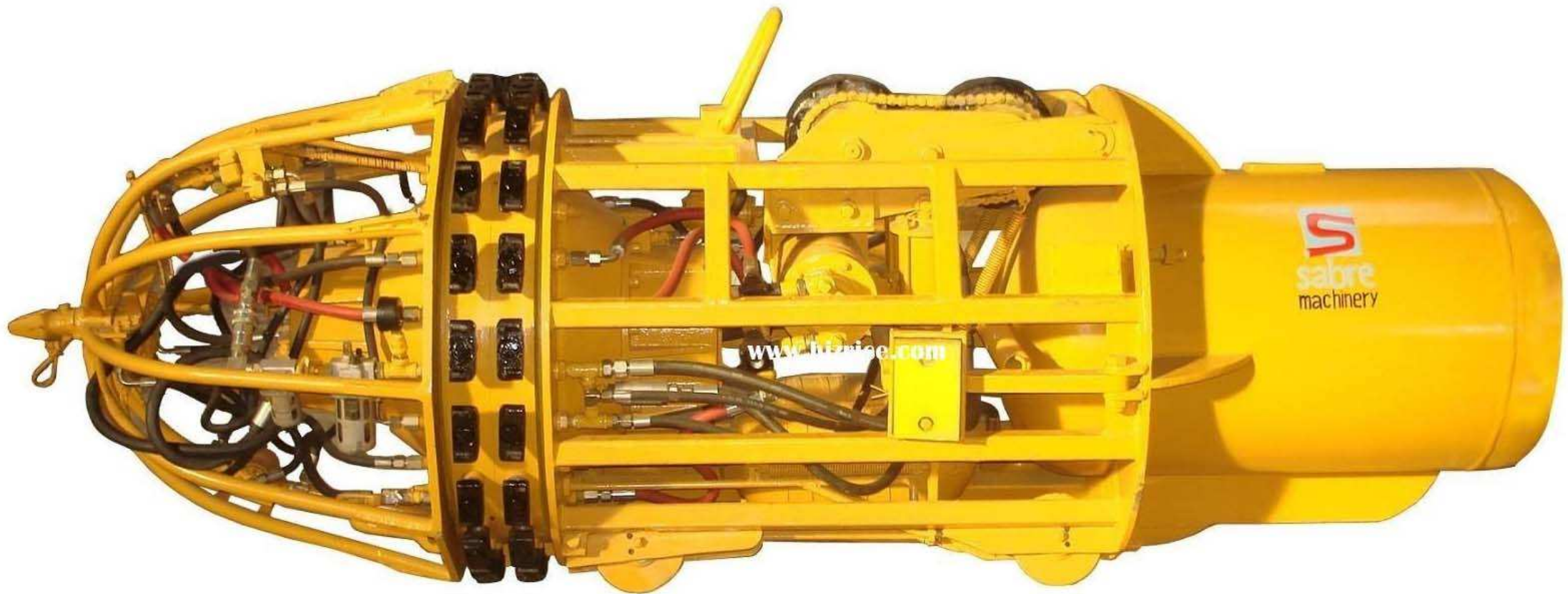
Gauss Meter



External Clamp



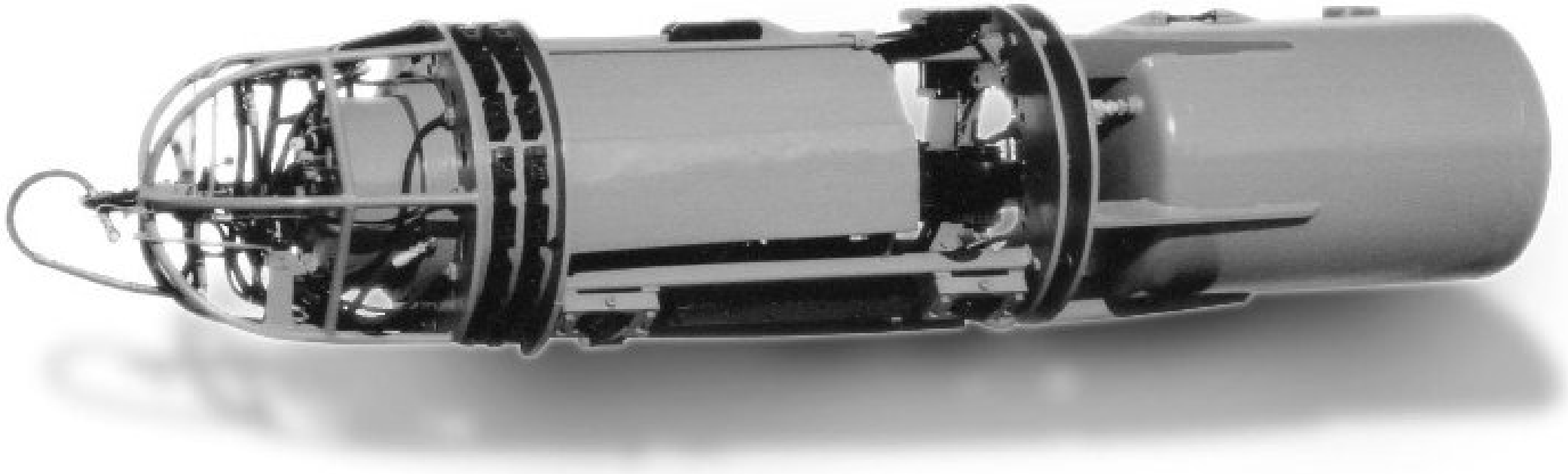
Internal Clamp



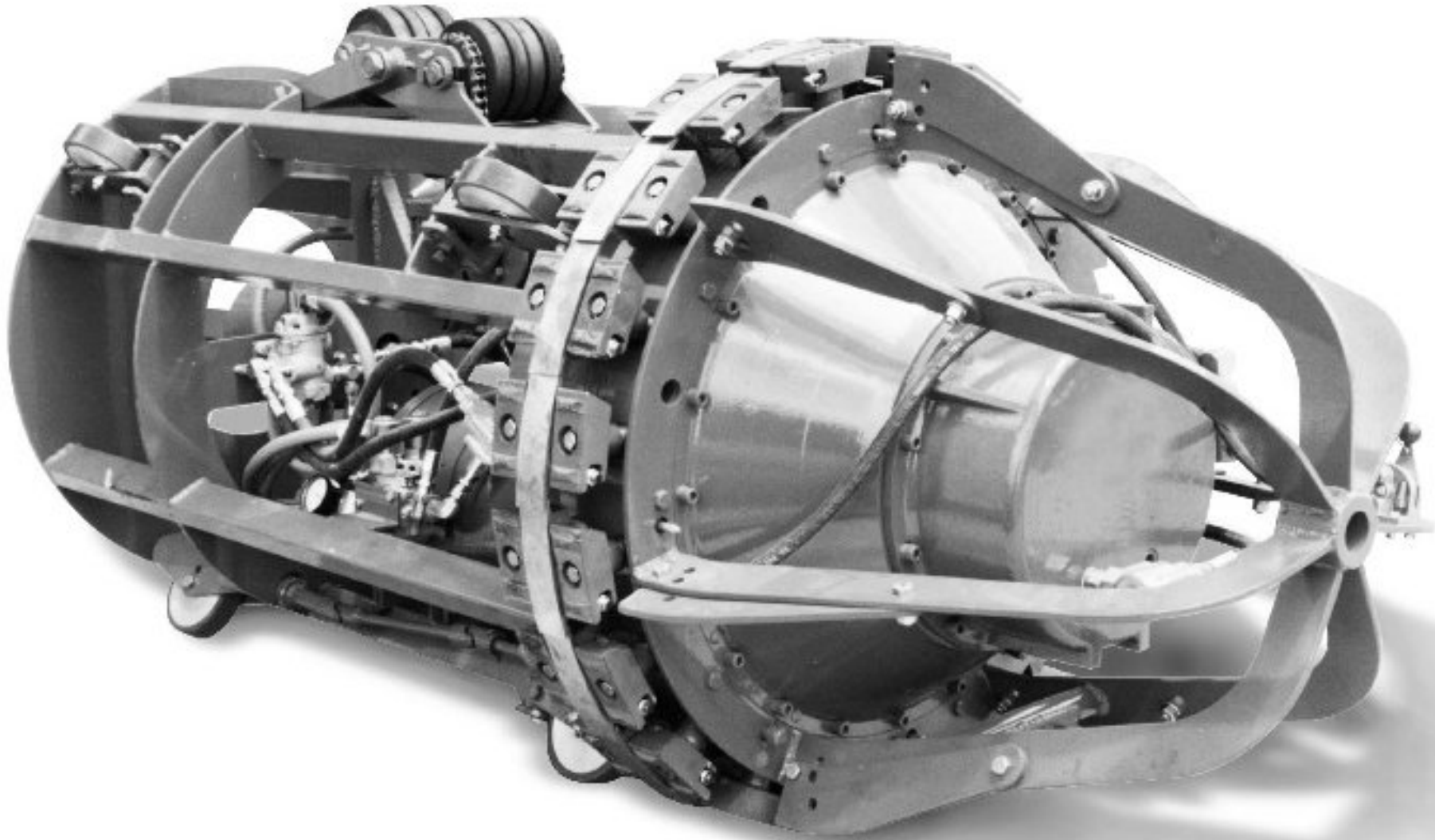
Internal Clamp Alignment



Internal Clamp



Internal Clamp



Effects of High Voltage Transmission Lines on Humans and Plants

Hear what the Expert said;

Jignesh.Parmar
India



Jignesh Parmar has completed his B.E(Electrical) from Gujarat University. He has more than 11 years experience in Power Transmissi...

[View Complete Profile](#)

<http://electricalnotes.wordpress.com/2012/02/17/effects-of-high-voltage-transmission-lines-on-humans-and-plants/>



Transmission Line EMF Interference with Buried Pipeline: Essential & Cautions

M. H. Shwehdi and U. M. Johar

Electrical Engineering Department at King Fahd University of Petroleum &
Minerals,
Dhahran, Saudi Arabia

<http://www.who.int/peh-emf/meetings/archive/en/paper02shwehdi.pdf>



Electromagnetic Induction in Pipelines Due to Overhead High Voltage Power Lines

E. Sawma, B. Zeitoun, N. Harmouche, S. Georges and M. Hamad
Department of Electrical and Computer and Communication Engineering
2010 International Conference on Power System Technology

<http://joa.csee.org.cn/Public/DownloadFile.aspx?FileStorageId=b5068437-d5f6-4735-b086-829939491be9>



D.2.6 Welding Inspection

Inspectors must carry out their responsibilities in the areas below to ensure compliance with specifications and standards (see AWS manual, API 1104, and ASME B31.4 Section 434.8). Inspectors should:

- have a copy of the qualified welding procedure readily available and the qualification papers of qualified welders and verify that proper welding procedures are being consistently followed;
- visually inspect each weld and observe welder technique/performance including smoothness of metal application, rod travel speed, starts/stops, and welder identification;
- verify that NDT contractor has provided written NDT procedures for all processes and performs in accordance with those procedures, and verify NDT of welds is in accordance with industry standards and regulations (Regulations require 10 % coverage, but generally, owner/operators inspect 100 % of all welds with suitable NDT.);

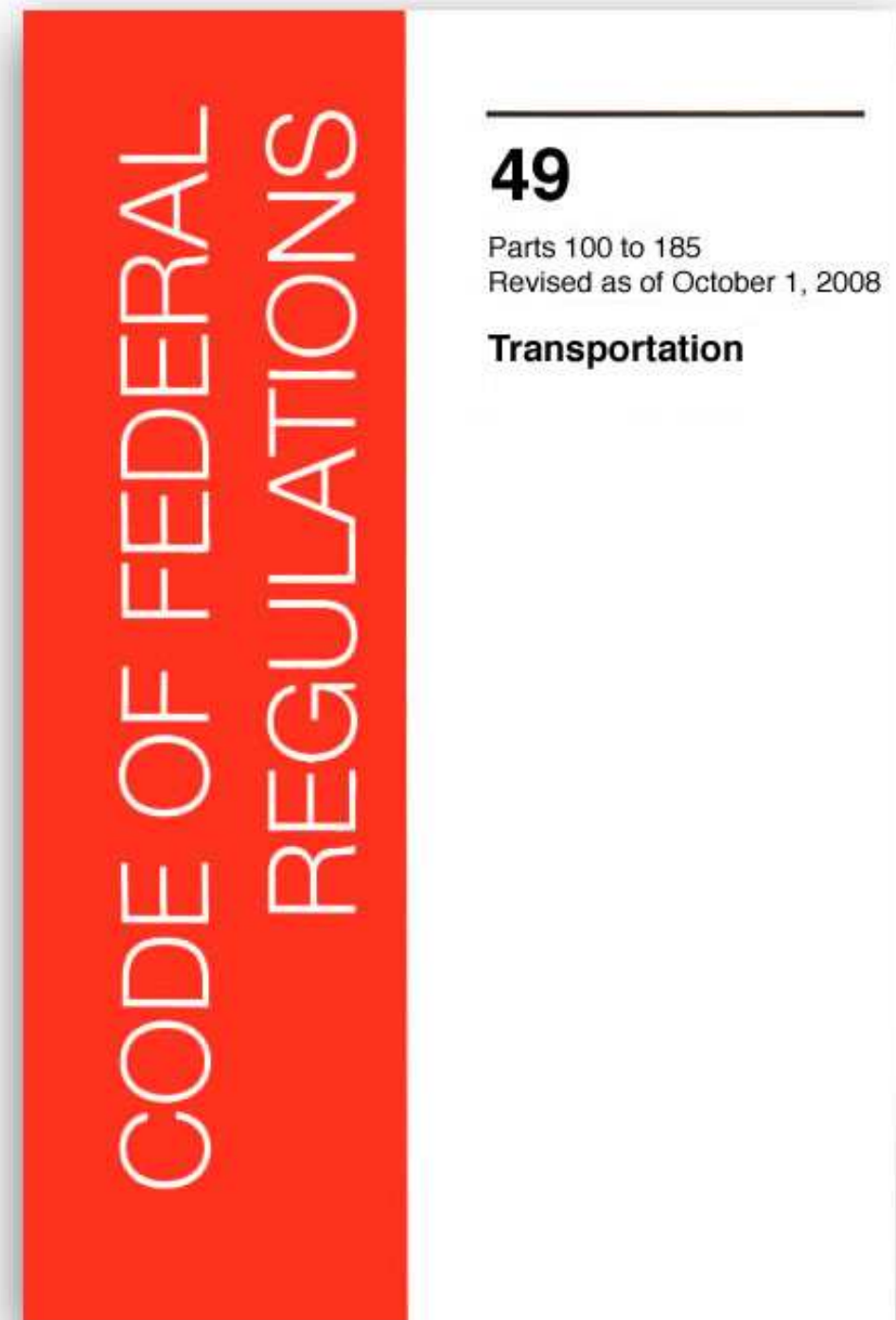
- evaluate weld quality by reviewing NDT results; noting defective welds, rejection rates, and repairable/ nonrepairable (cutouts) welds versus standards of acceptability contained in API 1104 and owner/operator specifications; marking any unacceptable welds for repair or cutout, and noting which welder or welders made the unacceptable welds.

D.2.7 Weld Repairs/Replacement

Inspectors inspect any repairs in the same manner and intensity as production welds and conduct the following.

- Ensure the cylinder of pipe cutout and the replacement pipe piece meet length restrictions for the diameter of pipe involved and ensure any weld repairs follow API 1104 and the qualified welding procedure that was used on the initial weld.
- Check proper beveling, fit up, weld quality, and NDT results versus standards. (If owner/operator allows more than one repair in a previously repaired area, verify that the repair is in accordance with a qualified weld repair procedure per 49 *CFR* 195.230.)

49 CFR - Transportation



<http://www.law.cornell.edu/cfr/text/49>

<http://www.49cfr.info/index.html>

49 CFR - Transportation

§ 195.230 Welds: Repair or removal of defects. **(a)** Each weld that is unacceptable under § 195.228 must be removed or repaired. Except for welds on an offshore pipeline being installed from a pipelay vessel, a weld must be removed if it has a crack that is more than 8 percent of the weld length.

(b) Each weld that is repaired must have the defect removed down to sound metal and the segment to be repaired must be preheated if conditions exist which would adversely affect the quality of the weld repair. After repair, the segment of the weld that was repaired must be inspected to ensure its acceptability.

(c) Repair of a crack, or of any defect in a previously repaired area must be in accordance with written weld repair procedures that have been qualified under § 195.214. Repair procedures must provide that the minimum mechanical properties specified for the welding procedure used to make the original weld are met upon completion of the final weld repair.

[Amdt. 195-29, 48 FR 48674, Oct. 20, 1983]

D.2.8 Tie-ins

Inspectors must inspect tie-in operations for proper alignment, beveling, welding, coating repair, and pipe placement and ensure pipe is properly supported when placed in the ditch (see ASME B31.4 Section 434.9).

D.2.9 Documentation

Inspectors complete in a timely manner all required records of welding operations, including but not limited to: number of welds, NDT records, rejection rates, repairs, and other documentation as specified by the owner/operator.

Annex E

(normative)

Corrosion Control Inspector

E.1 Scope

Individuals assigned as corrosion control inspectors (or coating inspectors) must be qualified and certified in corrosion control. Qualification and certification requires specialized schooling, usually under the auspices of NACE.

E.2 Qualifications

E.2.1 General

Corrosion control inspectors should be knowledgeable in the basic requirements included herein, have completed the NACE Coating Inspector Program (CIP), Level 1, and be capable of carrying out the inspection duties below.

E.2.2 Pipe Coating Requirements

Inspectors should be knowledgeable about proper aboveground/ belowground coating application techniques, including surface preparation, priming, type and method of application, curing time, application limitations, atmospheric condition restrictions, and integrity testing (see NACE RP0169-06 and SSPC Volume 1).

E.2.3 Mill Applied Coating

Inspectors should be capable of inspecting, marking, and following repairs in accordance with specifications and manufacturer's recommended repair criteria for any observed coating damage beginning with when the pipe arrives on the job to lowering in.

E.2.4 Over the Ditch Coating

Inspectors should inspect, assess, and note corrective action needed in the following areas:

- coating machine condition, suitability for the work, correct operation, and operator performance of his/her duties;
- ensure surface preparation meets specifications;
- check that correct primer is used, it is correctly applied at the specified thickness and drying time is within specification;
- verify correct coating is being applied at the proper rate, travel speed, tension, and overlap;
- verify proper lifting/placement techniques are used and coating protection is provided on lower in.

E.2.5 Field Joint Coating

Field joint coating and application methods are typically used on mill applied coating and all tie-ins. Inspectors should check the following to ensure coated field joints meet specifications:

- monitor contract personnel doing this work to ensure specified procedures are followed;
- ensure surface preparation meets specifications and manufacturer's requirements/recommendations are followed; — ensure correct primer is used, properly applied at the right thickness, and drying time is within specified limits;
- ensure coating is the correct type, applied per specifications and manufacturer's recommendations, and proper curing time is observed before movement of the pipe;
- check that coated pipe is properly handled and protected awaiting lower in.

E.2.7 Cathodic Protection Requirements

New pipelines require installation of corrosion control testing facilities, rectifier units, and ground beds. Inspectors must be knowledgeable about the proper installation and testing of these devices.

- Test leads for corrosion control monitoring should be checked by the inspectors to ensure they were installed properly.
- Rectifier units and ground beds must be checked by the inspectors to ensure proper installation per specifications and that they operate properly. Inspectors should complete owner/operator required documentation for these installations.

E.2.8 Foreign Pipeline Bonding Requirements

Inspectors should be knowledgeable on these installations, including the wiring, test station, and wire terminations and ensure they are tested and operate properly.

E.2.9 Cathodic Protection Testing and Measurement Requirements

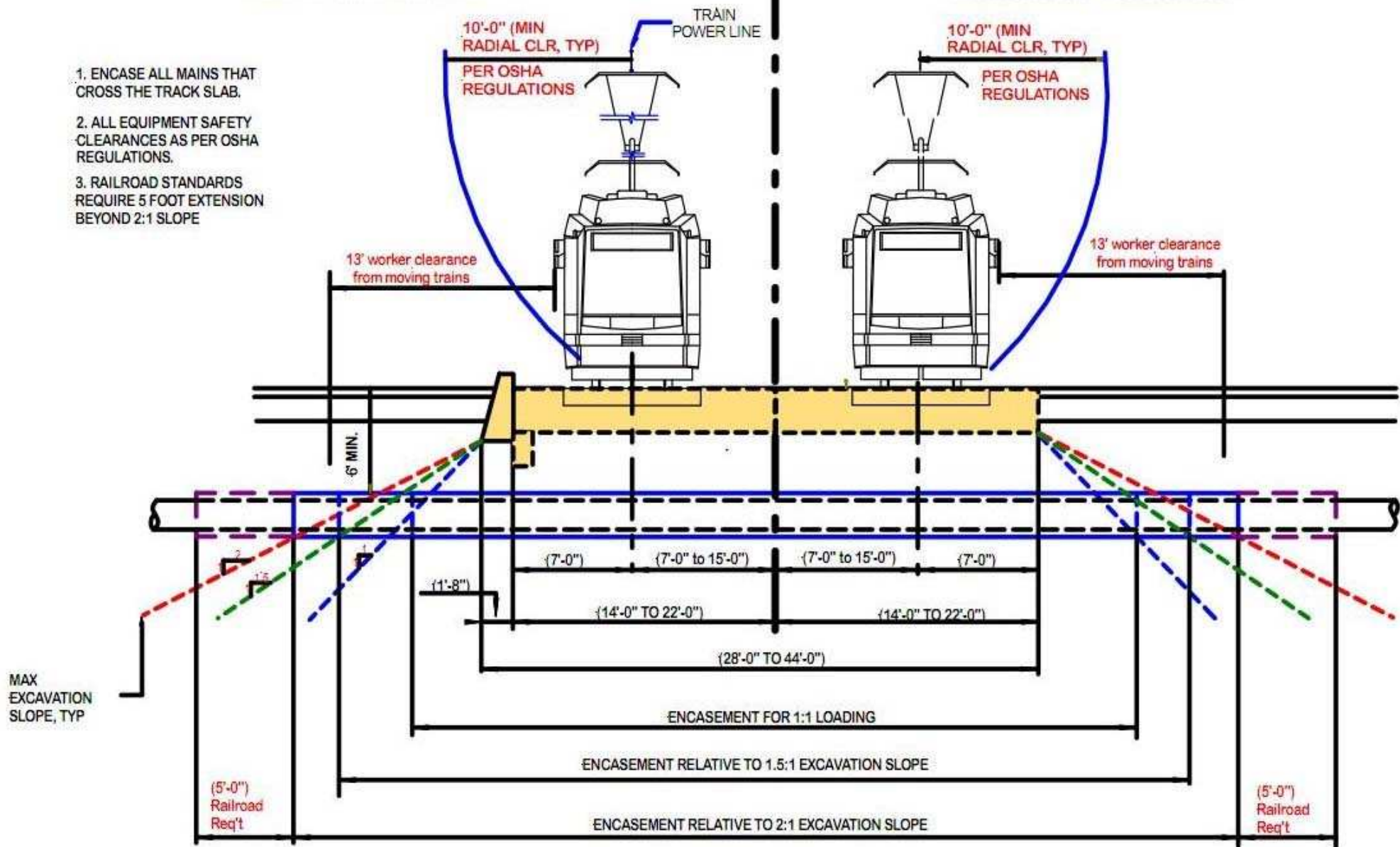
Inspectors should ensure all rectifiers are read, calibrated where needed, and pipe to soil potentials are taken at test stations and measure any cased crossings for electrical shorts to ensure all installations meet specifications.

Encasement requirements for Mains Crossing the Lightrail

Tie & Ballast Area

Embedded Track Area

1. ENCASE ALL MAINS THAT CROSS THE TRACK SLAB.
2. ALL EQUIPMENT SAFETY CLEARANCES AS PER OSHA REGULATIONS.
3. RAILROAD STANDARDS REQUIRE 5 FOOT EXTENSION BEYOND 2:1 SLOPE



Pipeline CP

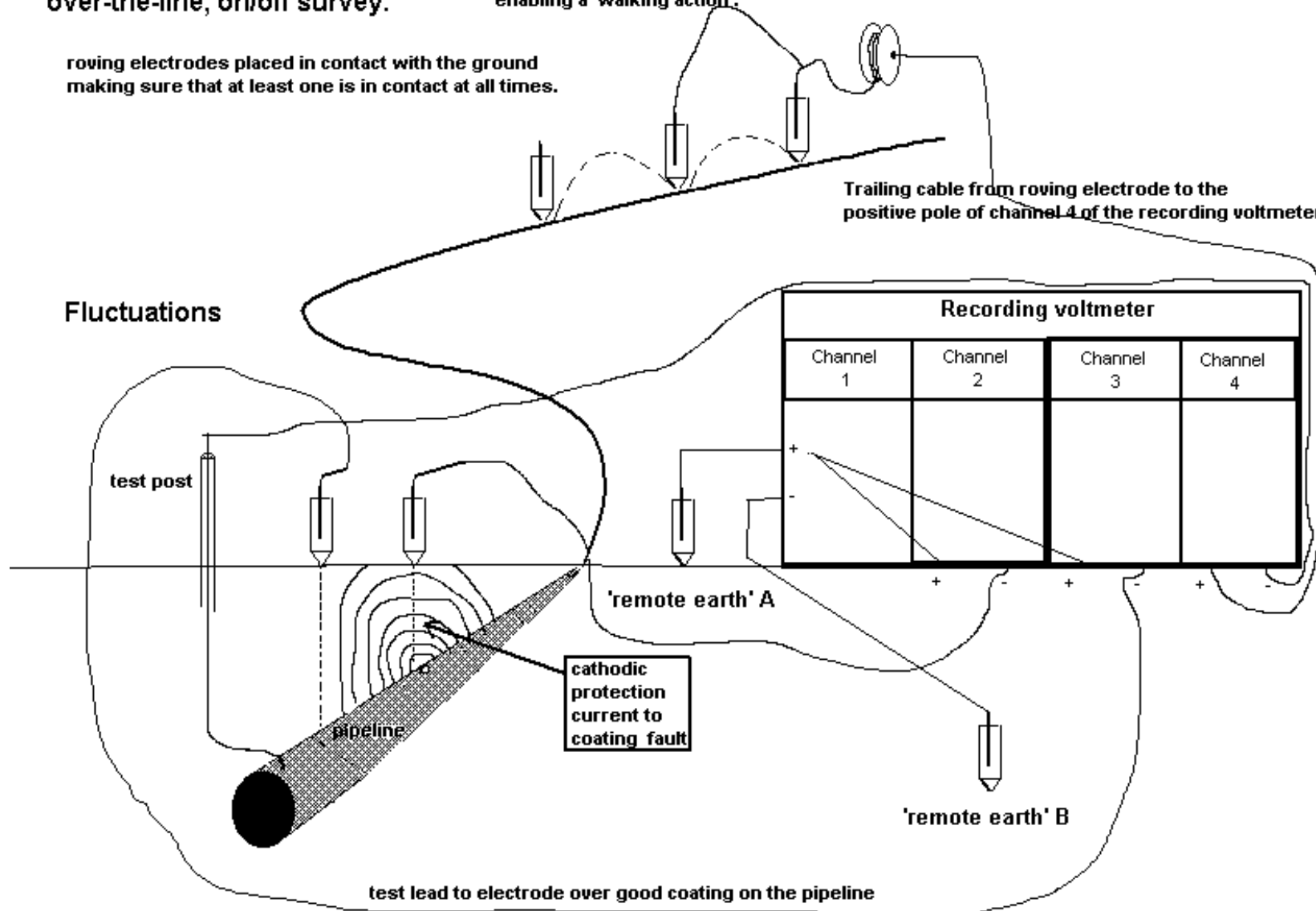
Continuous, recorded,
over-the-line, on/off survey.

two electrodes connected by conductive flex
enabling a 'walking action'.

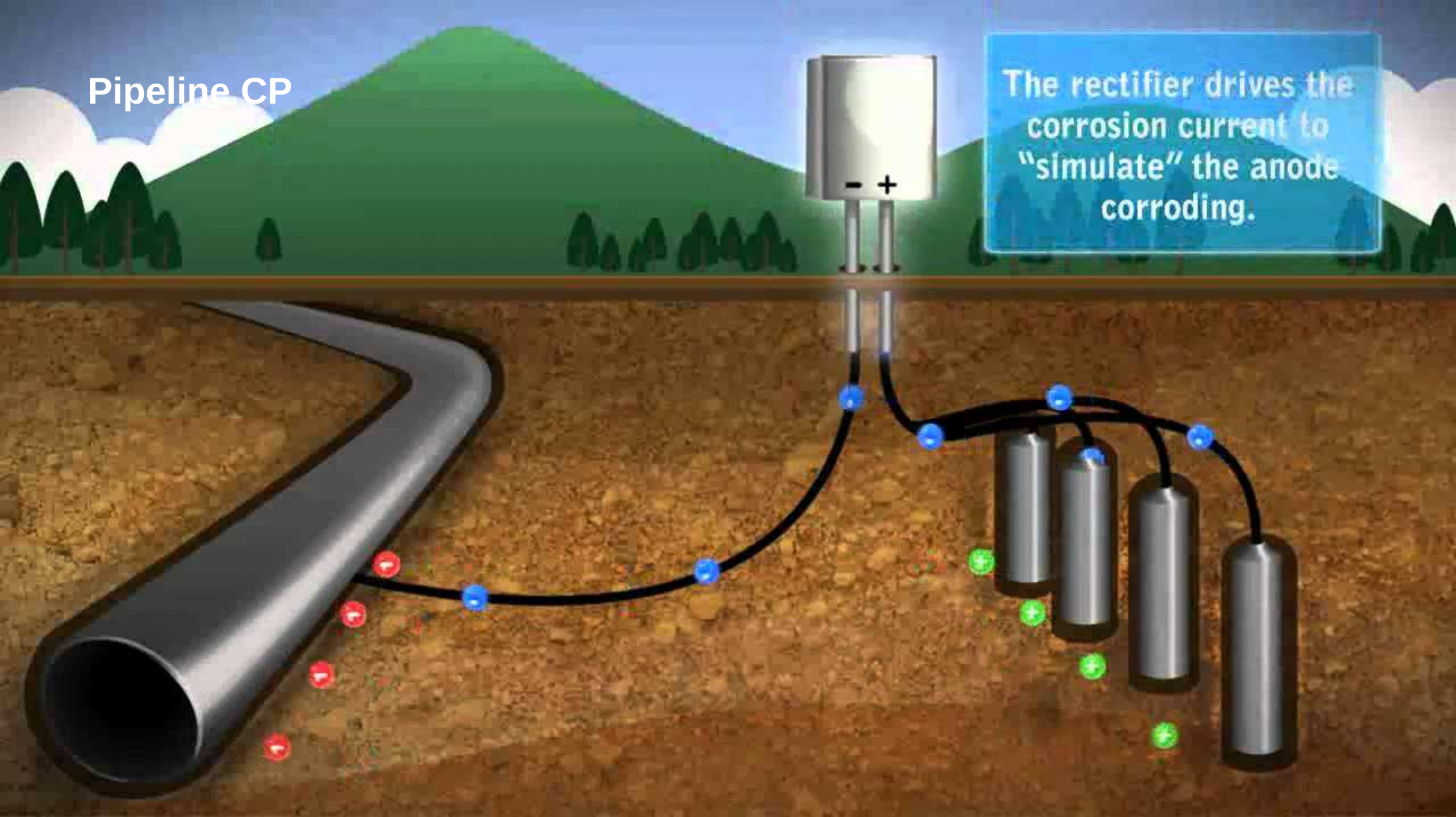
roving electrodes placed in contact with the ground
making sure that at least one is in contact at all times.

Trailing cable from roving electrode to the
positive pole of channel 4 of the recording voltmeter

Fluctuations



Pipeline CP



Pipeline CP



Pipeline CP



Pipeline CP



Pipeline CP



Pipeline CP

The GMC "STAPERM" cathodic protection test station is an all non-metallic, maintenance-free and high-strength test station with a terminal board for monitoring potential and currents. The "STAPERM" CP test station can be utilized worldwide by gas, oil, chemical and water pipeline companies. Manufactured by GMC Electrical, Inc. in Ontario, California. A name you can trust since 1984.

Features:

CP Test Station - Cap, Terminal Board, and Collect Nut made from Makloron® polycarbonate. One of the toughest plastics in the world.

Support Post - "STAPERM" PE (standard) polyethylene has over 20 years of proven durability. "STAPERM" PC (optional) polycarbonate is available for the toughest applications.) Standard length 6 feet, available to 40 feet.

Anchor - "STAPERM" PE is easily installed and prevents pullout.

Sizes - Available in models to fit 1 1/4", 2", and 3" pipe.



Hardware - Standard nickel plated brass or optional stainless steel for guaranteed long service life. Up to 11 terminals accessible from both sides of the board.

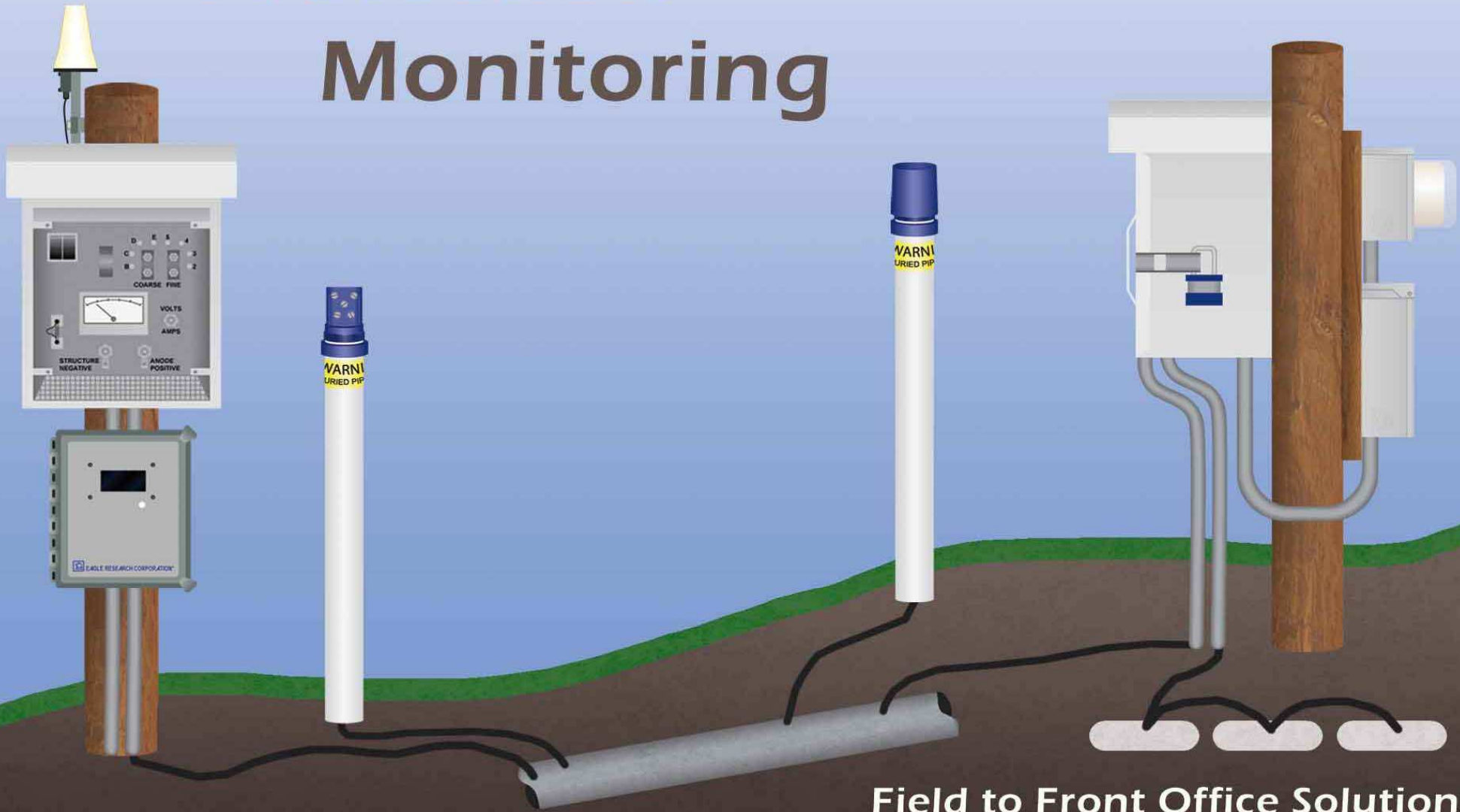
Accessories - All "STAPERM" terminal boards can accommodate Shunts, Slide Resistors, GMC Meters, (Volt or Amp), Burndy Connectors, "STAPERM" Bonding/Shorting Straps Banana Jacks, locking devices, lightning arrestors and flange mounting brackets.

Colors - Standard yellow, red and blue. Other colors available as an option

The test stations are available from GMC distributors worldwide.

Pipeline CP

Cathodic Protection Monitoring



Field to Front Office Solutions™

Pipeline CP



Pipeline CP





Pipeline CP

Insulation Mono Block

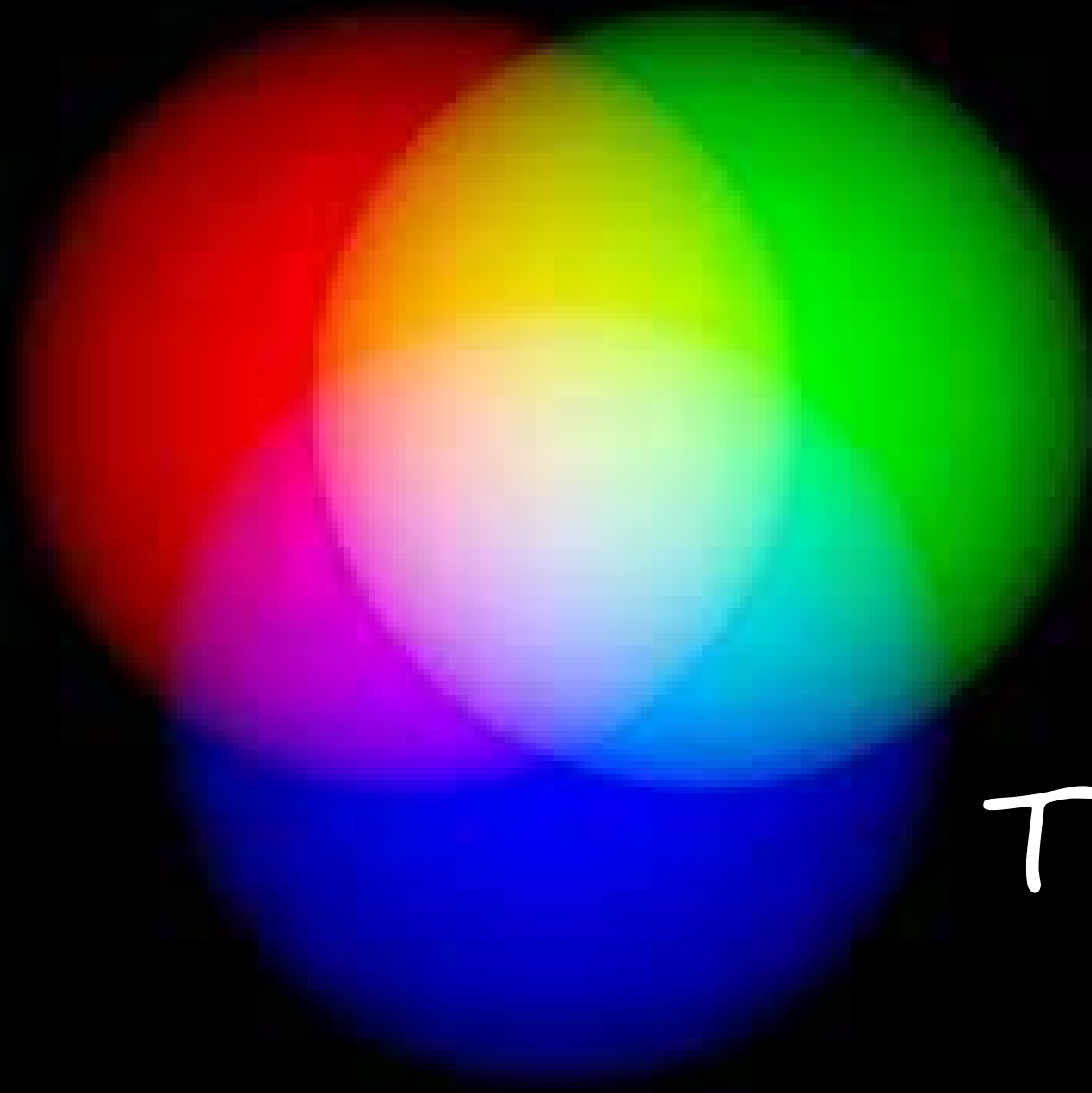


Acceptances



Acceptances





The End