Oil and Gas Pipeline Transmission Infrastructure Cybersecurity and Resiliency

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Agenda

• Review of O&G Transportation 5 Mins
• Applications, Networks Layers, Segmentation 15 Minutes
  • Transportation
    • Liquide
    • Gas
• Design of Pipeline Components – Why 20 Minutes
  • Regulatory requirments
  • Industry Recommended Practices and Guidelines
• Hypotheticals and Q&A 15 Minutes
Typical
Typical Pipeline

- Servers - OS
- Routers/Switches
- LAN/WAN
- Sensors & end devices.
- Programmable Logic Controllers (PLCs)
- I/O Servers
- Operator Clients
- Historian
Typical Pipeline

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- Multiple layers deep (n-3)
- Onion Philosophy (Guard the keys)
Design of Pipeline Components

Natural Gas
• Subpart D 49CFR192.1XX/2XX
• 49CFR192.203
  • Instrument, control, and sampling pipe and components.

Hazardous Liquids/Carbon Dioxide
• Subpart C 49CFR195.1XX
  • 49CFR195.100 Scope
  • 49CFR195.101 Qualifying metallic components other than pipe.
  • 49CFR195.102 Design temperature.
  • 49CFR195.104 Variations in pressure.
  • 49CFR195.106 Internal design pressure.
  • 49CFR195.108 External pressure.
  • 49CFR195.110 External loads.
  • 49CFR195.111 Fracture propagation.
  • 49CFR195.112 New pipe.
  • 49CFR195.114 Used pipe.
  • 49CFR195.116 Valves.
  • 49CFR195.118 Fittings.
  • 49CFR195.120 Passage of In-Line Inspection tools.
  • 49CFR195.122 Fabricated branch connections.
  • 49CFR195.124 Closures.
  • 49CFR195.126 Flange connection.
  • 49CFR195.128 Station piping.
  • 49CFR195.130 Fabricated assemblies.
  • 49CFR195.132 Design and construction of aboveground breakout tanks.
  • 49CFR195.134 CPM leak detection.
Typical Pipeline

- Programmable Logic Controllers (PLCs)
  - Watchdog Timers
  - Last Message
- I/O Servers
- Operator HMI
- Historian
- Mechanical Devices
  - Mainline Block Valves
  - Pressure Relief Valves
  - Flame Arrestors
Process Control Architecture

DCS System – Typical

Sub-segment

Applications

Solutions

Offerings

Reference architectures

Reference cases

Product descriptions

Human Interface

Operation Monitoring

Remote Instrument Control

High Speed Fiber Networks

Sensors (Pressure Temperature)

Gas Detection, High variety

More than 3K per site
Hypotheticals and Q&A

• Disgruntled Employee
  • Knowledgeable Insider
  • Isolate system
  • Corrupt Historian
  • Clone HMI

• Outsider
  • Requires an entry point (Insider or Gain access)
    • Web and Email Spam | Sites used in unsolicited commercial email.
    • Malicious Websites | malicious code.
    • Phishing and Other Frauds | counterfeit legitimate sites to elicit | user information
  • Needs patience to monitor activity
    • Understand protocols
    • Command structure
CYBER RESILIENT ENERGY DELIVERY CONSORTIUM

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