Washington State Cathodic Protection Plan & Progress 2003-2011

Avista Utilities hired a Senior Corrosion Technician, Mr. Gary Douglas, on October 27, 2003. Gary brought a better understanding of cathodic protection testing practices as outlined by the International Association of Corrosion Engineers (NACE International). During his first two years of employment with Avista, Mr. Douglas worked under the direction of the former cathodic protection foreman but was able to share his knowledge and make several recommendations to improve the state of Avista's Cathodic Protection Program, including the following:

Initial Program Improvements, 2003-2005, *including disposition of recommendations*

1. Gary recommended that all voltage data gathered must be recorded as it appears on the multi-meter. Data collection previously could be inconsistent and occasionally lacked polarity or showed variation in the number of significant figures noted. Polarity of the reading is important in order to determine if current is flowing on to or off of the pipe, and capturing this information was vital. *This recommendation has since become standard practice.*
2. Rather than a purely paper process, Gary recommended that all data be compiled and put into a consistent format on Excel spreadsheets. *This process was effective and was the status quo until a computerized system was commissioned.*
3. Gary recommended that only trained Cathodic Protection Technicians be allowed to access rectifiers to prevent possible mis-wiring by untrained personnel. *This recommendation has become standard practice.*
4. It was recommended that all isolation unions be cut out or barreled if they were not being used by the cathodic protection group as an isolation point for the new CP zones. *This recommendation has been incorporated into Avista's Gas Standards manual and Avista's CP group is contacted when isolation joints are unearthed to determine whether they need to be retained or cut our or barreled.*
5. Mr. Douglas recommended that, at a minimum, each Cathodic Protection Technician attend NACE's level 1 CP tester program. Additionally, Mr. Douglas provided weekly training for a period of one year to Avista personnel in the theory of cathodic protection. *Today Avista has two Level 1 CP testers, and four Level 2 technicians. Mr. Douglas himself has earned his Level 4 cathodic protection specialist certification.*
6. Finally, Gary recommended that test stations should be installed on all casings. Two wires were to be installed on the casing and two wires to be installed on the pipe. *Since this recommendation Avista has identified all such casings. Currently only one site lacking test leads remains in Washington. This site is challenging in that it is under Interstate Highway 90.*

In March of 2005 Mr. Douglas was appointed the title of Cathodic Protection Foreman. After this promotion and at the direction of the Chief Gas Engineer Mike Faulkenberry, Gary developed the following Plan to create continuous improvement within Avista's steel pipeline system.

Cathodic Protection Plan proposed in 2005, with results-to-plan YTD 2011

1. Identify possible isolation location, such as isolation flange kits, isolated valves, tracer wire that may be put into a test station, and possible locations for "ZUNTS" to be installed. A zunt is designed to isolate two sections of steel pipe. Both old isolation and new isolation are being used until testing can determine effectiveness of isolation.
    - Isolation points installed in Spokane area to date 184, with 96 still required.
    - Isolation points installed in outer Washington area to date 44. No additional required.

2. Where practical, separate all high pressure (HP) steel pipes from all intermediate (IP) piping. This allows CP techs the ability to trouble shoot the IP side of the piping more easily, and assures that the HP piping is not influenced by shorts found on the IP side of the piping. There are several small communities within Avista's service territory where multiple CP systems remain impractical and separation of systems is not employed.
    - Separated 6 HP lines from IP piping in Spokane. 1 to be completed.
    - Separated all HP from IP piping in Outer Washington. 16 remain tied in because they are small communities where multiple CP systems are impractical.

3. Identify and install test leads on all casings (part of original recommendations, carried forward to 2005 Plan).
    - Identified and installed test leads on 352 casings in Washington to date, 1 to complete.

4. Continue training CP technicians and monitor work. Mr. Douglas began the practice of going into the field with each technician for training regarding CP testing methods. Methods taught and explored include fixed cell moveable structure testing, continuity testing, current requirement testing, current span testing, soil resistivity testing, casing battery testing, and proper pipe locating techniques to locate shorts and opens. This effort greatly increases the cathodic protection group's ability to troubleshoot and identify systemic problems and shorts.
    - Mr. Douglas has been into the field with each CP technician for such training as needed.

5. Automate data collection. In preparation for the commissioning of the GoBook field computers in 2008, Gary compiled all initial data entry as well as assisted in creating the design of the data collection fields.
    - Mr. Douglas has been into the field with each CP technician for data collection training as well as attending utility commission audits to support the computerized data as it is presented to state inspectors.

6. Re-define and confirm all cathodic protection zones. Install isolation in the IP piping systems and install new ground beds.
    - CP zones have been re-defined and input into the GoBook program. Spokane formerly had 24 systems, and now has 35. Outer Washington formerly had 25 systems, and now has 41.

7. Replace all outdated and non-standard rectifiers to Universal 80 volt 12 amps or 40 volt 5 amps rectifiers. This allows Avista the ability to troubleshoot and replace parts in all rectifiers faster and more easily.
    - Most rectifiers have been replaced with standard Universal 80 units. Only 3 remaining units are left to be replaced in the Spokane area.

8. Complete "NATIVE" surveys on all newly established cathodic protection zones. The native survey will determine if there is a bi-metallic connection between magnesium anodes and steel pipe. This will also give Avista a better understanding of the soil conditions and the amount of polarization present in any given area.
    - Native surveys completed in Spokane: 0 of 35 possible.
    - Native surveys completed in outer Washington: 35 out of 41 possible.

9. Address bi-metalic zones. Gary established the policy that any bi-metallic zones identified must have cathodic protection coupon test stations installed. Any galvanic systems without the ability to remove the anodes will also need to have coupon test stations.
    - Avista has identified galvanic systems. Coupon test stations have not been installed as the potentials of the piping have been higher than -1.00 volts.

10. Begin Annual "Instant Off" surveys. Avista strives to be able to perform both "ON" and "INSTANT OFF" potential surveys, which will require additional isolation points within the system as well as the installation of current interrupters.
    - "ON and INSTANT OFF" Annual surveys completed in Spokane: 0 of a possible 35. (multiple CP isolation zones will be interrupted together to perform Isolated Steel Inspection/Replacement surveys. Additional work still outstanding to enable individual CP zone isolation.)
    - "ON and INSTANT OFF" Annual surveys completed in outer Washington: 41 of a possible 41.

11. Enhance survey tools. To update Avista's equipment, Mr. Douglas recommended Avista purchase Radio Detection GPS current interrupters, Tinker and Razor isolation testers for above ground flange kits, pipe locators, and current mapping equipment.
    - Equipment has been purchased and maintained.

12. Replace isolated steel where possible. During the past 2 years (2009 and 2010) Mr. Douglas recommended that isolated steel also be removed from the system, using the isolated steel list generated in 2002 for existing sites and with a policy that any sites found but not included on the 2002 list be immediately replaced upon discovery.
    - The total list of isolated risers discovered in Washington in 2002 that were still in existence in 2005 was 1,625. To date Avista has replaced 474 of that 1,625 count. Additionally, 72 isolated steel mains over 100' in length were discovered and are being monitored.

Additionally, the following system improvements were made since 2005:

- New ground beds and deep-well installs in Spokane: 23
- New ground beds and deep-well installs in outer Washington: 33
- Drawings standards were developed and an as-built filing system is being maintained
- Effective communication with the major transmission pipelines to resolve issues has been established