MEMORANDUM

TO: Water Right File 13-7934

FROM: Daniel Nelson – Analyst 3

DATE: April 3, 2020

SUBJECT: Licensing Review of Water Right 13-7934

The field exam for this right was performed by Certified Water Right Examiner Patrick Naylor of Rocky Mountain Environmental. Mr. Naylor recommended that this permit be licensed for a diversion rate of 0.24 cfs. Mr. Naylor didn't include a recommendation for the volume. However, Mr. Naylor did complete the volume calculations in Part G. (2). I feel the diversion rate calculations and measurements Mr. Naylor made were reasonable and should be carried forward towards licensing. The place of use recommended in Mr. Naylor's maps showed a full 40 acre tract, and then the smaller actual location of the cathode beds. I am recommending that the smaller actual locations of the cathode beds be used for the place of use.

The industrial use for this permit is for a pipeline corrosion system. I have not had any experience with this type of water use, but I was able to attain some information on the internet to determine the how these systems work. Please see the attached sheet.

I asked Mr. Naylor how the water is actually used in the process. From my initial review of the field report, it appears as though the water is used to keep the ground around the buried pipe wet to not only provide an Electrolyte to the process, but also to maintain a good Metallic Path for the Anode and Cathode energy transfer. My assumptions were correct per the Description of the Cathodic Protection System supplied by Stewart D. Edwards of PacifiCorp. Please see the April 8, 2020, email and attachment.

Conditions:

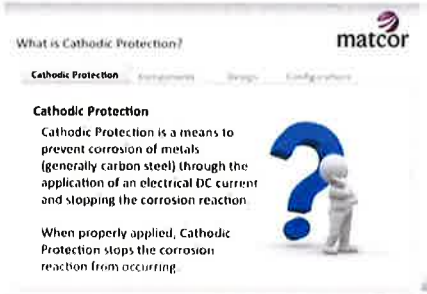
Condition 26A will be removed as is standard. The remaining conditions will be carried forward to licensing. I also added condition R43 for lockable head gate and measurement devices. This condition is required in all water districts, and should have been included on this permit. The pipelines to both beds have measurement devices and controlling works, so this condition will not place the permit holder in violation at the time of licensing.

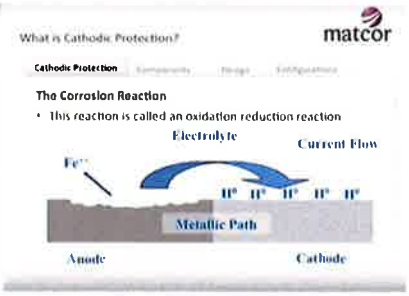
Permit 13-7934 – Review of Cathodic Protection Systems

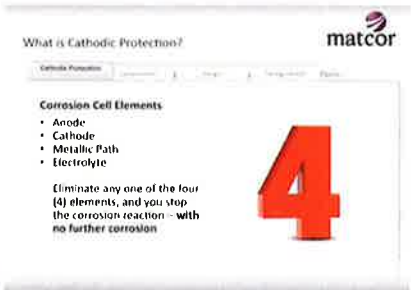
This permit was filed for a Cathodic Protection System (CPS). I have no knowledge of CPS systems, so I reviewed a training video provided by Matcor. Matcor produces and designs CPS systems, so I felt this video gave me a very basic understanding of how these systems are operated. I clipped out several power point slides in the video that should provide additional information concerning these systems. A CPS system is designed to prevent corrosion of pipelines or tanks. Carbon steel and similar metals are created by adding energy to carbon based products. After the metal products are developed in this process, the energy tries to leave the metal product. The leaving of energy from the metal is known as oxidation or rust. The oxidation and rust is the corrosion that is trying to be avoided through the CPS process. To prevent corrosion, you can apply a DC current to halt the corrosion process. To prevent corrosion, you need an Anode, which is a material that can be sacrificed to supply the needed energy to the material to be protected or Cathode. You also need an Electrolyte, which is generally water, and a metallic path, which could be wet soils, or a direct wire connection to the Cathode.

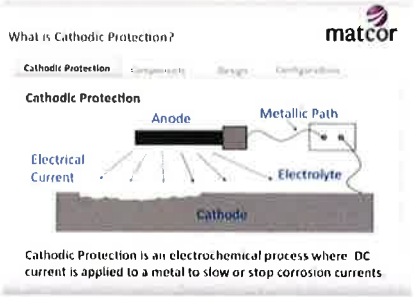
You can either supply the DC current by an electrical source such as a battery, solar power, power company, or other exterior means, or you can set up the system as a battery type system by using an Anode with a higher electro-potential than the metal you are trying to protect. A standard carbon steel pipe has a -500 Millivolt (mV) electro-potential, where magnesium has a -1700 mV electro-potential, so the magnesium will try to shed or even out the electro-potential by giving energy to the carbon steel which produce energy. In this case, the magnesium is the Anode, and the carbon steel is the Cathode. The reason this can happen is the negative always tries to go to the more positive metal.

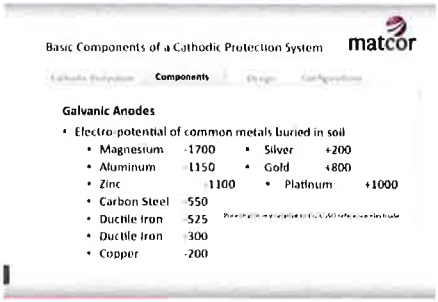
The goal to prevent corrosion is to shift the native state of the cathode metal approximately 100 mV. Adding a DC current into this process stabilizes the process and allows the Anode to last longer. I am not an authority on this process, but I felt this video and the slides below give a basic understanding of this process. Each system is designed differently based on the site, and what works best. I didn't get into the design portion of the video, but it did give me a better understanding of how these types of system are developed. You can find this video at https://www.matcor.com/cathodic-protection-introduction-video/ if you need additional information on how these systems work.











Nelson, Dan

From: patrick.rmea@gmail.com
Sent: Wednesday, April 8, 2020 3:32 PM
To: Nelson, Dan
Cc: 'Edwards, Stewart'; 'Morris, Buffi'
Subject: RE: Licensing of Permit 13-7934
Attachments: Description of Cathodic Protection System.pdf

Hi Dan

Attached is a brief description of the cathodic protection system at the Grace Hydroelectric Plant. As requested, this describes the need for water (and hence the water right) for the system. The write-up was provided by Stewart Edwards, a hydro engineer at PacifiCorp.

Please let me know if this description meets your needs. If you need it submitted in a particular format, please advise.

Regards
Pat

Patrick N. Naylor; PE, PG, CWRE
Vice-President, Senior Hydrogeologist
Rocky Mountain Environmental Associates, Inc.
482 Constitution Way, Suite 303, Idaho Falls, ID 83402
P.O. Box 4773, Boise, ID 83711
E-Mail: patrick.rmea@gmail.com
VOICE: 208-524-2353 ||| Cell: 208-323-4444

From: Nelson, Dan <Dan.Nelson@idwr.idaho.gov>
Sent: Monday, April 6, 2020 10:41 AM
To: patrick.rmea@gmail.com
Subject: RE: Licensing of Permit 13-7934

Thank you Patrick, I appreciate it.

Dan Nelson

From: patrick.rmea@gmail.com [mailto:patrick.rmea@gmail.com]
Sent: Monday, April 06, 2020 10:40 AM
To: Nelson, Dan <Dan.Nelson@idwr.idaho.gov>
Subject: RE: Licensing of Permit 13-7934

Dan, I sent an email to Stewart Edwards at PacifiCorp to ask for an explanation.

FYI, you added a "c" in the email for Buffi Morris. Her email is buffi.morris@PacifiCorp.com. Note only one "c", not two. I cc'd her when I forwarded your email to Stewart.

Pat

Patrick N. Naylor; PE, PG, CWRE
Vice-President, Senior Hydrogeologist
Rocky Mountain Environmental Associates, Inc.
482 Constitution Way, Suite 303, Idaho Falls, ID 83402
P.O. Box 4773, Boise, ID 83711
E-Mail: patrick.rmea@gmail.com
VOICE: 208-524-2353 ||| Cell: 208-323-4444

From: Nelson, Dan <Dan.Nelson@idwr.idaho.gov>
Sent: Monday, April 6, 2020 9:39 AM
To: patrick.rmea@gmail.com
Subject: FW: Licensing of Permit 13-7934

Patrick,

Here is the email that Sent Buffi Morris, but that email was returned as undeliverable.

Dan Nelson

From: Nelson, Dan
Sent: Monday, April 06, 2020 9:28 AM
To: 'buffi.morris@pacificcorp.com' <buffi.morris@pacificcorp.com>
Subject: Licensing of Permit 13-7934

Dear Ms. Morris,

I have been asked to review Pacific Corp's permit 13-7934 for licensing. This permit authorizes the water use at the pipe corrosion facility at the Grace Dam site. I have contacted Nathan Naylor of Rocky Mountain Environmental Engineers Inc. to supply some additional information, since he supplied the field report for this facility. Due to Idaho Governor Little's Stay at Home Order dated March 25, 2020, I am unsure if Mr. Naylor is working from home or is checking in with his office. Our offices are closed, but I am working from home, which allows us to actively pursue the licensing of this permit. I felt it may be beneficial if I relayed the request for additional information to you. This way you could get the information prepared for Mr. Naylor and/or send the information directly to me if that would be more convenient.

The information that I requested is a need to attain a better understanding of the corrosion beds associated with this permit. I have not worked on these types of systems, so I will need a bit of background to show that the water is being put to beneficial use. I have done some research on these types of systems, so what I will be needing is a brief explanation of how the system works, what pipelines it is protecting, and why the amount of water being used is needed. This doesn't need to be an in depth analysis or full report of the system, just a brief overview of how the system operates and the part the water plays in the system. Mr. Naylor has done an excellent job of describing the water system, but didn't provide any details on the entire system. Knowing how

and what the system does helps us to determine if the water use is beneficial. I would think a couple of sentences or paragraphs would be sufficient to supply the information I need.

I have done a little research of these systems, so I have attained a basic understanding of they work. I am simply trying to get a better understanding of how your system works. If you have any questions, please don't hesitate to contact me. If I return your call, it will be from an anonymous caller, since I am working from home. Thank you for your cooperation and understanding in these trying times. Please take care.

Respectfully,

Daniel Nelson
Water Right Analyst 3
Idaho Department of Water Resources
Telephone (208) 287-4856
Fax (208) 287-6700 (attn: Dan Nelson)

Description of Cathodic Protection System
Grace Hydroelectric Plant
Grace, Idaho

The cathodic protection system at the Grace Hydroelectric Plant is protecting three buried penstock pipes that bring water into the plant, located between the surge tank and the plant. In this system, the penstock pipes act as a cathode, sacrificial metal buried in the nearby soil (known as a groundbed) acts as an anode, the soil acts as an electrolyte for the movement of ions, and electrical cables connected to the penstock pipes and sacrificial metal act as metallic paths for the movement of electrons. Water in the soil allows for the free movement of ions associated with chemical reactions that are taking place at the sacrificial metal and soil interface, and the penstock and soil interface. Without a supply of water to the anodes, the soil surrounding them would dry out and the movements of ions would diminish, making the cathodic protection system ineffective. In order to supply water to the anodes, a drip irrigation system was installed in the same trench as the anodes during construction of the system.

STEWART D. EDWARDS, P.E. (UT)
East Area Hydro Engineer/Renewable Resources
PacifiCorp
Off: 801.220.4635
Cell: 801.618.6432
Fax: 801.220.4895
Email/Text: stewart.edwards@pacificorp.com