# PUBLIC SUBMISSION

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## Submitter Information

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**Name:** Steven Daily
**Address:**
24305 116th Ave W
Woodway, WA, 98020
**Email:** Steven.Daily@dnvgl.com



## General Comment

See attached uploaded file.

## Attachments

DNV GL Comments on LR-ISG-2015-01

**DNV GL Comments on LR-ISG-2015-01**

**Submitted by: Steven F. Daily**

**Date: 8/10/2105**

My questions and comments relate to the "Alternative Cathodic Protection Acceptance Criteria" that are described in LR-ISG-2015-01. The following alternative cathodic protection (CP) acceptance criteria were added for buried piping and tanks going through license renewal:

(a) -750 mV (CSE) instant-off structure-to-soil potential where the soil resistivity is greater than 10,000 ohm-cm to less than 100,000 ohm-cm, and

(b) -650 mV (CSE) instant-off structure-to-soil potential where the soil resistivity is greater than 100,000 ohm-cm.

We understand that the staff added these criteria for soils with higher resistivity based on its inclusion in international standards, the staff's review of industry papers on alternative acceptance criteria, and a recommendation to verify the alternative acceptance criteria through the use of electrical resistance (ER) probes to verify that the corrosion rate is less than 1 mpy. It would appear that these two alternative criteria are far less restrictive than the minimum -850 mV (CSE) polarized instant-off criteria as referenced in NACE SP0169-2013 or Table 6a "Cathodic Protection Acceptance Criteria" that is referenced in the previous Staff Guidance LR-ISG-2011-03 (i.e., -850 mV instant-off potential or the 100 mV minimum polarization that is limited to electrically isolated sections of pipe).

The following are my questions / comments. Based on these questions and comments I believe additional guidance from the NRC should be provided:

1) We have a client that has installed coupon test stations for buried piping at their site; however they do not have ER probes installed. We have conducted limited testing on the soil backfill in the lab for various chemical species, pH, % moisture content, soil resistivity (soil box method) and have performed linear polarization resistance (LPR) testing of the soil samples in the lab using a carbon steel coupon. LPR corrosion rate testing could also be performed in the field at the coupon test stations using the Native and CP Coupons. I assume that LPR corrosion rate test results would also be applicable to qualify use of the Alternative CP Acceptance Criteria?

2) Since some of the pipe is backfilled with engineered fill, the Wenner 4-pin method for determining soil resistivity (ASTM G57) would not be applicable, as these measurements are

taken in remote areas (typically outside of the plant area) where the readings would not be influenced by buried structures beneath the pins. The Wenner 4-pin readings would therefore be more applicable for measuring the soil resistivity of the native soil at the site, rather than the soil backfill. For measuring the soil backfill resistivity, the soil box method (ASTM G187) using "as-found" and "saturated" soil samples from around the pipe should be performed. Is this a correct assumption?

3) How often do you collect soil samples for resistivity testing along a piping system and how do you apply these readings to the alternative criteria? Is there a maximum distance from the pipe that the soil samples should be collected and tested? For example are 2 or 3 soil box resistivity readings measured at a plant typically sufficient to prove that the soils have higher resistivity (i.e., >10,000 ohm-cm), or should the use of the alternative criteria be based on assessment of documentation that indicates similar soil backfill conditions exist on any given section of pipe and using the soil box resistivity data from pipe excavations for that system.

4) How many ER probes (or LPR corrosion rate measurements) are considered necessary to verify that the corrosion rate is less than 1 mpy? ER probes rely on changes in the cross sectional area of a buried electrical resistance conductor that is exposed to the soil environment next to the pipe and typically the probe is furnished with a check element to verify equipment accuracy. For ER probes typically you would measure the corrosion rate with the same instrument on a quarterly basis and then trend the data to determine corrosion rate over several years so the corrosion rate can be determined as a function of environmental conditions such as rain fall and periods of drought. They can be electrically connected to the structure with an external grounding cable so the probe can provide a continuous record of the CP system effectiveness. Are LPR measurements using a carbon steel coupon exposed to the soil sample or LPR measurements from coupon test stations considered acceptable alternatives for determining corrosion rate?