Philosophy: Several techniques have been adopted to mitigate soil-side corrosion on storage bottoms. Nevertheless, total effectiveness of these techniques, as standalone or combined, have been questionable. New tanks constructed on clean sand with HDPE liner and equipped with grid of ribbon anodes are believed to provide the required protection, provided that the cathodic protection system is installed and managed appropriately. However, the inevitable presence of air gaps between bottom plates and sand, renders CP system ineffective in providing a uniform protection. It is also worthwhile noting that the existence of an HDPE liner presents a unique challenge for retrofitting cathodic protection. Usually, retrofit CP installations are difficult, costly and require the tank to be off-line.

There is a growing industrial acceptance to use amine carboxylate vapor phase corrosion inhibitor to supplement the performance of cathodic protection system in external protection of tank bottom plates. Vapor phase corrosion inhibitor is a chemical substance that acts to reduce soil-side corrosion by a combination of volatilization from a liquid, vapor transport through the sand layer and in the headspace between floor plates and the tank pad atmosphere providing a proactive layer on the metal surface. In light of the above, an online provisional vapor phase corrosion inhibitor delivery system need to be designed and integrated into the tank foundation during design phase and installed during tank construction. This will offer tank operator with an economic means to provide protection against soil-side corrosion when power is not available during construction phase of the tank or interrupted while tank is in-service.

System Description: The proposed system is an automated modular vapor phase corrosion inhibitor dispensing system. It is comprised of flexible PVC tubing with built in flow regulating orifices distributed along the tubing. The tubings are installed under the tank floor in equally spaced independent concentric rings configuration. Each dispensing ring is connected to a separate inlet and flow check line. Each transfer line is connected to a solenoid valve. All inlet and flow check lines are grouped into two separate manifolds. Inlet manifold is connected to a pressure relieve valve, filter, flowmeter and pressure & temperature transmitters. Flow check manifold is connected to a collecting container. The suction line of a diaphragm pump is connected to a corrosion inhibitor container and discharge line is connected to the inlet manifold. The dispensing system is controlled through a closed loop pressure and flow control unit.

System features:

- Cost effective and easy onsite installation
- Doesn’t require any changes to current standard tank foundation construction
- Provides an economic online treatment solution for tank bottoms to be used until CP system is energized during construction phase or in case of CP failure or interruptions during operation.
- Ensures uniform distribution of vapor phase corrosion inhibitor throughout the sand pad
- Can be used with existing corrosion probes under the tank to monitor the effectiveness of corrosion inhibitor.
- Independent concentric dispensing rings to minimize complete system failure