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LAWPS Hose-In-Hose Transfer Lines Permit Modification Comments

The Hose-In-Hose Transfer Lines (HIHTLs) have been used for at least twenty Single-Shell Tank retrievals. Only one leak of a HIHTL used for Single-Shell Tank retrievals occurred and that was at a coupling and not in the hose material. That type of coupling is no longer used. The Service Life requirements for the HIHTLs used for Single-Shell Tank Retrievals is defined in "Temporary Waste Transfer Line Management Program Plan," RPP-12711. HIHTLs have a 7-year shelf life (i.e., life from manufacture until first service use) and 3-year service life, with a maximum total life of 10 years from the date of manufacture. The title of RPP-12711 includes the phrase "temporary waste transfer" which implies these lines are only good for a limited length of time. However, when I looked at the properties of the material used for the HIHTLs, it could potentially have a much longer service life than allowed in RPP-12711. One thing that needs to be considered when evaluating the service life of a material in contact with Hanford tank waste is degradation of the hose material due to its exposure to radiation and chemicals. There was limited data available about degradation by radiation exposure when the original version of RPP-12711 was written. There is a wide range of chemicals in Hanford tanks, and there was not enough information about the degradation of the hose material for all possible combinations of chemicals. The upper limit of the available radiation exposure data was part of what was used to establish the service life. However, at the upper level of radiation exposure data, the hose material was stronger than unexposed material while it was somewhat less ductile. When some HIHTLs were left in storage and not used before the seven-year storage life, they were disposed of, and some samples were taken from these hoses and tested for physical properties. These tests showed no detectable difference in the strength and flexibility of the hose material compared to new hoses, indicating that the Service Life is overly conservative.

The same process for evaluating whether the service life of the HIHTLs can be extended should be the same as the process for evaluating whether metal pipelines can have a service life extension. This involves having an Independent Qualified Registered Professional Engineer (IQRPE) of doing an evaluation. One part of determining if transfer lines can have their service life extended is to do a pressure test of the lines. For the HIHTLs, this would probably involve flushing the lines with water and then pressurizing them to 150 percent of the operating pressure. This would be a good approach for both the HIHTLs used for Low Activity Waste Pretreatment System and the retrieval of Hanford tank waste. My opinion is if we had better data on the degradation of the HIHTLs, the service life could be extended significantly and reduce the cost while being adequately protective of human health and the environment. Collecting samples for HIHTLs that are being removed from service and determining their physical properties would be one way to get more data.

The original Service Life Limits were established based on the limited amount of available data. By collecting more data and doing service life extensions using an IQRPE would likely be a better use of resources rather than simply following the existing Service Life Limits.