Case Study

Refinery Enhances BWON Compliance Program

After about a decade of relatively minor enforcement activity, the Benzene Waste Operations NESHAP (BWON) was back in the spotlight in 2022, with a significant increase in BWON inspections led U.S. EPA Region V and the National Enforcement Investigation Center (NEIC) at refineries and chemical plants nationally. Recently, a large petroleum refinery subject to BWON controls engaged Trinity to ensure that the site was in compliance with BWON regulations and was prepared for an eventual U.S. EPA inspection.

Challenge

The refinery needed to ensure compliance with BWON regulations, but its end-of-line sampling program showed results that were inconsistent with the amount of benzene identified upstream at the points of generation.

Solution

Trinity partnered with the refinery to review existing waste stream characterization data, evaluate oil-water separator water and oil concentrations and flow rates, examine wastewater management equipment and procedures during field tours, and more.

Result

Trinity successfully identified previously unknown sources of benzene discharge into the wastewater, enabling the refinery to resolve issues quickly and avoid any noncompliance.

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Challenge

Because the refinery generates wastes that have a total annual benzene (TAB) quantity greater than 10 mega grams per year, it is subject to the control and treatment requirements under the BWON regulations, which regulate benzene emissions from waste operations at refineries and chemical plants. At refineries, the focus has been on systems that are controlled for emissions under both the BWON and New Source Performance Standards (NSPS) Subpart QQQ.

The refinery had chosen the 6 BQ "treat to target" compliance option, which required the facility to maintain and update annual 6 BQ calculations and prepare quarterly and annual BWON reports. To assure compliance, facilities need to identify all waste streams that are sources of benzene and classify them as controlled or uncontrolled. The refinery's end-of-line sampling program indicated the possibility that not all benzene was being accounted for. The refinery engaged Trinity to uncover the source of the additional benzene.

Solution

Trinity needed to find the source of the benzene that wasn't accounted for in the TAB calculations—a process that required analysis and investigation, including challenging prior assumptions and estimates.

Trinity reviewed existing waste stream characterization data, evaluated oil-water separator water and oil concentrations and flow rates, examined wastewater management equipment and procedures during field tours, and interviewed people working in operations, management, and maintenance roles—everyone from environmental experts to vacuum truck operators.

Because the end-of-line sampling wasn't consistent with prior TAB calculations, Trinity worked to identify potential waste streams that weren't previously included. Trinity created and implemented a sampling plan with strategic waste sampling locations—a process that went far beyond the requirements under BWON and allowed the team to isolate sources of benzene to a specific zone of the sewer system.

This plan enabled the team to work more quickly and efficiently by zeroing in on areas of concern, disregarding the 90% of streams that were not a concern. In addition, because organic-phase liquids have the ability to impart benzene to low-benzene-containing waste streams, the team also tested mid-stream levels to uncover additional areas where benzene may have been underestimated.

During this process, the Trinity team was able to improve the characterization of specific waste streams and identify a previously unknown waste stream. In addition, the team was able to recommend process improvements that would reduce the amount of benzene being sent to the sewer system.

Result

By leveraging the team's comprehensive understanding of facility wastewater systems, including the origins, purposes, and typical behaviors of wastewater-generating processes, as well as its ability to dig deeper beyond normal BWON program activities, Trinity was able to successfully identify previously unknown sources of benzene discharge into the wastewater.

This work allowed the refinery to ensure ongoing compliance with BWON regulations, avoiding fines that compound by the day as well as negative publicity associated with noncompliance. Trinity also enabled the refinery to make simple administrative and process changes to reduce the amount of benzene being discharged to the sewers (and thereby enhance the compliance margin with respect to BWON limitations) without any additional capital expenditures.

About Trinity Consultants

Trinity Consultants, a leading global environmental consulting firm, provides services and solutions in the EH&S Regulatory Compliance, Built Environment, Life Sciences, and Water & Ecology markets. Founded in 1974 Trinity has the technical expertise, industry depth, and capabilities to help clients achieve their goals across the natural and built environments.

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