



Project Summary

Fugitive Emission Testing at the Kosovo Coal Gasification Plant

R. L. Honerkamp and D. A. Dalrymple

Fugitive emission testing was partially supported by the U.S. Department of Energy and performed as part of an ongoing cooperative environmental data acquisition program which is being sponsored by the U.S. EPA. The government of Yugoslavia has provided technical, logistic, and manpower support. The subject of the data acquisition program is a commercial-scale, medium-Btu, Lurgi gasification plant which is currently operating in the province of Kosovo in Yugoslavia.

Fugitive emissions are generally defined as emissions that are not released through an enclosure such as a duct or vent pipe. Fugitives include process fluid leakage from seals (e.g., valves, pumps, flanges, compressors), process fluid purges (sampling), secondary emission sources (e.g., drains, wastewater systems, cooling towers), and particulate sources (e.g., storage piles, unpaved areas). Process fluid leakage sources were the subject of the testing at Kosovo. The process fluid species analyzed included hydrocarbons, carbon monoxide, hydrogen sulfide, hydrogen cyanide, and ammonia. The four major objectives of this assessment of fugitive emissions were to: 1) determine the frequency of leak occurrence, 2) measure leak rates from leaking sources, 3) estimate total fugitive emissions from leakage, and 4) compare the results to other fugitive emission test data.

Source screening and source sampling were the two types of emission tests that were required in order to fulfill the objectives of the program. Source screening provided a determination of the number of sources leaking and an order of magnitude estimate of

their leak rates. Source sampling involved enclosure of a leaking source and measurement of the leak rate from the source. Detailed descriptions of these two types of emission tests are included in the project report.

This Project Summary was developed by EPA's Industrial Environmental Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction and Summary

The Kosovo test program was implemented by the EPA in response to a need for representative data on the potential environmental impacts of Lurgi coal gasification technology. Because many proposed coal gasification projects in the U.S. are based on Lurgi technology, the EPA is interested in taking appropriate steps to enhance the environmental acceptability of the technology. Previous test efforts at Kosovo have been directed toward characterization of process and discharge streams and also monitoring of ambient air. The report summarizes results of a test program to characterize fugitive emissions from the Kosovo coal gasification facility.

Results of the study show similarities to results of fugitive emission testing in U.S. oil refineries and organic chemical plants. The results indicate that most of the sources tested have very low emission rates, and most of the total emissions are contributed by a small fraction of the sources. Based on emission factors developed from the test data, Kosovo fugitive sources emit 5.7 kg/day of hydrocarbons. The environmental concern associated with fugitive emissions depends on the

composition of the process fluid contained by the source, because the emissions are the result of process fluid leakage from valve packing and seats, pump seals, and flange gaskets.

Fugitive emission controls that have been implemented in the U.S. oil and chemical industry include leak detection/repair strategies and substitution of equipment components with lower leak potential. These controls, also applicable to fugitive emission sources in coal gasification plants, should be considered during the design of these plants. The report contains a general description of the Kosovo gasification facility and an overview of the process units and streams included in the test program. The test methodology is described, and results of the tests are presented. Conclusions drawn from the results and recommendations for developing fugitive emission control are summarized. Selected results are: gas valves in clean gas service leak more than gas valves in dirty gas service, 95 percent confidence intervals on emission factors span two or more orders of magnitude about the mean valve, most emissions were from valves in hydrocarbon service followed by flanges in hydrocarbon service, and liquid leaks from pump seals were the largest of any other liquid source.

Appendices to the report contain detailed test protocol descriptions, analytical instrument technical data, discussions of statistical treatment of the data, examples of data recording forms, and the raw data obtained during the test program.

R. L. Honerkamp and D. A. Dalrymple are with Radian Corporation, Austin, TX 78766.

William J. Rhodes is the EPA Project Officer (see below).

The complete report, entitled "Fugitive Emission Testing at the Kosovo Coal Gasification Plant," (Order No. PB 83-239 533; Cost: \$19.00, subject to change) will be available only from:

*National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: 703-487-4650*

*The EPA Project Officer can be contacted at:
Industrial Environmental Research Laboratory
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711*

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