

# State Department of Geology and Mineral Industries

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## INVESTIGATION OF GAS SEEPAGE IN NORTHEAST PORTLAND

Multnomah

### Introduction

Donald Parker, chemist with the State Board of Health, called December 13, 1963, to discuss some gas analyses he had from a sample taken in the vicinity of S.E. Grand Avenue and S.E. Division Street, where seepage was occurring. Arrangements were made for representatives of the Department of Geology and Mineral Industries to check the area to determine if seepage was of a natural origin or a result of leakage from a pipeline or storage facility. Mr. Parker mentioned that a sewer ditch was being excavated along S.E. Grand Avenue in the vicinity of the gas seepage and would allow a view of sediments underlying the area.

### Purpose of the Investigation

A check of geologic conditions in the vicinity of the seepage would give some clue as to whether or not marsh gas could be generated at this location. Also, entrapment mechanism was to be determined if the seepage proved to be of natural origin.

It was further decided to have two samples of the seepage gas checked for fractions of hydrocarbons on an ultrasensitive chromatograph being used by the Gulf Oil Corporation in a well being drilled near the little town of Halsey in the central Willamette Valley. If fractions of hydrocarbons heavier than methane (ethane, propane, etc.) were found in the gas samples, then it would be suspected that seepage was a result of escape of gas from

buried pipelines or nearby storage tanks. "Marsh gas" would be composed mostly of methane, nitrogen, and carbon dioxide. High nitrogen content of the gas in question suggests that decay of wood fiber buried in recent fill is the source of the gas. Also, a large part of the nitrogen in near surface sediments is residue from entrapped air.<sup>1</sup> Lower nitrogen content would be expected in gases originating in deeply buried sediments.

### Conclusion

Gas seepage in the S.E. Grand Avenue and Division Street area is likely from decomposition of the sawdust fill underlying a few square blocks and not from any pipeline or storage facility. The possibility that seepage is from deep-seated rocks is remote.

Chromatographic and mass spectrographic analysis of the gas indicates it to be of a type formed in Recent sediments and not the type of gas which is being piped into the area.

### Investigation

H. G. Schlicker, geologist, and V. C. Newton, petroleum engineer, both from the Department of Geology and Mineral Industries, drove to the vicinity of S.E. Grand Avenue and Division Street on December 16, 1963, to investigate the gas seepage.

S.E. Grand Avenue and Harrison Street. A 12-foot excavation was inspected at S.E. Grand Avenue and Harrison Street, where a Lord Bros. shovel was working. Workmen reported that no gas seepage had been noted in that end of the trench. The ditch exposure showed: 6 feet of fine sandy silt underlain by a cobble-pebble conglomerate with a silty matrix.

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<sup>1</sup> Rankama and Sahama, 1949: Geochemistry, p. 348-50, 360.

2320 S.E. Grand Avenue - May Hardware Company. A 12-foot excavation for a manhole was inspected and showed: 8-10 inches of paving underlain by 11 feet of sawdust which appeared unaltered. Workmen reported a sour smell in the excavation but said no gas had been noticed. One of the workmen said the sawdust dated back 75 years.

2445 S.E. 8th Avenue - Six Robbles' Inc. Mrs. Reid, assistant manager, reported that the gas seepage had first been noticed last August in the yard near their incinerator. Firemen had found small amounts of combustible gas in the Robbles' building on a few occasions. Mrs. Reid said no one could smell any gas. She said the building had been built on piles over a sawdust fill. The Robbles' building is just one block northeast of three large gas storage tanks. The extent of the filled land covers several city blocks, and the amount of sawdust used in the "made land" is unknown.

#### Discussion

Production of gas from decay of sawdust and wood chips could be considerable, and with an impermeable cap of clay and soil this gas could build up to a substantial volume under moderately low pressure.

The Northwest Natural Gas storage tanks are located within a few blocks of the area, and leakage from these tanks below the ground level or from old gas lines of the Portland Gas & Coke Company could be the source of gas seepage if the gas is found to be other than "marsh type." A third possibility, although remote, would be a natural gas seep introducing gas into the permeable sawdust reservoir from rocks below.

Gas has been noticed intermittently in closed buildings in this area for several months. Large concrete slabs for building foundations poured

upon permeable sediments could serve to concentrate the gas seepage. Pipes and vents penetrating foundation slabs would allow a passageway for gas to escape into the buildings.

Changes in atmospheric pressure could cause intermittent escape of gas from sediments in the vicinity. Variations in height of the water table could also create surges of pressure.

Gas Analyses by Baroid Chromatograph

Two samples of gas collected in the vicinity of the seepage by Donald Parker, Occupational Health Section, State Board of Health, were taken to the Gulf Oil Company "T. J. Porter 1" well site and analyzed on a chromatograph in the Baroid logging unit. The Baroid chromatograph was designed for ultra-sensitivity to hydrocarbons. Nitrogen, carbon dioxide, and oxygen could not be detected since air was being used as the carrier gas. Analyses of the samples were as follows:

	<u>Volume</u>	<u>Methane</u>	<u>Ethane</u>	<u>Heavier Fractions</u>
Sample No. 13	3 cc	600 ppm	0	0
Sample No. 14	3 cc	8000 ppm	0	0

Volume of methane in Sample No. 13 was calculated as 0.1% and in Sample No. 14, 1.5%. Apparently the sample was contaminated with air to some extent. A conversation with Larry Johnson, chemist, Northwest Natural Gas Company, disclosed that his analysis showed methane of seepage samples to range from 2% to 15% by volume.

Mr. Johnson was asked if the odor added to gas in their pipeline system would distinguish it from natural seepage. He thought not as clays and organic

material in soil would most likely remove the odor producing compound. Odor is added to the pipeline gas at the point where it is taken at the El Paso system.

Mr. Johnson gave the following composition as average for pipeline gas used in the Northwest system:

Methane . . . . .	93.0%
Ethane . . . . .	5.0
Propane . . . . .	1.5
Iso and normal butane . .	0.2
Pentane . . . . .	0.1

Report by: V. C. Newton  
H. G. Schlicker

Date: December 20, 1963