Complaint Case Facts and Findings
(Playa Del Rey Storage Field)

By

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Table of Contents

I. Introduction

This report presents some of the data that Consumer Protection and Safety Division (CPSD) has gathered from the investigation of the Complaint Case (C.00-05-010) proceedings. On May 11, 2000, three residents of Playa Del Rey area filed similar complaints against SoCalGas, C.00-05-010, C.00-05-011 and C.00-05-012, respectively. In addition, Grassroots Coalition and several other residents of Playa del Rey (PDR) and Marina del Rey joined the complaints. Although the complaints were filed separately and individually, they shared a common a concern that SoCalGas is operating its Playa Del Rey gas storage facility unsafely, in a manner hazardous to the health and safety of nearby homeowners. Specifically, the complainants alleged the storage reservoir was leaking, resulting in dangerous toxic pollution from venting and leaking gas, atmospheric contamination, noxious odors, and a leaking abandoned well . Each complainant asked the CPUC to conduct an investigation of the SoCalGas Storage facilities in Playa Del Rey.

SoCalGas filed a motion to dismiss these cases or consolidate the cases. Although the Commission denied the motion to dismiss the cases, but the motion to consolidate was granted and the three complaints were consolidated under Rule 55 of the Commission's Rules of Practice and Procedure. These three cases are now treated as one case under C.00-05-010.

CPSD investigations focused on all the allegations. During the course of these investigations, CPSD conducted laboratory analysis (Isotopic Analysis) of field samples from leaking abandoned well. CPSD also requested and reviewed large volume of data from SoCalGas and Grassroots Coalition. After review of all available data provided to CPSD, the findings were used to determine the merit of the allegations and consequently resolved some of the allegations. The remaining unresolved allegations have been classified into two issues: **(1) Any evidence of PDR storage gas and/ or Thermogenic gas within SoCalGas mineral rights migrating to the surface, (2) Any evidence that the PDR Gas Treatment and/ or PDR Gas Storage facilities are contributing to local**

residents' exposure to carcinogenic toxins. This report focuses on some of the data CPSD has collected, implications of our findings to date, and recommendations for resolving the two remaining allegations.

II. Discussions of Facts and Findings

One must remember that the following facts and findings do not definitively explain or answer the allegations. However, this information, individually or cumulatively, indicate that there might be potential problems that warrant further investigation. The type of investigation or study scope must consider the available data, along with how to integrate that data into a full reservoir study and a Health Risk Assessment (HRA) that provides definitive results that lead to resolution of the two outstanding allegations. It is important to note facts and findings presented below do not indicate any wrong doing on the part of SoCalGas. Instead, they simply reflect the existence of potential hazards compounded by lack of definitive test results or data gaps. The following facts are discussed below:

(a) Evidence of three types of natural gas in PDR

(b) 133 PPM Helium in a natural gas sample from a bar hole near Big Ben well

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(c) 22 PPM Helium from a shallow probe by John Sepich & Assoc.,

(d) Greater than 800 PPM Helium from groundwater samples

(e) ETI report indicated Thermogenic gas components detected in shallow subsurface geologic units and H2S detected in soil gas samples

(f) Previous reservoir inventory analysis

(g) 50,000 PPM gas detected at Troxel Well and known migration loss to well

(h) Potential problems with validity of some SoCalGas data.

A. Three types of natural gas in PDR

There is evidence of surface detection of three types of natural gas in PDR namely: Biogenic gas, Native PDR Thermogenic gas and Storage Reservoir

Thermogenic gas. Biogenic gas is commonly known as Swamp gas. Its chemical and physical characteristics are mostly Methane gas, formed by bacteria action in shallow surface. It has ***no*** Helium, Ethane, Butane or other heavier hydrocarbon. Biogenic gas is non jurisdictional. In contrast, Native PDR Thermogenic gas (native PDR gas) and Storage Reservoir Thermogenic gas (Storage gas)are formed by decomposition of prehistoric fossils under high temperature and pressure in deep and intermediate geological zones. Thermogenic gases have, Methane, Ethane, Helium and other hydrocarbons. Both native themogenic and storage reservoir thermogenic gases have some identical physical and chemical characteristicscontain varying amounts of Helium, Ethane, Methane and other hydrocarbons. Unfortunately, these identical characteristics make it difficult to differentiate Native PDR gas from Storage Reservoir gas. However, experts like Dr. Arehart (Department of Geological Sciences, University of Nevada) have discovered some subtle differences such as the difference in Helium content and the age of the Helium. There are evidence from various gas sample tests and isotopic analysis that show each of these three gases emanating to the ground surface at various locations at one time or another. The presence of Ethane, Methane, Helium and other hydrocarbons are one of the key considerations in determining if a sample is Biogenic or Thermogenic. Once it is determined that a sample is Thermogenic, then the Helium and the concentration present in that sample determines if it's Native PDR gas (1-15 PPM Helium) or Storage Reservoir gas (15-450 PPM Helium). However, commingling of these gases, alteration of physical and chemical properties by some external factors, and filtration of some gas constituents (possibly by groundwater or aquifer) obscure the minor differences and complicates the chemical speciation. *Please see Appendix # A*

B. **133 PPM Helium from bar hole samples near Big Ben Well**

SoCalGas internal office memorandum, dated November 20, 1991 revealed that gas samples collected from bar-holes around Big Ben Well contained 30,000 PPM to 620,000 PPM natural gas and these samples contained 133 PPM to 188 PPM

Helium. A close examination of the memo revealed that three samples were collected on 1/11/91, at bar-holes # 12, 13 & 14. Isotopic analysis of these samples indicated with high probability the signature of Storage Reservoir gas (meaning that the gas migrated from Storage Reservoir). In addition, the memo did not indicate any more sampling at these bar-holes or subsequent remedial action. On 8/23/91 and subsequent dates, samples were collected from bar-hole H instead of bar-holes 12, 13 & 14. The isotopic analyses of the new samples did not reveal the storage gas signature and subsequent discussion on the memo ignored the initial sample data, its significance and if there was any remedial action. *Please see Appendix # B*

C. 22 PPM. Helium from a shallow probe sample by John Sepich and Associate.

Isotech Laboratory performed an isotopic analysis of a gas sample submitted by Sepich & Associates on 3/25/99. Sepich and Associates was working for Playa Vista developers (developers of residential and business properties around the PDR.Storage field. The isotopic analysis report indicates the gas sample was collected from Playa Vista Project Area-D. The analysis report also revealed presence of Ethane and 22 PPM Helium in the gas sample. The significance of this isotopic analysis report is the presence Storage Reservoir gas or Native PDR gas signature and the location where the gas sample was collected (Area – D of Playa Vista Project). My opinion is that the probability of Storage Reservoir gas sample from PDR area containing Ethane and 22 PPM Helium is greater than 50 percent (>50%). Furthermore, the location where the sample was collected should be of major concern. Please see Appendix # C

D. 100 PPM–1000 PPM Helium from groundwater samples collected and analyzed by Exploration Technologies, Inc (ETI)

City of Los Angeles Building and Safety Department retained ETI to conduct test, analyze and provide advice on Playa Vista project. Groundwater samples were collected in 2000 from Playa Vista Project Area, and dissolved

gases were extracted and analyzed by ETI in addition to other scientific sampling and testing. Several groundwater samples revealed presence of high Helium concentrations and methane dissolved in the groundwater. The origin of this Helium in the groundwater is not clear. However, some people have postulated that the groundwater absorbs or strips the Helium from the Storage Reservoir gas or Native PDR gas as it migrates through the aquifer to the ground surface. Hence, Thermogenic gas is detected in soil-gas without Helium. Although, this postulation seems plausible, I have not seen any scientific paper on this absorption theory and the kinetics. *Please see Appendix # D*

E. Dr Victor Jones of ETI detected Thermogenic gas components at the surface and detected H2S in soil gas during his investigation in 2000.

ETI conducted an extensive soil gas investigation in Playa Vista area for the City of Los Angeles in 2000. The isotopic analysis report of the samples collected revealed presence of Methane, Ethane, Helium, H2S, Toluene and other volatile organic compounds (voc). The presence of numerous Thermogenic gas components in the shallow soil gas samples analyzed indicates a deeper source for this gas.

F. Previous Reservoir Inventory Verification Analysis by SCG indicated gas migration loss (8/22/80)

A Reservoir Inventory Verification Analysis conducted by Theodoros Georgakopoulos on August 22, 1980, for SoCalGas indicated gas migration loss. The migration pathways to the Townsite area (separate geologic zone) is unknown. The report estimated storage reservoir gas loss between January 1961 and December 1979 to be 0.10 B.c.f. Subsequent reports estimated the gas loss to have decreased. *Please see Appendixt # F*

G. Presence of Methane gas around Troxel Well.

As part of Energy Division (ED) initial preliminary investigation, ED retained MHA, who subcontracted Giroux & Associates to conduct site investigations at the Troxel and Lor Mar well site locations in 2001. These recent studies found very high methane concentrations (greater than 50,000 ppm) at the Troxel site and low methane concentrations (1 to 6 ppm) at the Lor Mar site.

Although high methane levels at Troxel dissipated over time, low methane levels persisted through the end of the 32 days study period. This indicates a possible source of methane at this location. Methane concentrations also fluctuated during the study period, indicating that external factors (atmospheric pressure, tidal influences, gas storage reservoir operations) may be affecting data measurements. However, a soil gas survey study requested by the Commission and conducted by SoCalGas' consultant, TRC concluded that there were no measurable concentrations of volatile or combustible compounds encountered in the soil gas. Also, the study detected presence of Hydrogen Sulfide and the source was unknown. But recent sampling by Energy Division's CEQA team reported measurable concentrations volatile hydrocarbons.

H. Validity of SoCalGas Data.

Data collected by SoCalGas may be flawed. Procedures used by SoCalGas to collect gas samples at the Troxel did not follow standard gas collection and sample handling procedures established by Federal Environmental Protection Agency and other trade associations. A plastic sheet was used to accumulate enough gas to collect samples for analysis. Samples were collected in plastic bottles. Since plastic is permeable to many gases, and may also absorb some hydrocarbon based gases, test results would not fully characterize gas emitted from the well.

Although bar hole testing is acceptable for Department of Oil Gas & Geothermal Resources leak detection requirement, it does not follow standard procedures established

for soil gas investigations. Soil is disturbed and compacted when the bar is driven into the ground. This could interfere with movement of some soil gas. Therefore, low levels of methane may not be detected and concentrations reported may not be valid.

III. Recommendations

A review of the aforementioned facts and findings suggest the existence of a potential safety hazard. Since the available geological data does not definitively support or disprove the existence of safety hazard in and around the storage reservoir, further investigation and study is needed. It is important and recommended that CPSD conduct (1) comprehensive reservoir study and (2) Health Risk Assessment (HRA) (HRA that is not limited to 'for sale lots" and integrate some of the data gathered from the CEQA study). The basis for this recommendation are in response to allegations of hazards to public health and Safety, potential ratepayer liability, lack of definitive results from available data and mandate from General Order 58-A, section 22. We recommend a reservoir study that will include but not limited to:

1) Construction of a 3-dimensional geologic computer model (Earth Vision or equivalent) using existing data (wells records, soil gas investigations, geo-technical borings, geophysical data, environmental borings, site contamination data, groundwater data, etc) to fully integrate and visually display geologic data (strata and discontinuities) and other subsurface information (gas and groundwater locations) at the storage field.

2) Drill a minimum of three shallow well observation wells to describe the stratigraphic conditions (visual and geophysical logging) in geologic deposits above 1000 feet elevation in order to define potential gas storage zones and migration pathways, and to collect gas samples from depths below biogenic sources.

3) Collect and analyze (isotopic and chemical analysis) the gas in geologic deposits from these wells, focusing on depths below

minus 500 feet elevation (below sea level), in order to determine the origin and genesis of the gas.

4) Integrate the results from items 1, 2 and 3 above to develop a logical, defensible subsurface model that explains the surface and subsurface gas detections and the potential pathways for gas to reach the surface environment.

5) Retain an expert to perform Helium Ratio Analysis.