Application: A.18-11-010
Exhibit:
Witness: M. J. Rosenfeld

Application of Southern California Gas Company (U 904 G) and San Diego Gas & Electric Company (U 902 G) for Review of Costs Incurred in Executing Pipeline Safety Enhancement Plan	Application 18-11-010

CHAPTER XIII

REBUTTAL TESTIMONY OF

MICHAEL J. ROSENFELD

(RECORDS)

ON BEHALF OF

SOUTHERN CALIFORNIA GAS COMPANY (U 904 G)

AND

SAN DIEGO GAS & ELECTRIC COMPANY (U 902 G)

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

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TABLE OF CONTENTS

I. INTRODUCTION

The following rebuttal testimony of Michael J. Rosenfeld, PE addresses the matter of Southern California Gas Company (SoCalGas) and San Diego Gas & Electric Company (SDG&E)'s Application for review of costs incurred in executing Pipeline Safety Enhancement Plan (PSEP) (A.18-11-010). The following testimony addresses opening testimony from the Public Advocates Office (Cal Advocates) regarding the lack or presence of certain test records[1]. This testimony provides a review of various issuances of applicable standards and regulations for hydrostatic pressure test and record keeping requirements.[2,3,4]

II. BRIEF REVIEW OF HISTORICAL HYDROSTATIC PRESSURE TEST REQUIREMENTS

The historical pressure test requirements in industry standard American Society of Mechanical Engineers (ASME) B31.8, California regulation General Order (G.O.) 112, and federal pipeline standard 49 Code of Federal Regulations (CFR) 192 are briefly summarized for the period from pre-1955 through post-1970. The requirements for transmission pipelines operating at hoop stress levels above 30% of the specified minimum yield strength (SMYS) and pressure greater than 100 pounds per square gauge (psig) are discussed. Other requirements have applied to pipelines operating below these levels.

[1] The Public Advocates Office Direct Testimony (Li) at 3.
[2] American Standards Association (ASA), "B31 Code for Pressure Piping", ASA B31.1, 1935, 1942, 1951; ASA B31.1.8, "Gas Transmission and Distribution Piping Systems", 1952, 1955; ASA B31.8, 1958, 1963; USA Standards, USAS B31.8, 1968; American National Standards Institute (ANSI), ANSI B31.8, 1975; American Society of Mechanical Engineers (ASME)/ANSI B31.8, 1982.
[3] Public Utilities Commission of the State of California, "Rules Governing Design, Testing, Maintenance and Operation of Utility Gas Transmission and Distribution Piping Systems", G.O. 112, 1961; G.O. 112-A, 1964; G.O. 112-B, 1967; G.O. 112-C, 1971
[4] CFR, Title 49—Transportation, Subtitle B—Other Regulations Relating to Transportation, Chapter I—Pipeline and Hazardous Materials Safety Administration, Department of Transportation (previously Hazardous Materials Regulations Board, then Research and Special Programs Administration, Office of Pipeline Safety), Subchapter D—Pipeline Safety, Part 192 (49 CFR 192) —Transportation of Natural and Other Gas by Pipeline: Minimum federal safety standards, 1970 and annual sequels.

A. ASME B31.8

ASME B31.8 is a voluntary industry standard stating generally accepted good practices.[5] Prior to 1952, the standard did not require pressure testing after construction for establishing the operating pressure. Some piping systems were tested at levels between 5 psig to perhaps 50 psig above the planned working pressure, typically with gas. Testing any higher was viewed as risky. The 1952 edition did not require a pressure test but allowed a higher working pressure if a test was performed. The 1955 edition required a post-construction pressure test to factors of 1.1, 1.25, and 1.4 times the maximum allowable operating pressure (MAOP) in location classes 1, 2, and 3 or 4, respectively. Tests could be performed with air, gas, or water in classes 1 and 2, or water in classes 3 and 4. The test duration was not specified.

Pressure test requirements in the 1958, 1963, 1967, 1968, 1975, and 1982 standards and their addenda were the same as in the 1955 standard. The 1984 Addenda to the 1982 edition specified that the pressure test be held for a minimum duration of 2 hours.

B. G.O. 112

California G.O. 112 went into effect June 30, 1961. Prior to that date, no regulation of gas transmission pipelines was in effect in California. G.O. 112 incorporated significant portions of the 1958 B31.8 standard, with certain changes to the pressure testing requirements. Among those changes were: the pressure testing requirements were extended down to pipe operating at hoop stresses of 20% or more of SMYS, the test margin for Class 1 pipelines was increased to 1.25, the test margin for Class 3 and Class 4 pipelines was increased to 1.5, and the test pressure was required to be maintained until it was stabilized for a period of not less than 1 hour. The requirements for pressure testing in the 1964 G.O. 112-A and 1967 G.O. 112-B were unchanged from 1961.

Following the issuance of 49 CFR 192, the 1971 G.O. 112-C replaced content from B31.8 with content from Part 192. The content from Part 192, Subpart J – Test Requirements, was incorporated verbatim. The 1979 G.O. 112-D incorporated the content from Part 192 issued in 1978.

[5] Hough, F.A., "The New Gas Transmission and Distribution Piping Code (ASA B31 Section 8)", GAS Magazine, Series in 8 Parts, January through September 1955.

C. 49 CFR 192

The first full set of federal pipeline regulations were issued in 1970. Subpart J – Test Requirements, §192.501 through §192.517 set forth requirements for pressure testing of pipelines after construction. An important difference relative to preceding or contemporaneous editions of B31.8 or G.O. 112 was §192.505(c) which required maintaining the strength test pressure for at least 8 hours.

For pipe installed after November 11, 1970, test pressure ratios were 1.1, 1.25, and 1.5 in Classes 1, 2, and 3 or 4, respectively. For pipe installed and tested prior to November 12, 1970, the test ratio for Classes 3 and 4 was 1.4, based on the requirements in the interim Federal standard between 1968 and 1970, which were the same as B31.8, and based on B31.8 being the de facto national standard prior to 1968 (except in California and perhaps a few other states). These requirements for testing after construction have remained static in subsequent years.

D. Grandfathered Pipelines

Provisions in §804.6 of the 1955 B31.1.8 and its sequels state that the standard was not intended to be applied retroactively to existing facilities insofar as design, materials, installation, establishing the operating pressure, and testing were concerned. Consistent with these exemptions, the concept that new or evolving requirements concerning those aspects are not retroactive to existing facilities that are already in operation was recognized in the federal pipeline regulations from the outset. This concept is embodied in §192.13 and is discussed in the Preamble to Part 192.

The term "grandfathered pipelines" refers to those pipelines for which the operating pressure was established on the basis of operating history rather than pressure tests. The 1970 regulation included a "grandfather" clause to permit continued operation of pipelines at the highest operating pressure the pipeline had experienced in service during the 5 years preceding July 1, 1970 (even if the pipe had previously been subjected to a hydrostatic pressure test on or before July 1, 1965 to qualify a higher MAOP but the pipe had not operated at that level during the specified 5-year interval).

G.O. 112 already had set a regulatory precedent for the grandfathering of untested pipelines. Gas pipelines placed in service after July 1, 1961 were required to be pressure tested, but those installed before that date were exempted from pressure test requirements.

III. BRIEF REVIEW OF HISTORICAL RECORDKEEPING REQUIREMENTS

The recordkeeping requirements in pipeline standards and regulations are briefly summarized below. The periods of time are categorized as pre-1955, 1955-1960, 1961-1970, and post-1970.

A. Recordkeeping Requirements Prior to 1955

Recordkeeping requirements specified in engineering standards for gas pipeline prior to 1955 were few and focused on welding. The 1935 B31.1 standard required employers of welders to maintain records of their welding operators showing dates of employment, results of welding tests, and their assigned identifying mark. The 1942 B31.1 standard, Appendix I, Part I required that records of welding procedure qualification testing and copies of the record for each qualified welder were to be kept by the manufacturer or contractor. No record retention period was specified, and no other recordkeeping requirements were stated.

No provisions or requirements for recordkeeping of any kind dealing with welding or installation were specified in the 1951 B31.1. Similarly, none were given in the 1952 B31.1, Section 8 in its entirety.

Retention of technical documents was not addressed by standards in that era. The project specifications were primarily intended to direct the construction contractor. It was generally thought that a copy of the specifications under which the pipeline was built and supplemented by commercial documents (e.g. contracts and purchase orders), would be adequate to provide evidence of the work that was done.[6]

B. Recordkeeping Requirements 1955 through 1960

The 1955 B31.1.8 Chapter II "Welding" continued the requirement that records of welding procedure qualification tests be retained for as long as the welding procedure is in use. Whoever employed the welders was required to maintain records of welder qualification, but only during actual construction.

Chapter IV "Design, Installation, and Testing" presents requirements for testing after construction of the pipeline. Under 841.41 "Test Required to Prove Strength of Pipelines and Mains to Operate at 30% or More of Specified Minimum Yield Strength of the Pipe", Paragraph 841.417 required maintaining records showing the type of fluid used for pressure testing and the

[6] Hough, 1955.

test pressure, for the useful life of the facility. The subsequent section 841.42 "Tests Required to Prove Strength of Pipelines and Mains to Operate at Less than 30% of Specified Minimum Yield Strength of the Pipe, but in Excess of 100 psig" contains no requirements for records. Since 841.417 is a subsection of 841.41 rather than appearing as a general requirement ahead of all tests for pipelines, or being repeated within each section discussing testing of differing categories of pipelines, or appearing in a separate section following all required tests, it is not a general requirement on all testing. It only applies to testing performed under 841.41.

The 1955 edition was the first B31 piping standard to extend its scope beyond design, construction, and commissioning of the piping system to include operation and maintenance. Accordingly, additional recordkeeping language was introduced in Chapter V, "Operating and Maintenance Procedures". Paragraph 850.3 "Basic requirements" stated that "each operating company having gas transmission or distribution facilities … shall: (a) Have a plan covering operating and maintenance procedures…(c) Keep records necessary to administer the plan properly." Under Section 851 "Pipeline Maintenance", records "should" be made of pipeline inspections for external or internal corrosion, listing several items of potential interest, and records "should" be made covering leaks and repairs. In addition, leakage survey records, line patrol records and other records relating to routine or unusual inspections "should" be kept on file for as long as the section of line remains in service.

The terms "shall" and "should" were used throughout B31.1.8 and its sequels. "Shall" is understood to mean an action is required, while "should" is understood to mean an action is recommended, but not required. Records adequate to effectively execute the pipeline operation and maintenance plans were required, but specific records were merely recommended and what was actually required was left to the operator. The possibility was not precluded that data different than or in addition to what the standard said "should" be recorded might be necessary in order to fulfill the requirement to "keep records necessary to administer" the operation and maintenance plan. Note also that the Code has historically given leave to not follow specific requirements where the operator can show by experience, testing, or analysis that an alternative is safe and reliable. An operator might conclude that maintaining some kinds of records is unnecessary based on experience or judgment.

C. Recordkeeping Requirements, 1961 to 1970

The recordkeeping requirements in the 1958 and 1963 editions of B31.8 did not differ from the 1955 edition. The 1968 edition added certain enhancements such as the weld inspection requirements similar to those introduced by the 1961 G.O. 112 but without the accompanying weld inspection recordkeeping requirement. On the other hand, the corrosion inspection and leak investigation recordkeeping provisions became required, not recommended.

California G.O. 112 of 1961 incorporated most if not all of the 1958 B31.8 standard, with added requirements to better meet the objectives of the CPUC, for clarification, and for enforcement. Some important additions involved recordkeeping. G.O. 112 added minimum welding inspections based on location class and stipulated that a record be made of the results of the tests and the inspection method used. The requirements for pressure testing of pipe that operates at 30% or more of SMYS was extended downward to pipe operating at 20% or more of SMYS, including the pressure test recordkeeping requirements. The records only needed to state the test fluid and test pressure per §841.417. In G.O. 112, Chapter V, recommended patrols and corrosion inspections were made mandatory, and records of corrosion inspections and leak investigations recommended in B31.8 became required.

A Chapter VI "Records" was added to G.O. 112 consisting entirely of CPUC-originated language. Clause §301.1 therein stated that "the responsibility for maintenance of necessary records to establish that compliance with these rules has been accomplished rests with the utility. Such records shall be available for inspection at all times by the Commission…". In other words, the utility must maintain sufficient records to be able to demonstrate that the utility is complying with all of the rules. This could include design calculations, material procurement records, and a broad range of construction and installation inspection information, in addition to the operation and maintenance activities described above and could well have involved more extensive recordkeeping than was considered necessary before G.O. 112. The purpose for these records was to demonstrate compliance, not for day-to-day operation. Clause §302.1 required that the specifications for materials and equipment, installation, testing, and fabrication were to be maintained by the utility. Clause §303.1 required that plans for operation and maintenance including the intended MAOP were to be maintained; Clause §303.2 stated that the utility may not operate the pipeline at pressure greater than the MAOP of record under §302.1.

A Chapter VII "Reports" was added requiring reporting to the California Public Utilities Commission (CPUC) thirty days in advance of any proposed new installation, major reconstruction, or change in MAOP. Specific information to be reported to the CPUC included the purpose or reason for the activity, specifications concerning pipe to be installed, the MAOP, and the test parameters to be used.

G.O. 112-A of 1964 and G.O. 112-B of 1967 added no new recordkeeping requirements.

D. Recordkeeping Requirements, Post-1970

Complete federal safety standards for gas pipelines were introduced in 1970. Although some technical content was based on the 1968 edition of B31.8, the regulatory provisions went well beyond B31.8 in terms of inspections and recordkeeping. All provisions were required, not merely recommended ("shall", not "should"). Moreover, many of these requirements exceeded those in effect in G.O. 112 at that time. These are briefly discussed below.

- Subpart E – Welding: §192.243(f), where nondestructive testing of girth welds is performed, a record is required showing the number of welds made, the number tested, the number rejected, and their disposition by location, for the life of the pipeline. Also §192.225(c), requires a record of the details of each qualification of a welding procedure, to be retained for as long as the procedure is used.
- Subpart J – Test Requirements: §192.517, a record is required of each test performed on pipelines operating at a hoop stress of 30% or more of SMYS or above 100 psig but below 30% of SMYS. The record must indicate the following seven items: (1) the names of the operator, the responsible employee, and the test company (if any); (2) the test medium used; (3) the test pressure; (4) the test duration; (5) pressure readings; (6) elevation variations if they are significant; and (7) leaks or failures. Such records must be retained for the useful life of the facility.
- Subpart K – Uprating: §192.553(b), a record is required of each investigation, work done, and each pressure test in connection with the uprate. The record must be retained for the life of the uprated segment.
- Subpart L – Operations: §192.619(a) sets forth several criteria for establishing the MAOP, as the lowest of: a design pressure based on component pressure ratings or engineering calculations using specified material strength and wall thickness; the highest pressure to which the pipeline had been subjected during the 5 years preceding July 1,

1970; a percentage of the highest test pressure to which the pipe had been subjected, either in the pipe mill or in the field; or the safe pressure considering the condition of the pipeline. Recordkeeping is not discussed but records of some type are necessary to meet at least one of the criteria at the time the MAOP is established.

- Subpart M – Maintenance: §192.709, a record is required of each leak discovered, repair made, line break, leak survey, line patrol, and inspection of transmission pipelines for as long as the line remains in service. Records must be retained at least until the next round of inspections.
- Numerous other activities (sampling of odorant, valve maintenance, vault maintenance, distribution leakage surveys, and others) must occur at specified periodic intervals. No recordkeeping was specified in connection with those activities.

The 1970 issuance of Part 192 added Subpart I on corrosion control, which required installation and criteria for the cathodic protection (CP) of buried steel pipelines, periodic monitoring of the effectiveness of the CP system, monitoring of internal corrosion, and monitoring of atmospheric corrosion. Recordkeeping requirements introduced on July 31, 1972 are discussed below.

- Subpart I – Corrosion Control: §192.491(a), each operator was required to maintain records or maps showing the location of cathodically protected pipe, CP facilities, and other structures bonded to the pipe. Also, per §192.491(b), each record or map from (a) plus records of each test or inspection of the CP system in sufficient detail to show adequacy of corrosion control were required to be retained as long as the facility is in service.

Important and extensive new recordkeeping requirements were put in place to support operator qualification (Subpart N) in 1999, integrity management planning for transmission pipelines in high consequence areas (Subpart O) in 2004, and distribution system integrity management planning (Subpart P) in 2009. Most such records were to be retained for defined but limited periods of time, not permanently.

IV. IMPLICATION OF MISSING RECORDS

The implications of missing records for day to day operation and integrity management are discussed below.

A. Records Continuity Was Not a Requirement

The practical significance of the "grandfather" rule was that it was unnecessary for an existing pipeline already in service to have been pressure tested to the minimum specified ratio of the MAOP. In fact, §192.619 offered four possible alternatives for establishing the MAOP:

- §192.619(a)(1) recognized the design pressure of the weakest component in accordance with Subparts C and D. In this case the MAOP would be based on manufacturer's component pressure ratings or engineering calculations using specified material strength and wall thickness.
- §192.619(a)(3) recognized the highest pressure to which the pipeline had been subjected during the 5 years preceding July 1, 1970.
- §192.619(a)(4) recognized 85% of the highest test pressure to which the pipe had been subjected, either in the pipe mill or in the field. If no field test was documented, the mill test would govern. The operator could determine the pipe mill test pressure from the pipe product specification without a certified mill test report. A purchase order for pipe meeting a specific specification such as ASTM A106 or API 5L X42 would be sufficient to determine the mill test.
- §192.619(a)(5) allowed the operator to determine the maximum safe pressure considering the history of the segment, known corrosion, and actual operating pressure. This might be used, for example, with an uncoated pipeline that had experienced general wall thinning due to corrosion. (Note that this language existed prior to the use of in-line inspection for conducting integrity assessment, so an operator might not have had complete information about the extent of corrosion.)

None of the above methods for establishing the MAOP required documentation of a prior post-installation pressure test. In fact, clause (a)(3) requires knowing no information about the specified grade or wall thickness of the pipe. That these alternative methods of establishing MAOP were allowed indicates that OPS accepted that records of testing or of pipe physical attributes were not always available. In other words, records being incomplete was an accepted

norm. These alternatives have been in Part 192 from 1970 to today, so the Office of Pipeline Safety (OPS) (now Pipeline and Hazardous Materials Safety Administration (PHMSA)) has since 1970 accepted that not all records need necessarily be available, or if present, need necessarily be complete.

B. Can an Operator be Prudent While Having Incomplete Records?

It is not uncommon for pipeline operators to have incomplete or inaccurate data about attributes of portions of their pipeline systems, including specified pipe material grades, specified nominal wall thicknesses, seam types, pipe manufacturers, coating types, flange or valve pressure classes, installation dates, construction specifications, welding procedures, pressure tests, corrosion control, and historic operating pressures.

The likelihood of records being incomplete increases with the age of the system, particularly with systems built prior to 1970 when the more-extensive records requirements of Part 192 came into effect. While the likelihood of gaps in the data increases with age, compromised data exist in systems built in many eras, including those built in recent years. Whether a lack of certain documents constitutes violation of regulations or indicates operator imprudence has become central to whether shareholders or rate payers pay for costly retesting or replacement of pipe.

There are many innocuous causes for loss of records, for example: an individual not recognizing the importance of a document or collection of documents, change of facility ownership, a property loss event (fire, flood), clerical mishandling, or misplacement in offsite storage. Back-up copies in one form or another can offset the loss of originals but consider that photocopy technology was not widely available until the mid-1960s perhaps after some original documents were already lost, and also that the back-up process is not without risk either.

Loss of useful records for any reason is undesirable, but past failure to preserve records does not necessarily imply operator imprudence or irresponsibility, neither does operating a pipeline while gaps exist in some records. Not all records are important to safely operate a pipeline day-to-day; once the primary purpose of the record has been satisfied, prudence is exercised in making good choices with the information available. Consider that a pressure test of a pipeline following construction had been performed and that all stakeholders (owner, state or federal regulator, lender, insurer) were satisfied that the pipeline had been properly designed, constructed, and commissioned. The MAOP is entered into a ledger, a memo stating the MAOP

is issued to the control room, pressure control set points are confirmed, and operating procedures are updated. Consider next that the actual pressure test records become lost some years later. How does the loss of that record affect any of the numerous activities a prudent operator is obliged to carry out day after day, such as: controlling pressure within established set points, marking the line for excavators, conducting damage prevention and public education programs, periodically testing valves, performing leakage surveys, repairing leaks, conducting line surveillance, maintaining cathodic protection, or training operations personnel, to name a few? The answer is that it does not. Once the MAOP has been correctly established using any one of the allowed methods, those records have little bearing on the safe day-to-day operation of the line.

Gaps in data that validate the MAOP severely limit an operator's options for addressing a change in location class, pressure uprate, or request for regulatory waiver or special permit, which is as it should be. Data quality also has implications for integrity management. Certain elements of an Integrity Management Program (IMP), notably the integrity threat identification and risk assessment tasks, are facilitated by having reasonably complete and accurate historical and technical data. ASME B31.8S recognizes that data important or useful to these tasks may be missing: §4.2.1 "Data Requirements: Prescriptive Integrity Management Programs" states that if listed data elements relevant to an integrity threat are not available, the integrity threat must be assumed to apply; §4.4 "Data Collection, Review, and Analysis" states that unavailability of data cannot be used to justify excluding an integrity threat; §5.9 "Data Collection for Risk Assessment" advises that if significant data are not available, the risk model may need to be modified based on an analysis of the impact of the data being unavailable; Appendix A, the paragraph "Gathering, reviewing, and Integrating Data" states that where the operator is missing data, conservative assumptions shall be used with the risk assessment or the segment shall be prioritized higher for each integrity threat listed. Part 192, Subpart O, §192.917 requires the operator to perform integrity threat identification and risk assessment in accordance with B31.8S, Sections 4 and 5, respectively, which incorporate the above provisions concerning how to compensate for unavailable data. By referencing these sections, the regulations clearly contemplate that data important to an IMP may be unavailable.

The foregoing discussion is not meant to suggest that all records losses or data gaps are inconsequential. In fact, accurate and readily available data of some kinds are essential for safe

and efficient operation. The industry's efforts to respond to the San Bruno incident by evaluating the accuracy of its records are beneficial. There is value in good records, however the industry, including regulators and other stakeholders, should contemplate whether any amount of retrospective records analysis can offer complete protection against "unknown unknowns", particularly where they originated many decades ago. That recognition supports the CPUC's directives to require replacement or retesting where adequate test records are lacking.[7] However, failure to maintain documents not originally required, or the retention of which was not enforced, does not automatically mean the operator was irresponsible or imprudent in day-to-day operations. Ratepayers should reasonably bear the cost of achieving the added assurance provided by pipe replacement or retesting unless it can be shown that an operator's behavior was in some way irresponsible beyond a failure to maintain historic documentation, or the missing records somehow led to a systemic safety-related condition. In this case, there is no evidence that either circumstance is the case.

C. Cal Advocates' Position is Inconsistent with CPUC's Prior Decision

Cal Advocates has stated that without records of a historic test not having been performed, a test should be presumed to have occurred.[8] This is objectionable for the following reasons:

- It attempts to enforce a requirement that did not exist. Prior to 1961, testing was not a requirement. Even if the utility may have stated a policy of observing B31.8, observance was still voluntary. Not testing a pipeline was not a barrier to the pipeline entering service.
- The assertion that prior to 1961 it was the utility's policy to test does not allow for the possibility that in some cases a test might not have been performed for reasons of feasibility or other consideration.
- Cal Advocates is expecting the utility to prove a negative. Events that do not occur are rarely documented. Even if the nonevent is documented, a record of "no test" is as subject to physical loss as a record of a test.

[7] CPUC Rulemaking 11-02-019, Order Instituting Rulemaking on the Commission's Own Motion to Adopt New Safety and Reliability Regulations for Natural Gas Transmission and Distribution Pipelines and Related Ratemaking Mechanisms, February 24, 2011.
[8] The Public Advocates Office Direct Testimony (Li) at 8.

- It is contrary to the position the CPUC has taken in its prior decisions, which is that without a sufficiently detailed record of a test, a test cannot be presumed to have happened and the utility must test or replace the pipe. The utility was not allowed to apply logic, judgment, or speculation, based on company policy, industry convention, or any other reason, to argue that a test likely did occur, particularly post-1961. Cal Advocates now argues that the same event that the CPUC would not acknowledge could have happened without a confirmative record, actually did happen without a confirmative record that it did not.

This concludes my prepared rebuttal testimony.