Appendix II

ACCIDENTAL DEATHS

The following memorandum was prepared for me by Harry Chapman, Superintendent of Sewer Operations. The data were prepared from memory, and notes kept by Chapman and from office records.

During the construction of the South Bay Cities Main Trunk in 1925 along the beach, a timber set failed and the sand flowed in covering the pipe layer and he had suffocated before the sand could be removed. This sewer was built by J. C. Duncan.

In 1927 the Joint Outfall "A" was constructed by Charles and George K. Thompson, north of Rocha Street on Wilmington Avenue. A crane was using a clam shell to pull timber. The clam broke loose from the machine killing the man below.

Mr. Cooper, working as an inspector for the P.W.A. was killed by falling off a pier built by Merritt Chapman and Scott Construction Company building the Ocean Outfall in 1936.

Two W.P.A. workers engaged in building a sewer line in Wilmington Avenue were killed while cleaning up a manhole. The names are unknown to the Districts as were the names of most W.P.A. workers whose employment records were kept by Federal timekeepers.

Construction crew building sewer lines in Long Beach, 1948, was making connections of existing lines to the Water Street Trunk. Aguilera and Schumacher, without jurisdiction or permission, tried to make a connection between two sewers and were overcome by gas. When found both men had expired in a manhole on Pico Avenue at Eighth Street.

William Chorovich lost his life in 1948 due to a cave-in while working for the George Miller Company on the construction of the Alameda St. Ext. Trunk sewer. H. L. Kennedy injured his head in a

fall during construction of the 12′ tunnel and later died from the accident.

Pete Grgic, working for the P & J Artukovich Construction Company building the Joint Outfall "F" in 1950, contacted a cable on a crane that was against a power line causing his death.

Martin Brkich Company constructing the Joint Outfall "C" tunnel on Eleventh Street, in Long Beach, caused the death of a man in 1951 when the timbering in a shaft failed.

William Katko lost his life in 1951 while working with District Forces cleaning the Lomita Trunk. Al Hartwig while working in a manhole lost consciousness. Katko entered the manhole and tied a rope around Hartwig who then was removed from the manhole and given first aid by men on the crew. In the meantime the fire department had arrived, removed Katko and applied first aid. The doctor who had been called to the scene pronounced Katko dead. Hartwig was revived and is still working for the Districts.

In 1955 Frank C. Kelly, working for Healy-Tibbitts Company on the inshore end of the Ocean Outfall, was killed when he fell off the pier to the rocks below.

Pipe stacked to be layed for the Base Line Trunk being constructed by the Kevry Construction Company in 1955, was the cause of the death of a child, Nancy Jean Sherer. She was crushed when the pipe shifted while playing on the stacked pipe.

A man was killed by a cave-in during the construction of the District 5 Relief Trunk by the Bosko Construction Company.

John F. Jensen was killed at Palos Verdes Landfill on July 4, 1961, when the tractor he was operating turned over and crushed him.

Harry Chapman

Appendix III

SOME SIGNIFICANT FINDINGS

On many occasions, the engineering staff of the Districts was confronted with situations which could not be resolved by application of the experience of others. Five of these occasions are notable in the life of the Districts because of the solutions presented by the Districts and which had widespread acceptance. Two of the efforts have received honors from the American Society of Civil Engineers; a third is incorporated in its Proceedings and the other two have been given wide publicity in technical journals.

The condition which had developed in the trunk sewers of Los Angeles and was apparent prior to commencement of District work, was such as to imperil the life and safety of many of the sewerage structures. Almost immediately upon completion, the screening plant at Hyperion began to show the destructive action of oxidized H_2S upon unprotected concrete. Early in 1925 the Districts requested authority to build an experimental line near the inlet to the City plant, thru which sewage would flow during high flow periods. Each four foot length of pipe in the line was protected on the inside with a lining which had been recommended for use in such construction and one which the District thought might be satisfactory. The line was placed in operation December 7, 1925 and inspected from time to time by all concerned. All of the lining materials failed excepting that proposed by the District engineers. Actually the District had merely adapted a lining previously used by the City but improved it by rendering certain joints impervious to acid attact.

This experiment dictated a course of action to the Districts which was followed for years at a good deal of expense, but it proved of temporary value only in the long run. That it did partially protect the main trunk of the districts during years of extremely limited sewage flow is the sole value it produced. For years, however, it remained the genesis of experimental work in

this direction and practically every experimenter into this matter found himself eventually at the end of the line at Hyperion. At the time it was considered a step in the right direction. Actually it was the wrong approach but the Districts' interest in the subject led to a far better solution later.

A much better precaution against the H_2S destruction problem was brought to light a number of years later when a fairly high velocity flow in the Wright Road sewer in District 1, in which sewage of required age to produce sulfide, in sufficient quantity to promote destruction of concrete pipe, did not appear to be doing so. Experiments showed that sulfide was being formed by the slimes on the submerged pipe wall, but something was happening to it before it could escape into the sewer atmosphere. It was determined that the sulfide was being oxidized as fast as formed by oxygen absorbed at the surface of the stream. Subsequent investigations, prompted by the phenomenon observed in the Wright Road experience gave rise to the Bowlus-Pomeroy formulae defining the strength temperature - velocity conditions controlling escape of hydrogen sulfide to the atmosphere from sewage. This permitted design of sewers to prevent escape of the gas and thus protect the pipe interior. The results were published in a paper in 1946 that was awarded honors by The Sewage Works Federation, and that is now widely used in sewer design.

Prior to Sanitation District experimentation, there was very little accurate knowledge of the rate of diffusion of fresh water in salt water, consequently little was known or could be determined, in advance of actual operation, about the spread of a sewage field in sea water before its disappearance as such. In March, 1926 the District staff undertook to find out the factors which influenced the phenomenon and, to that end, installed a small experimental plant on a raft anchored in San Pedro Harbor. At the model study the effect of depth, direction and quantity of discharge, upon the spread of a field of fresh water on one of salt water was determined and applied, with great benefit, to design of the District Ocean Outfall at White's Point. The formulae derived, (Rawn-Palmer) were widely adopted and were published, with a description of the research, in proceedings of the American Society of Civil Engineers.

In 1962, after many years of experience, research and analysis, a second treatise on the subject was prepared and published in the journals of the American Society of Civil Engineers. The second paper reviewed the existing District structures at White's Point and, in addition to a further analysis of the phenomena of ocean disposal, prepared a pattern of design. The second paper was awarded honors by the Society. The second paper and treatise were authored by Bowerman, Brooks and Rawn. All were employees of the District at the time.

A radical departure from universal sewage sludge digestion practice was investigated by the District staff. Known then, and now, as stage digestion, it took advantage of the gravimetric segregation of sewage solids during the digestion process, resulting in more rapid progress of readily digested solids thru digestion tanks, less tank capacity and better control of the process. The investigation resulted in a paper descriptive of the work, authored by Banta, Pomeroy and Rawn, all employees of the District. The paper was awarded honors by the American Society of Civil Engineers and was published in its journals. Much of the progress in the perplexing problem of sewage sludge disposal was stimulated by the District effort and the development of the process has materially reduced the cost of sewage treatment to the Districts and elsewhere.

Measuring small sewage flows was a problem in sewerage practice for many years. It was one which confronted the Districts in apportioning sewage flow costs to the various districts, in the early days of operation. Incorporating the principal of critical flow in fluids, Bowlus and Palmer, both District employees, developed a simplified weir which offered no obstruction to the passage of sewage solids thru the area where normal flow was temporarily increased to critical flow. Loss of head in the sewer was greatly minimized and the weir could be moved from place to place easily. Its use has been adapted to many locations since publication of the results in technical journals. For the Districts it simplified the trimonthly task of apportioning costs of operation to flow and accurately assessing each District with its proper cost.

Appendix IV

Some Published Articles Written by District Personnel

Title	Author(s)	Reproduction	Year
"Pre-Determining the Extent of a Sewage Field in Sea Water"	Rawn, A M Palmer, H. K.	Transactions Vol. 94, p. 1036	1930
"Multi-Stage Sludge Digestion at Los Angeles County Sanitation Districts' Plant"	Rawn	Sewage Works Journal Vol. III, No. 4	Oct. 1931
"Adaptation of Venturi Flumes to Flow Measurements in Conduits"	Palmer, H. K. Bowlus, Fred	Transactions Vol. 101 (1936) p. 1195	1936
"Multiple-Stage Sewage Sludge Digestion"	Rawn, A M Banta, Perry Pomeroy, R.	Transactions Vol. 104 (1939) p. 93	1939
"The Utilization of Sewage Water for Agriculture"	Rawn, A M	Printed. International Sewerage Conference Dresden.	1941
"Sludge Digestion Temperature Control With Live Steam"	Rawn	Water Works & Sewerage	July 1942
"Developments of the Year in Sewerage & Industrial Wastes"	Rawn	Water Works & Sewerage Vol. 91, No. 2	Feb. 1944
"Employee Organization in the Professional Field and the Public Services"	Rawn	Journal of the American Water Works Assn. Vol. 36, No. 7	July 1944
"Report on Sulfide Control Research"	Pomeroy, R. Bowlus, Fred	Sewage Works Journal Vol. XVIII, No. 4	July 1946
"Water from Wastes: Concepts and Costs"	Rawn	Engineering News-Record	Sept. 1949
"Postwar Growth and Development of the County Sanitation Districts of Los Angeles County"	Parkhurst Gilman, III, R.	California Sewage Works Journal	1949
"Handling Radioactive Wastes in Sewers"	Parkhurst	Sewage Works Journal Vol. 22, No. 8	Aug. 1950

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"Postwar Growth and Development of the County Sanitation Districts of Los Angeles County"	Parkhurst Gilman, III, R.	California Sewage Works Journal	1949
"Handling Radioactive Wastes in Sewers"	Parkhurst	Sewage Works Journal Vol. 22, No. 8	Aug. 1950
"Some Effects of Anaerobic Digestion on Sewage Sludge"	Rawn Candell, E. J.	Transactions Vol. 115 (1950) p. 181	1950
"Some Effects of Home Garbage Grinding Upon Domestic Sewage"	Rawn	The American City	Mar. 1951
"Central Garbage Grinder Stations"	Rawn	The American City	Apr. 1951
"Sewage Reclamation by Spreading Basin Infiltration"	Stone, Ralph Garber, W.	Transactions Vol. 117 (1952) p. 1189	1952
"Application of Molecular Filter Membranes to Specific Problems in Water Analyses"	Goetz Gilman Rawn	Journal of the American Water Works Assn. Vol. 44, No. 6	June 1952
"Integrating Reclamation and Disposal of Waste Water"	Rawn Bowerman Stone	Journal of the American Water Works Assn. Vol. 45, No. 5	May 1953
"Influence of Water-Borne Sewage"	Rawn	Centennial Transactions Vol. CT (1953) p. 649	1953
"Disposal of Digested Sludge by Dilution"	Rawn Bowerman	Sewage & Industrial Wastes Vol. 26, No. 11	Nov. 1954
"Incineration and Alternative Refuse Disposal Processes"	Stone Bowerman	Proceedings Vol. 80 Separate No. 471	Aug. 1954
"Philosophy of Water Pollution Control in California"	Rawn Bacon	Sewage & Industrial Wastes Vol. 27, No. 11	Nov. 1955
"New Methods for Sand Tunneling"	Haug	Western Construction pp. 25-27	Apr. 1956
"Planned Refuse Disposal for Los Angeles County"	Rawn	Civil Engineering Vol. 26, No. 4	Apr. 1956

Title	Author(s)	Reproduction	Year
"Planned Water Reclamation"	Rawn Bowerman	Sewage & Industrial Wastes Vol. 29. No. 10	Oct. 1957
"Refuse Collection and Disposal in 194 Western Cities"	Updegraff Bowerman	Western City	May, June. July 1958
"Bacterial Monitoring Guards Coastal Recreational Waters"	Rawn	Wastes Engineering Vol. 30. No. 4	Apr. 1959
"The Why, When, and How of Sewer Maintenance"	Parkhurst	Sewage & Industrial Wastes	Dec. 1959
"Non-Clog Pumping and Dewatering"	Compton	Wastes Engineering	Oct. 1959
"A Density Meter to Control Sludge Pumping"	Garrison Nagel	Sewage & Industrial Wastes	Nov. 1959
"Sewerage & Waste Disposal Practices of Sanitation Districts of Los Angeles County"	Parkhurst	Journal - Water Pollution Control Federation (reprints)	Oct. 1960
"Diffusers for Disposal of Sewage in Sea Water"	Rawn Bowerman Brooks	ASCE Transactions Paper 3179 Proceedings Paper 2424	Mar.
"Composting Operation in Los Angeles County"	Compton Bowerman	Compost Science Vol. 1, No. 4	Winter 1961
"Effect of Wind, Tide, and Weather on Nearshore Ocean Conditions"	Parkhurst Garrison Whitt	Reprints from Pergamon Press Int. Conf. on Water Pollution Research, London	Sept. 1962
"Garbage, Detergents, and Sewers"	Bowerman Dryden	Journal - Water Pollution Control Federation	May 1962
"Water Reclamation at Whittier Narrows"	Parkhurst Garrison	Journal - WPCF Vol 35, No. 9	Sept. 1963
"High Rate Digester Design and Operation" (titled in magazine "Gas Recirculation-Natural, Artificial")	Parkhurst Garrison Nagel	Published in Wastes Engineering pp. 58-63 Vol 1., No 2. (typed)	Feb. 1964
"Reclaiming Used Water"	Parkhurst	The American City	Oct. 1963
"Water Reclamation in Southern California" (titled "Water - Reuse May be the Key to a Vital New Water Resource" in Magazine)	Parkhurst	The Tax Digest Vol. 42. No. 2	Second Quarter 1964