STATE OF NEW HAMPSHIRE
BEFORE THE
PUBLIC UTILITIES COMMISSION

City of Nashua: Taking Of Pennichuck Water Works, Inc.

Docket No. DW 04-048

# DIRECT TESTIMONY OF RICHARD RIETHMILLER

January 12, 2006

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## I. INTRODUCTION OF RICHARD RIETHMILLER

**Q. Please state your name and address.**

A. My name is Richard Riethmiller. My address is 62 Jackson Court, Pagosa Springs, Colorado 81147.

**Q. Are you currently employed?**

A. I am a professional engineer and currently work as an independent consultant. I recently retired from the engineering firm of Burgess & Niple, with whom I worked for 41 years.

## II. PURPOSE IS TO DETERMINE THE RCNLD OF THE TANGIBLE PERSONAL PROPERTY OF THE PWW SYSTEM

**Q. What is the objective and purpose of your testimony in this proceeding?**

A. I understand that the City of Nashua has filed a petition to condemn the operating assets of Pennichuck Water Works, Inc. ("PWW"), which is the subject of this docket before the Commission. I was engaged by counsel for PWW along with the engineering firm of Gannett Fleming, Inc. ("Gannett Fleming") to conduct a replacement cost new less depreciation ("RCNLD") method analysis of the tangible personal property associated with the water system owned and operated by PWW in Nashua and portions of other communities west of the Merrimack River. That tangible personal property includes, among other things, the treatment plant, wells, pump stations, tanks, and the transmission and distribution mains and services. An appraisal of the land and the discrete intangible assets is being performed by others.

**Q. How did you coordinate your efforts with Gannett Fleming?**

A. I was responsible for the overall assignment and consulted on all aspects of the work with Harold Walker at Gannett Fleming. As I will discuss in more detail later in my testimony, Gannett Fleming prepared the replacement cost new component of the analysis under my supervision, and I focused my primary attention on the observed depreciation component.

**Q. Did you also coordinate your efforts with Robert Reilly of Willamette Management Associates?**

A. Yes, it is my understanding that the results of the RCNLD assessment of the tangible personal property of the PWW System will become a part of the overall fair market valuation of the operating assets of PWW being conducted by Robert Reilly of Willamette Management Associates. I understand that Mr. Reilly will utilize the RCNLD results as one component of the fair market valuation. During the course of this work, I, along with Harold Walker of Gannett Fleming, met with Mr. Reilly and coordinated all aspects of the work so as to provide a consistent and complete analysis of the value of the tangible personal property of the PWW System. We fully apprised Mr. Reilly of the scope, substance and results of our analysis.

## III. RICHARD RIETHMILLER'S QUALIFICATIONS AND EXPERIENCE

**Q. Have you submitted a current copy of your professional qualifications?**

A. I have. It is Attachment RWR-1, and I will incorporate that statement of my professional qualifications into this testimony by reference.

**Q. In what states are you registered as a professional engineer?**

A. I am currently registered as a professional engineer in the States of New Hampshire, Illinois, Ohio, California, Kentucky, Michigan, and Pennsylvania.

**Q. Please describe your experience in conducting RCNLD studies.**

A. As you can see from my qualifications, I began my career with Burgess & Niple in 1963. Burgess & Niple has been in the utility business since its inception in 1912. Mr. Burgess, the Company's founder, was a recognized expert in water utility design and in the valuation of such property.

My first involvement with RCNLD studies began in 1959. At that time, I attended Ohio State University and worked summers in the Burgess & Niple appraisal department. My first assignment was to assist in conducting the property inventory and in assembling of the report of the Richmond, Indiana Water Works valuation. I spent the next summer in Muncie, Indiana assembling the water system inventory, assisting with pricing, and assisting with the on-site observed depreciation inspection.

Following graduation from Ohio State University, I joined Burgess & Niple full time and participated in the valuation of water systems in Ashtabula, Ohio, Terre Haute, Indiana, Joplin and St. Joseph Missouri, and Tiffin, Ohio. My work included conducting asset inventories and assisting with the observed depreciation analysis. In 1966, Burgess & Niple began preparing a RCNLD valuation of the Alexandria Water Works in Fairfax County, Virginia. I was on site for over 2 years, assembling inventory, pricing, and assisting in the observed depreciation analysis.

**Q. How many RCNLD studies have you participated in over the years?**

A. Over the years I have conducted and supervised over seventy RCNLD studies for various purposes. As a result, I have developed a particular expertise in assessing the observed depreciation associated with water and wastewater systems.

## IV. TOTAL RCNLD OF TANGIBLE PERSONAL PROPERTY

**Q. Did you reach a determination as to the RCNLD of the PWW System tangible personal property?**

A. Yes, in my opinion, the RCNLD of the PWW System tangible personal property is $412,000,000 (rounded) as of December 31, 2004. A complete and detailed schedule describing the PWW System inventory, quantities, unit prices, replacement cost new, and observed depreciation percentages is reflected in Attachment HW-2, Schedules 1-20, to the Testimony of Harold Walker.

## V. REPLACEMENT COST NEW

**Q. Please explain the replacement cost new component of the RCNLD method.**

A. The replacement cost new less depreciation method is one of several appraisal methods available within the cost approach to property appraisal. For purposes of this analysis, replacement cost new ("RCN") is defined as the estimated cost of replacing under current conditions the water treatment, storage and distribution assets of the PWW System with new property having the nearest equivalent material and/or utility compared to the property being valued. This appraisal method assumes construction of the entire system in one continuous effort.

Our procedures include the preparation and verification of an inventory of all the tangible personal property. Upon verification of the inventory, the current material costs, construction costs, engineering costs, administration costs, interest during construction, and entrepreneurial profit are applied to the inventory listing in order to determine the RCN.

**Q. In the case of a water utility, have the type of construction materials changed materially over time?**

A. No, in the case of a water utility, the basic materials and construction methods historically used to build water utility systems have not varied materially over time. Therefore, in determining the replacement cost, one can generally identify either identical or very similar materials to those found in the utility being valued. However, in those instances where original construction materials are no longer available or utilized in the marketplace, replacement material with similar functionality may be utilized. For instance, there is a significant amount of unlined cast iron pipe in the PWW System. Today, you would not install this type of material even if it was available. Therefore, ductile iron pipe was utilized as the replacement material in pricing this item. In some instances, the replacement material may be functionally superior to the property being valued. If that is the case, adjustments may be made when accounting for functional obsolescence in the observed depreciation analysis.

**Q. Who gathered the inventory and pricing information for the RCN component of your analysis?**

A. As I indicated earlier, Harold Walker with Gannett Fleming prepared the RCN component and I performed the observed depreciation analysis. Mr. Walker is submitting testimony on the RCN of the tangible personal property in the PWW System.

## VI. <u>OBSERVED DEPRECIATION IN GENERAL</u>

**Q. Please explain what type of depreciation analysis you perform under the RCNLD method.**

A. In our RCNLD analysis of the PWW System tangible personal property, I quantified depreciation using the observed or existing depreciation method. Generally, in a cost approach valuation analysis, observed depreciation seeks to ascertain the existing condition of the property. Some refer to this process as an existing condition assessment. The components of an observed depreciation analysis include: (1) physical deterioration, and (2) functional obsolescence (including technological obsolescence).[1]

**Q. When you say "physical deterioration," what do you mean?**

A. Physical deterioration is the reduction in the value of an asset due to physical wear and tear resulting from continued use, exposure to the elements, and all physical stresses that reduce the life and serviceability of the asset over time.

**Q. How does that compare to "functional obsolescence?"**

A. Functional obsolescence is the reduction in the value of an asset due to its inability to adequately perform the function for which it was originally designed. This also includes a decline in the value of an asset due to general improvements in technology that make an asset less than the ideal replacement for itself over time. Technological obsolescence, which is a specific type of functional obsolescence, occurs when a replacement asset produces a greater standardized measure of utility production than the subject asset, due to improvements in design or engineering technology.

**Q. How is "observed depreciation" generally expressed in your analysis?**

A. Observed depreciation is generally expressed as a percentage of RCN. For example, a brand new asset has observed depreciation of zero percent. On the other end of the spectrum, a retired asset with no scrap value has observed depreciation of 100 percent.

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[1]To the extent it exists, Mr. Reilly is analyzing the impact of external obsolescence in his report.

In Attachment HW-2, the observed depreciation percentage can be calculated as 100% minus the percentage "good" of the asset. For instance, we observed 4" cast iron unlined pipe to be depreciated by 80%, thus having a 20% "good" factor. Therefore, 100% minus the observed depreciation percent equals the percent good of the asset. The percent good of any given asset is then multiplied by the RCN of that asset to arrive at the RCNLD for that asset. See Attachment HW-2.

**Q. Please identify the factors and procedures you generally utilize in formulating your opinion of the observed depreciation percentage under the RCNLD method.**

A. Unless an asset is new or is retired with no scrap value, the estimate of observed depreciation is rarely simple and requires (1) the analysis of multiple factors, (including historical system information) and (2) the application of engineering experience and professional judgment. In fact, an engineer evaluating the observed depreciation of any given asset will seek to obtain as much physical and historical information as possible concerning that asset. Ideally, the engineer will inspect the physical condition of the asset, provided it is visible and accessible. Whether the asset is visible or not, the engineer will review any historical information and/or data in the company's records concerning the asset, such as its age, frequency of use, capacity, exposure to the elements, conditions under which the asset is operated, internal vibration (if applicable), and other operating stresses.

**Q. Is it important to talk with the people who are familiar with the operation and history of the System?**

A. Yes, it is very important to conduct in-depth discussions with personnel who are familiar with the operation of the System and who have institutional knowledge of the System.

The purpose of these discussions is to learn about the level of system maintenance and rehabilitation, the frequency of use, and the System's experience with similar assets that have already been retired. In addition, it is important to ascertain the historical performance of the subject assets.

**Q. What do you do to determine the existing condition of buried assets?**

A. In the case of buried assets, such as transmission and distribution mains, I will follow the same protocol mentioned above in collecting information on the specific asset. In addition, it is important to inspect random pipeline samples, particularly of the pipe materials that typically evidence the highest level of depreciation over time.

## VII. <u>WATER PIPE MATERIALS</u>

**Q. Are the transmission and distribution piping a relatively large investment for a water company?**

A. The transmission and distribution piping, along with services, constitutes an enormous capital investment in a water system.

**Q. What justifies this enormous capital investment?**

A. The capital investment is justified by the great longevity of piping materials. Much of the piping will last for hundreds of years. While some piping will need replacement, massive replacement of pipe that has been in service for 50 to 100 years is not generally justified by the actual conditions observed when pipe is randomly selected for detailed inspections. The PWW System pipe samples stand as evidence of this reality.

**Q. You stated earlier that the basic materials and construction methods historically used to build a water utility system have not varied materially over time; does this statement hold true as to the types of piping?**

A. The materials used to make potable water pipe have not changed much over the years, and the number of different pipe materials is not extensive. Most systems have varying amounts of most, if not all, pipe types, depending on cost, availability when the pipe was purchased, and soil factors that would favor one type of pipe over another. These basic types of pipe material include:

- Cast iron pipe
- Cast iron cement (mortar) lined pipe
- Ductile iron pipe
- Asbestos cement pipe
- Concrete pressure water pipe
- Copper pipe
- Lead pipe
- Galvanized steel pipe and
- Polyvinyl chloride (PVC) pipe

**Q. Please describe how the above materials typically perform over time from an observed depreciation standpoint.**

A. **Cast iron** is undoubtedly the most common pipe currently in service. Originally, it came with lead joints and was "unlined" i.e., not lined with cement mortar. It was coated inside and outside with sprayed tar. The lead joints were made in the field. Oakum Fiber was pounded into the joint, a rope hawser was wrapped around the joint except at the top, and molten lead was poured into the void between the Oakum Fiber and the hawser. After solidification, the lead was pounded into the joint (caulking) to make a tight bond between the lead and the rough cast iron. This process was very effective.

Later, if a pipe moved or was displaced, the joint could be recaulked to restore watertight integrity. It also greatly resisted the thrust forces at bends and valves. After many years of service (perhaps 100 years), some joints will corrode slightly and seep. The other problem occurred during World War II when "lead substitutes" were used. That material would sometimes expand and push-out or possibly fracture the bell. Many "bell clamps" were used to repair these problems.

Corrosion of cast iron depends mostly on soil factors. Exterior corrosion proceeds as pits that are sharp and may extend deep into the metal. As these proliferate, the pipe strength is reduced and usually a ring fracture will occur, normally during rapid ground temperature changes that increase differential soil pressures. Expansive soils can also fracture cast iron pipe in small diameter sizes (4" or less) due to its brittle nature. Observed depreciation will generally be higher in unlined cast iron pipe.

The interior of a cast iron pipe may also corrode, but by a different process. Iron bacteria gain access to the iron through "holidays" in the tar coating and eventually lift the remaining tar. They utilize the free iron in their cell chemistry, and they leave medium hard to very hard coral-like mounds. Although this also results in pits, these are usually shallow and do not cause structural problems. However, pits may contribute to the structural weakening if combined with external pitting. The principal problem with the interior deposits or "tuberculation" is the loss of hydraulic capacity, which can be severe in some cases. The interior surface can be cleaned and lined, but this process is usually reserved for the larger sizes. Also, the lower velocities inherent in the smaller size mains result in more serious tuberculation. Unlined cast iron pipe particularly in small diameter pipe (6" in diameter or less) will ordinarily exhibit higher depreciation percentages than more modern materials.

**Cast iron cement (mortar) lined pipe** was first available in the late 1930's. The structure and exterior of the cast iron was unchanged, but the new mortar lining eliminated the tuberculation problem. The metallurgy of cast iron changed in the 1960s to produce **"ductile" iron pipe**. This material is much less brittle than cast iron. The pipe wall thickness could be reduced and the pipe is much less prone to fracture. Another innovation involved the use of a polyethylene film wrap on the outside of the pipe to effectively prevent corrosion. My experience with cast iron lined and ductile iron pipe has shown that there is little difference between the two products from the standpoint of observed depreciation. Both materials perform exceptionally well over long periods of service.

Another common pipe material is **asbestos cement (also known as "transite")**. It is made from asbestos fibers imbedded in a Portland cement matrix. It is somewhat brittle and, therefore, it has a greater thickness than ductile iron. It is virtually impervious to internal or external corrosion. In limited cases there may be a slight softening of the external surface. This is caused by very acidic soils, usually septic soils in areas of dense but unsewered urban areas. Normal water quality conditions will not affect the interior. In extreme low alkalinity waters, there can be leaching of the cement leaving a slightly roughened internal surface. Poor installation has caused problems with asbestos cement pipe. If not properly bedded, point loading caused by rocks can lead to fracture. Most of these are found in the first 8 to 10 years after installation. Also, service taps can pull out or cause ring fractures. This has been solved by using tapping saddles or tapping the coupling between pipes where the material is much thicker.

Asbestos cement pipe is no longer sold in the United States. But, this is only because of the negative connotation with the word "asbestos." No health problems have been documented with asbestos pipe. In fact, asbestos fibers occur naturally in waters of some mountain areas in California without any associated health problems. Asbestos cement pipe experiences little depreciation over time. Due to its brittle nature, observed depreciation will typically be slightly higher in the small diameter pipes sizes (4" or less), but not as high as in the case of cast iron pipe.

**Concrete pressure water pipe** is an excellent material for water pipe. Like asbestos cement, it is virtually impervious to internal or external corrosion. It is reinforced with steel so that the manufacturing process must be carefully monitored to ensure the proper strength and protection of the interior steel. Installation is also critical but not as critical as with asbestos cement. About the only problems found in the field when this pipe is examined, involve the joint rings. This is the result of improper "diapering" or mortar encasement of the joint. Even where this occurs, the corrosion is slight and proceeds very slowly. Accordingly, little observed depreciation will be encountered with this material over long periods of time.

**Copper pipe** is more expensive than other materials so it is typically limited to smaller pipe sizes. Although copper is a corrodible material, the natural tight oxide coating that develops, coupled on the inside by carbonate and natural organic complexing of the interior film, make this pipe material excellent for underground conveyance of potable water. This, along with its ductility and high-bursting strength, make it ideal for house services. Indeed, copper is by far the most common material for this purpose and holds up well over time.

**Lead pipe** is very similar to copper with respect to potable water uses. Although it is corrodible, it also forms a tough oxide coating and interior films. Some aggressive well waters will corrode lead as will extremely low alkalinity waters, but this is very rare. Other problems with lead pipe involve the joints. Some sweated joints (where lead is melted over a "swedged" bell and spigot type joint) were improperly made and simply not thick enough to resist shrinkage stresses in the soil. The other common problem was due to the use of 90-degree flared joints. This caused weakness at the flare and subsequent blowout. Later when 45-degree flares were utilized, this problem was all but eliminated. While lead is not ordinarily installed today, it functions well for long periods of time.

**Galvanized steel pipe** was a poor material to use for potable water. However, it was commonly installed up to the late 1940's, both inside and outside of homes and for distribution mains. The earlier galvanized pipe was deep-dipped, and some had a "paint seal coating" which was a cement coating. This greatly increased the life of the pipe. Later, pipe, especially that made after World War II, was electroplated without the coating, which had a greatly reduced life. Experience has shown that the pipe is always corroded on the inside and although exterior corrosion varies, for the most part, it is in poor condition.

**Polyvinyl chloride (PVC) pipe** is a very good material for potable water pipe. The interior is immune to attack from even the most aggressive well waters. Likewise, the exterior is immune from the natural types of corrosion, but can be attacked by hydrocarbons if of sufficient quantity in the ground. The major vulnerability of PVC pipe, as with other plastic materials, is its limited resistance to fatigue. Excessive pulsations in water pressure over an extended period of time caused by pumps or automatic valves can lead to failures with this material. Proper engineering can eliminate this problem. Other plastics, primarily polyethylene, have this vulnerability as well. However, "high density" and "cross-linking" have greatly improved this material and it has the same benefits from the corrosion standpoint as PVC. Also where ground movement can occur, its fused joints and flexibility are invaluable.

## VIII. OBSERVED DEPRECIATION ANALYSIS OF THE PWW SYSTEM

**Q. Please describe your observed depreciation analysis with respect to the inventoried tangible assets of the PWW System.**

A. In determining the observed depreciation of the PWW System, I considered and evaluated (1) the multiple factors discussed previously in my testimony and (2) the system information gathered concerning the PWW System. I then applied my engineering experience and professional judgment in assigning an observed depreciation percentage to each asset category.

**Q. In the case of the distribution mains and services did the type of material play a significant role in your assessment of the percentage of observed depreciation?**

A. In the case of water pipes that are not visually assessable, the type of pipe material played a significant role in the assessment of the percentage of depreciation observed in the system, in addition to the available PWW System information, history and sampling data I gathered.

**PWW System Water Pipes**

**Q. What type of pipe materials did you find in the PWW System?**

A. The PWW System mains consist of most materials discussed above: asbestos cement, cast iron lined, cast iron unlined, ductile iron, concrete, copper, PVC and galvanized steel. In addition, the PWW System has a limited amount of 6" and 72" Swiss steel pipe, which is a spiral wound, riveted mild steel pipe with a bitumastic coating on the exterior and interior. The 72" Swiss steel main was installed in 1898 and was unlined. Company records reflect that the main was cleaned and lined in the early 1970's. Recent sampling and inspection by the company revealed that the main is in exceptionally good condition.

**Q. How did you use this information?**

A. The material information gave me a basis from which to build my observed depreciation analysis. As in the case of the other assets, we also interviewed PWW Water employees with institutional knowledge of the PWW System to inquire (1) into their maintenance and rehabilitation efforts, (2) system pressures, (3) system performance and capacity, (4) corrosiveness of soils in general, (5) leak/break experience, and (6) unaccounted for water loss percentages. As a result of our investigation, we concluded that the PWW System Water Mains were in remarkably good condition.

**Q. Did you do anything to confirm your general assessment?**

A. In order to confirm our general assessment of observed depreciation in the PWW System Mains, we selected a random sample of the various pipe materials, and we physically excavated 18 locations to visually inspect the pipe. Our sampling focused on the pipe materials with which we expected from our experience to find the most problems with interior and exterior corrosion and pitting.

**Q. Please describe the process you employed to conduct the sampling.**

A. After the sample locations were randomly selected, PWW contracted with a local utility construction contractor to excavate and expose the selected pipe segments and remove samples. Soil samples were analyzed in a laboratory for corrosiveness. Observations recorded included the pipe location, inspection method, pipe diameter and material, depth of cover, ground conditions, coating, diameter (inside and outside), wall thickness, indicated pipe class, joint type, vintage, observed condition, and soil test results.

**Q. What did the soil tests generally reveal?**

A. Soil tests were conducted at 15 of the 18 sample locations. The soil tests consisted of pH, alkalinity, resistivity, total solids (moisture content), chlorides and sulfates. The soils at the sample excavations were generally found to be non-aggressive and as a result they would not adversely impact the condition of the piping over time. The soil condition at most of the sample sites would be characterized as dry sand. Only one of the samples (Sample No. 9 Briarwood Drive) was corrosive to any type of pipe materials and that pipe was not corroded, which is most likely because of the lack of moisture.

**Q. What did the sampling reveal in terms of the general condition of the transmission and distribution mains in the PWW System?**

A. The 18 samples confirmed that the PWW System transmission and distribution mains are in remarkably good condition. Attachment RWR-2 to my testimony sets forth in more detail the observed conditions at each sample location.

**Q. Please describe your depreciation analysis with respect to the other inventoried assets of the PWW System.**

A. I followed the standard procedures for assessing observed depreciation as outlined above in my testimony for each category of property. The following outlines my analysis in regard to the remaining specific categories of property found in the PWW System.

The **dams, river intakes, wells, booster stations** and **storage tanks** were inspected over a three day period during the week of July 11, 2005. I was accompanied by an experienced operator who was very familiar with the facilities and the equipment. He operated all of the pumps and other equipment with a few exceptions, where the equipment was under repair or where its operation might cause system problems. I questioned him often during the inspection as to the operation of these facilities and any lack of function or usefulness. A detailed memorandum describing the facilities and their general state of condition as observed during the inspection is included with my testimony as Attachment RWR-3. In general, these assets were in good to very good physical condition with only limited exceptions.

Q. **How were the booster stations accounted for in the RCNLD analysis?**

A. There are thirty-six booster stations in service in the PWW System. Two booster stations are not in service (AVD Booster Station and Great Brook Booster Station) and were not included in the RCNLD inventory for pricing or depreciation purposes. While each booster station is unique, they have many characteristics in common based on equipment type and building size. Accordingly, they were grouped and placed in six categories with similar stations. A representative station from each category was then physically inventoried and priced by Gannett Fleming. However, I inspected each station as reflected in Attachment RWR-4. I averaged the depreciation percentages of the boosters in each of the six categories to arrive at an average depreciation percent for the respective categories. The Bon Terrain Booster Station did not fit into any of the six categories, so it was inventoried, priced and depreciated separately.

Q. **Please describe your depreciation analysis with respect to the remaining inventoried assets of the PWW System.**

A. **Valves**

Valves are a major part of any distribution system. As such, they were operated as part of the depreciation survey. Twenty-five valves were randomly selected to be inspected. Of those, one was a normally closed valve, and the operator did not attempt to operate for fear the valve was not plugged. Two valves could not be operated through the valve box and were therefore not turned. Of the remaining twenty-two, thirteen were rated in excellent condition, six were rated in very good condition, one in good condition, and one valve would not turn. The valves overall are in very good operating condition. However they will not outlast the pipe, so this factor was also considered in determination of the percent condition of system valves.

**Meters**

Small meters were pulled for testing from each of the service sample locations. The meters were then tested at the distribution facility. Nineteen of the twenty meters that were pulled and tested were 5/8" meters (the smallest size) and the final one was a 1½" meter. All of the meters were very accurate. Fifteen were within 1% accurate, four were within 2% accurate and one was within 2.5% accurate. The average age since "last pull" or new, was 15 years, with the oldest at 24 years. It is obvious from the test accuracies and "ages" that the meters are in excellent condition and that the quality of the water is such that meter accuracy is not affected by incrustation, corrosion or sediments.

Although meters larger than 2" were not in the population to be sampled (since the larger services were not included), the larger meters are tested much more frequently, even annually, for the larger ones. Again, based on the meter materials, i.e., bronze and the water quality, these meters are also in excellent condition.

**Hydrants**

Hydrant depreciation was based on the results of a random sampling of twenty hydrants from all of the hydrants in the system. Of the twenty, four were in Bedford, three were in Merrimack and thirteen were in Nashua. All of the hydrants were operable and all had adequate pressure and flow. Of the twenty, seventeen were rated as in excellent condition with the remaining three in very good condition.

All of the hydrants had a 4" steamer connection and two 2½" pump connections. Also, although all of the hydrants had "watch" valves or isolating valves, six of the valves had some type of problem. Either the box was not straight and the valve could not be accessed by an operating key (or wrench), or the box had sand in it that prevented operation of the valve, and a vacuuming of the box would be required if the hydrant were to develop problems and its isolation from the system were to become necessary for repairs. Although the valve and valve box are part of the T&D mains account and are depreciated with that account, the additional necessity that the watch valve be accessible for quick repairs to their hydrants' functionality is very important. Therefore, it was taken into account for overall depreciation of the hydrants.

**PRV**

Pressure Regulatory Valves ("PRV") are the reverse of a booster station. They provide water at a reduced pressure to a district at a lower elevation from the supplying district. Normally these are very small underground units with two or more pressure regulatory valves and are in subterranean vaults. Two were inspected as part of the overall inspection and both were in excellent condition with valves functional.

**Services**

Services were depreciated in a similar manner to that of the mains. For instance, I examined system records, observed "bone pile" services that had been replaced, and most importantly, interviewed distribution personnel with extensive experience with the PWW System as to their experience with different types of materials that they see in the field.

The great majority of the services in the PWW System are copper. Others include galvanized steel known to be in poor condition and a very few early plastic services also are considered in poor condition. Larger services are similar to the materials utilized for the transmission or distribution mains and were depreciated accordingly. In addition, a random sampling of 20 smaller services was performed. The same procedures that were followed in the sampling of the transmission and distribution mains were followed in the case of the service samples. Attachment RWR-4 reflects the results for each sample. In general, the samples reveal that the services, the vast majority of which are copper, are in good to excellent condition.

**General Plant and Building Structures**

General Plant and Building Structures were depreciated similar to other structures. Each was visited and the condition noted. For the most part, each was assigned a single depreciation percentage or, more correctly, a percent condition.

**The 340 Accounts**

The 340 accounts, which include office furniture, equipment, transportation equipment, tools, laboratory equipment, power operated equipment, communications equipment, and miscellaneous equipment and other items, were depreciated consistent with the other assets. The equipment was observed to the extent possible and an estimated depreciation applied.

Q. **How did you depreciate the water treatment plant, which is in the middle of a major capital intensive renovation?**

A. Since the water treatment plant is in the process of being completely renovated at a cost of over $38,000,000, we met with PWW engineers and reviewed the plans for the upgraded plant and made a determination as to what aspects of the facility would be utilized as a part of the renovation. For those items, they were priced and depreciated accordingly. Since the system will have a new treatment plant upon completion of the renovation, the new components of the system were simply priced at the cost being incurred by PWW for the renovation. From a depreciation standpoint, the system will be in 100% good condition upon completion. Therefore, we subtracted out the investment that has not been incurred as of the date certain.

**Q. What were your conclusions with respect to the observed depreciation of the PWW System?**

A. As reflected in Attachment HW-2, the observed depreciation percentage on each asset category found in the PWW System is individually calculated. I concluded that the overall observed depreciation percentage was approximately 25% (i.e., 75% good). As noted earlier, this results in an RCNLD value for the tangible personal property of $412,000,000 (rounded).

**Q. Does that conclude your testimony?**

A. Yes.