# A NEW TECHNOLOGY FOR POLLUTION ABATEMENT

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Robert Fuehring, who has authored a booklet exclusively for Westinghouse simply entitled "Water" has stated various studies show that within the next twenty-eight years this country will need one trillion gallons of fresh water daily. Disregarding the natural geographical distribution of this resource, it has been estimated that there are only about six hundred billion gallons available. Obviously, if we could but reuse the water once, we could effect a two hundred billion gallon surplus instead of a deficit. Dr. Leon Weinberger, past chairman of what was then called the Federal Water Pollution Control Administration, has said in testimony given before a senate sub-committee on water pollution that if we expect to meet the immediate needs for fresh water, particularly in the water-short southwest, it is imperative that we make multiple reuse of this resource.

Water treating and pollution abatement equipment available on the market today, at best, only solves a portion of the problem. Pollutants, generally organic in nature, can be handled effectively with such techniques as filtration, flocculation, and bio-degradation. However, until now, there has been no effective method for the complete removal of concentrated chemical and mineral contaminants from brackish water and effluents resulting from use by industry and municipalities.

Gentlemen, today's presentation describes an actual operating facility and process which is one possible solution to the concentration problem. A fifty thousand gallon per day test facility now in continuous service at an El Paso Natural Gas Company compressor station is reclaiming 99.6 to 99.7 per cent of a cooling tower blow-down water. The returned product water contains less than one part per million total dissolved solids while the resultant concentrate of about four-tenths of a gallon per minute of a twenty-five per cent total salt content is poured on a salt pad. The return of this high quality water for reuse within the industrial installation has had some rather dramatic effects on the water consumption experienced at the station.

Exhibit One is a bar-chart showing an average thirty day load of some nine million one hundred thousand gallons. In order to stabilize the operations, it was necessary to dispose of one million one hundred thousand gallons. Since this water reclamation plant has been in service, it has effected an approximate thirty per cent reduction in the water demand to six million two hundred thousand gallons of water over a thirty-day period of time with a net resultant blow-down not exceeding some twelve thousand gallons for the same thirty-day period. From a water analysis standpoint, the effect of this facility is equally dramatic as expressed in Exhibit Two.

Exhibit Two is an abbreviated water analysis. The first column shows parts per million or pounds of salt per million pounds of water.

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For example, chlorides as shown in this exhibit are some eight hundred and seventy-seven pounds per million pounds of water and the sulfates are some thirteen hundred pounds per million pounds of water. If you were to add up the weights of all the salts listed here and those not listed, you would find that the feed water coming to the water reclamation plant contains a total salt content of some three thousand four hundred and sixty-eight pounds of salt per million pounds of water. In contrast, the water being returned for reuse, in this case to the cooling towers at the El Paso facility, contains less than eight pounds of salt per million pounds of water.

The Third Exhibit is a color coded isometric drawing of the El Paso Water Reclamation Plant. Going from right to left, we see the blow-down from the cooling towers going to a small storage tank which provides flooded suction to a feed pump which in turn pushes the feed water through to a unique heat exchanger. This heat exchanger is comprised of five individual tube aluminum coils. The feed water entering the heat exchanger at the bottom and spiraling upward absorbs the sensitive heat from the hot condensate which enters at the top of the heat exchanger flowing counter-flow to the direction of the feed water. The condensate leaves the heat exchanger at the bottom and returns to the cooling tower for reuse. This heat exchanger makes an approximate seven and a half degree approach; that is to say, that if the feed temperature entering the heat exchanger is at seventy degrees, then the product water returned to the towers will be in the neighborhood of some seventy-seven degrees.

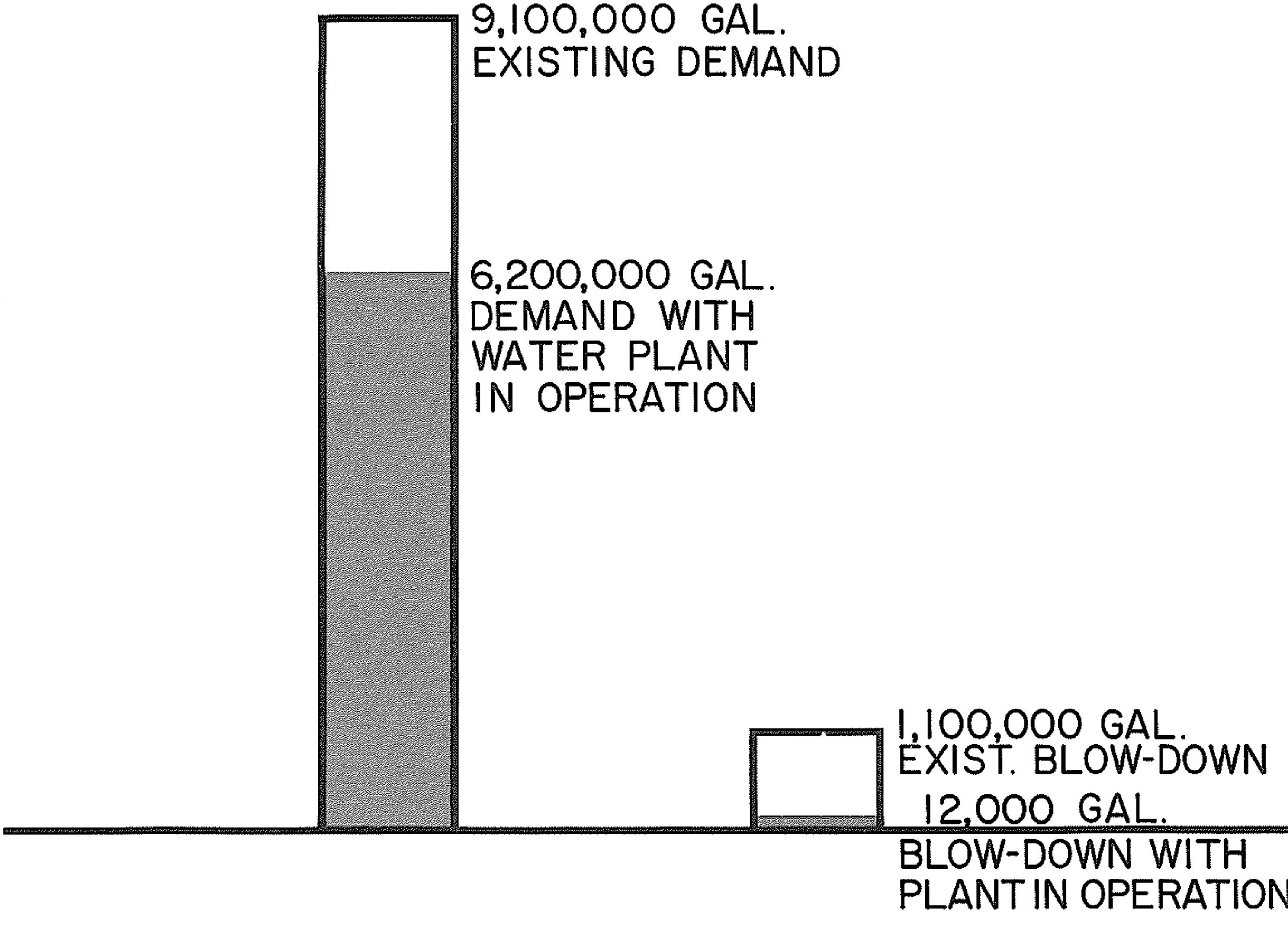
The feed water leaving the heat exchanger passes through a deaerator which allows the absorbed atmospheric gases to be expelled back into the atmosphere. From here the feed water flows by gravity into what we call our first stage evaporator. This is simply an unpretentious rectangular aluminum box with a sloped bottom. We establish a liquid level which provides a flooded suction to recirculating pumps that push what we now call brine to the top of the evaporator. This brine is then allowed to flow over the external surface of what we call aluminum leaves. These panels are approximately three inches thick by eight feet wide and fourteen feet long. To start the process, we activate our heaters and establish a vapor pressure of approximately four inches of water column. At this point we turn on our compressor which compresses the vapor to approximately twenty-seven inches of water column, or about one pound, and inject this steam into the internal side of these aluminum leaves. By compression, we force the vapor to condense on the internal surface of the leaves giving up its heat to vaporization which passes through the thin skin aluminum surface and is reabsorbed by the circulating brine flowing over the external surface. Condensate is accumulated at the bottom of each leaf through a common manifold which flows to a condensate tank that provides the flooded suction to the product pump. From there it goes through the heat exchanger and back into the plant for reuse.

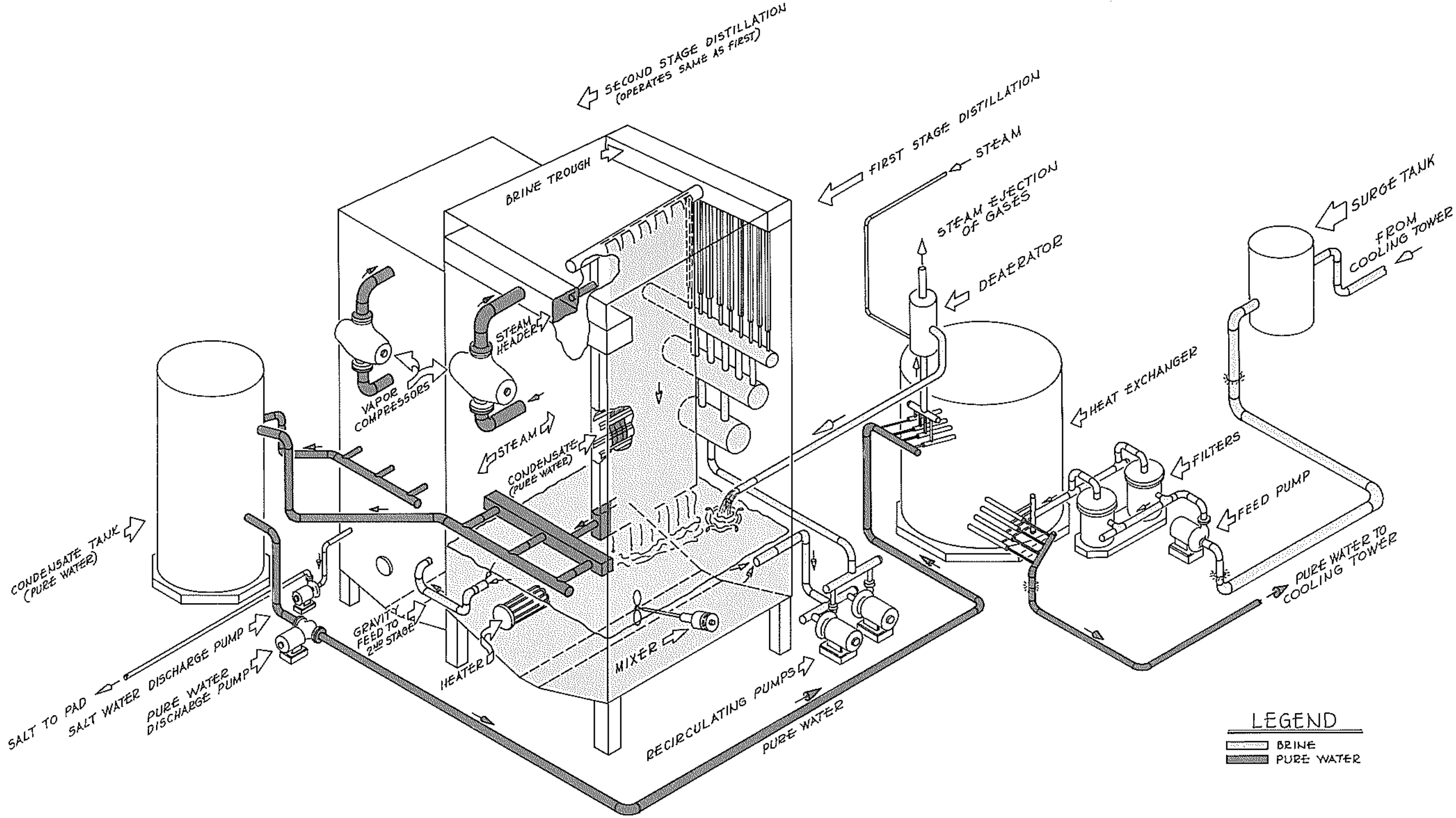
Much like a mulligan stew, we add only enough water initially to establish a liquid level, continuously withdrawing pure water until we have concentrated the initial feed water approximately ten times, or to

# WATER ANALYSIS

| | PRESENT BLOW-DOWN | PURE WATER RETURN |
|---|---|---|
| pH | 6.5 | 5.8 |
| M-ALK | 15.0 | 5.0 |
| CHLORIDES | 877 | 0 |
| SULFATES | 1300 | 0 |
| TOTAL HARDNESS | 1048 | 1 |
| CALCIUM | 756 | 0 |
| SILICA | 182 | 0 |
| NALCO TREATMENT | 30 | 0 |
| TOTAL DISSOLVED SOLIDS | 3468 | 8 |

# 30-DAY
# ESTIMATED WATER CONSUMPTION
# EL PASO STATION






# EL PASO WATER RECLAMATION PLANT

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