WATER FOR THIRSTY INDUSTRY

LEAFLET NUMBER 2

IT'S YOUR PROBLEM

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Our daily newspapers are continually reporting water problems — too much, too little, poor quality, salt-water encroachment, and falling ground-water levels. Is the water supply becoming smaller? Hydrologists tell us that there is no long-term decline in our water supply. Then why are water problems occurring more frequently? The answer is that we are using more water than ever before, and industry is the largest single user.

WATER PROBLEMS ARE COSTLY TO INDUSTRY

Today, industry needs water in fantastic quantities; and the demands are skyrocketing. Industry in Florida uses 1,200 gallons per person per day. Therefore, water problems such as shortages, floods, and inferior quality can be costly to industry and a community. Everyone profits if these problems are solved before heavy investments are made for plant sites or construction.

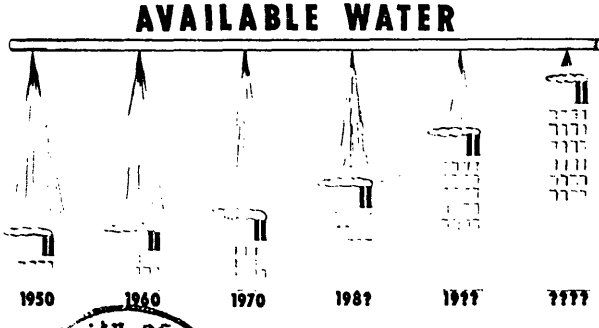
HOW CAN WE SOLVE THE WATER PROBLEM?

The solution of an industrial water problem may be divided into four steps:

1. Learn the water needs of the industry.
2. Inventory and evaluate the quantity and quality of water available.
3. Relate the supply to the needs.
4. Prepare plans for developing the water supply and act on them.

The first two steps and the fourth are the responsibility of everyone; the local business men; local, county, and state leaders; and citizens of the community. The third step is for the expert, the industrialist, and his consultants.

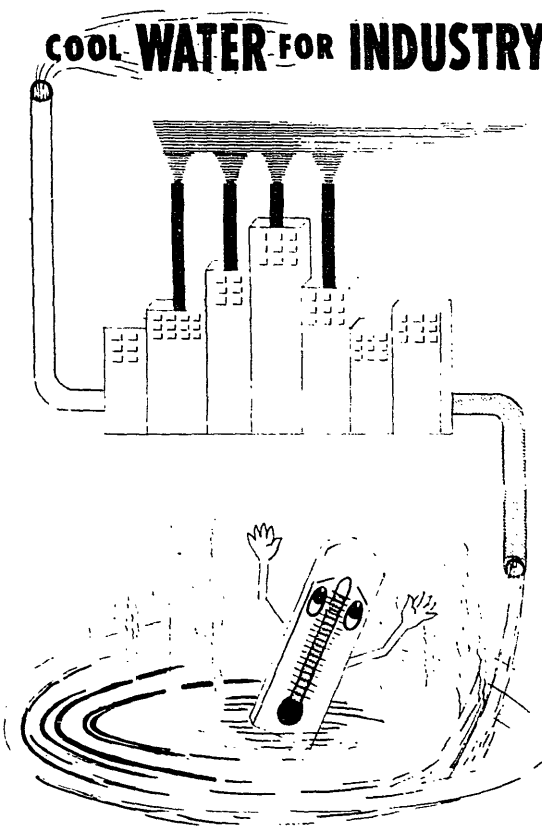
After the needs of industry are known, action must be taken to satisfy the needs. Such action may call for the design and construction of dams, pipelines, and water treatment plants, or the drilling of wells. If the supply cannot be taken to the need, then the need must be taken to the supply. Water development structures and industrial plans cannot be designed on general information such as "plenty of good, pure water." Information such as records



of temperature and flow, yield of wells, and chemical analyses are necessary. Years may be required to collect sufficient information. Unfortunately, when the data are needed it is too late to start collecting them.

HOW INDUSTRY USES WATER

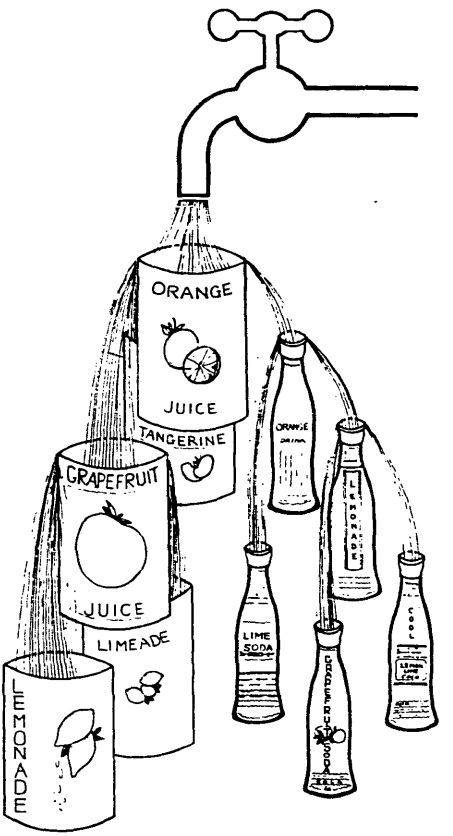
Industry uses water for cooling, process, and sanitation and services. Generally the quality of cooling water is unchanged during a single use. The outgoing water is a few degrees warmer than the incoming water, but otherwise it is unchanged. The electric power industry uses water to cool steam from turbines. The cooled steam condenses,



reducing the back pressure on the turbines and increasing the plant efficiency. After water has been used for cooling, it contains heat which must be dissipated before it can be used again. The water may be cooled in a cooling tower or a pond, where some of it evaporates.

Reuse of the water has an adverse effect on quality. All natural waters contain dissolved minerals. As the circulated water loses volume by evaporation, these dissolved minerals become concentrated in the unevaporated water. When this concentration reaches the maximum limit for the process, the water must be discarded.

Saline water may be used for cooling. However, the machinery involved must be designed to resist corrosion; and, because corrosion-resistant



machinery is more expensive than ordinary machinery, saline water is used only when fresh water is not available at a reasonable cost.

The temperature of incoming cooling water is important. Generally, the cooler the incoming water, the less water required. A cooling water of uniform temperature is also desirable.

Process water is either incorporated in the product, as in soft drinks or canned fruits and vegetables, or it comes in direct contact with the product. The pulp and paper industry uses process water for washing pulpwood, cooling wood chips, and transporting the pulp to paper machines.

Sanitation and service water is used to clean and maintain the plant. Showers for the workers, lawn watering, and fire fighting are typical examples. Drinking is a minor but important use of sanitation and service water. Sanitation and service is the prime use of water in some industries and usually the water demands of these industries are not great.

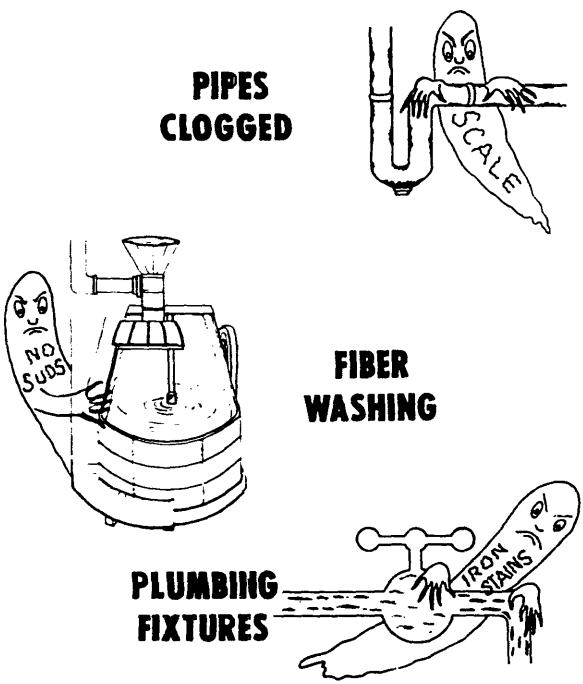
Some industries use more water than others; for example, nationwide, the electric power industry uses almost 10 times as much as the chemical industry, the next largest user. The amount of water used depends on the size of the industry and how the water is used.

Even within an industry the amount of water used to complete a product ranges widely. The

reasons for this wide range are many and complex. A product manufactured by one process may require more water of a different quality than the same product manufactured by another process. Further, different plants using the same process may use different amounts of water depending on plant design, water quality, and water availability.

Large quantities of water do not constitute an adequate water supply if the quality is poor. Everyone is familiar with ugly stains caused by iron in water and with the annoying and wasteful curds that form when soap is used in hard water. These properties of water are unwelcome in the factory as well as in the home. Iron will stain many products of industry, and hardness is undesirable for all processes that require washing.

Calcium and magnesium compounds are undesirable in process water, especially if the



water is used hot, because a scale will be deposited in the machinery just as a scale formed in the old-fashioned tea kettle.

Alkalinity is detrimental in many industrial processes, particularly in products of carbonated and acid fruit beverages such as citrus fruit juice, because it neutralizes the natural taste producing substances. Thus, specifications for industrial water are varied and they differ from product to product and from process to process.

The plant-site locator has a list of water specifications that must be met. He must base his decision on facts. If facts are not available for a site, he will move to another site where they are available. Most water problems can be solved if the facts on availability and quality are known. If water is a prime requirement, the industrialist will want to know the answers to many questions including some or all of the following.

TWENTY QUESTIONS

1. What are the possible sources of water — wells, streams, lakes, or ponds?
2. What is the flow of the stream and how does it vary from day to day and season to season?
3. If the source of water is a lake, how much water does it contain and how deep is it?
4. What is the range in lake level and what are the extremes? Will it flood out my plant, or leave my intake high and dry?
5. What are the water-bearing formations and how deep to the saturated zone?
6. How much pressure will I have to pump against and how will it vary?
7. How much water can I expect to obtain from a single well?
8. If one well will not meet my needs, how many wells must I have? How should the wells be spaced to obtain the optimum yield?
9. If I withdraw all the water I need, would I eventually deplete the water supply or lower the water level in the well below the economic pumping level?
10. If I draw all the water I need, will I encroach on my neighbors' rights?
11. What is the water temperature and how does it vary from day to day? How does it vary with depth?
12. Is the water colored? If so, what is the intensity?
13. What dissolved minerals does it contain and how much? What is the range in concentration of the dissolved minerals?
14. If it is a coastal stream, will the saline water reach my plant site? If so, how often and how much? Will the salinity be different at the surface and at the bottom? If so, how much different?

15. If I pump all the water I need, will I cause the well to salt up? If so, how soon? How much water can I pump without salting up the well? How can salting be prevented?
16. If the well taps more than one water-bearing formation, could I improve the water quality by sealing off one or more aquifers?
17. Will the temperature of the water change as I use the water? If so, how much?
18. If I store water, what effect will storage have on water temperature and water quality?
19. Is the source of water (aquifer, stream, or lake) polluted?
20. What are the legal aspects of using water? Who owns the water? Do I need a permit or water right?

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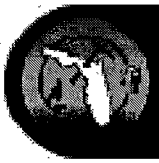

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