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BEFORE THE U. S. HOUSE OF REPRESENTATIVES
COMMITTEE ON RESOURCES
SUBCOMMITTEE ON WATER AND POWER
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I am David R. Stewart, a Colorado Registered Professional Engineer. I have worked for over twenty-nine (29) years as an Engineer for various industrial and commercial companies in the western US. My experience includes the design and operation of water reuse facilities, design of advanced treatment technologies, and development of a production water treatment system for augmentation of tributary water in Colorado.

BACKGROUND

In 2003, Interior Secretary Norton announced a new Federal initiative to assist communities in addressing chronic water shortages in the West. In this initiative, areas where shortages are most likely were identified. To a large extent, these areas coincide with the states that produce oil and natural gas. The top producing states are Colorado, Texas, Louisiana, Alaska, Oklahoma, and California.

In 2002, 2.1 billion barrels of oil and 196 trillion cubic feet of natural gas were produced in the United States (API). These activities resulted in nearly 22 billion barrels of produced water. Produced water is water, generally mineralized, brought to the surface with oil and gas.

PRODUCED WATER REMAINS A LARGELY UNTAPPED WATER RESOURCE

Despite individual efforts by the oil and gas industry to beneficially reuse produced water, and an increasing trend toward reuse and recycling, by far the most common method of disposal is subsurface injection. This disposal method is very costly and treats water as a liability rather than an asset. There appears to be several reasons why previous reuse efforts have had limited success, including:

- Unfamiliarity of the oil and gas industry with the intricacies of water marketing.
- Uncertainties related to the duration of the produced water supply.
- Fluctuating oil and gas prices and the resulting fluctuation in the willingness to make capital investments in recycling technology.
- Wide differences between the desire for rapid development of recycling by private industry, once a “go” decision has been made, and the slow pace of development for public water infrastructure.
- The relatively poor source water quality of produced water and the need for extensive treatment.
- Risks associated with environmental and public exposure to treated produced water.
- The relatively low value placed on water, particularly in relation to the high value of oil and gas.
- Focus of time and capital by the oil industry on their core business – finding oil.
- Clean Water Act limits the discharge of produced water to surface water in the West.

In short, although there are significant technical, economic, environmental, and legal barriers to produced water development, the primary barriers are the institutional and communication differences between the private oil and gas industry and the publicly dominated water industry.

BENEFITS OF PRODUCED WATER DEVELOPMENT

Despite the barriers to development of produced water, the benefits are substantial and are both economic and technical.

The economic benefits of produced water treatment include:

- Adding a new water resource to the shrinking number of water resources available in the water-short West.
- Water is becoming an increasingly valuable commodity that is both transportable and in demand.
- Dramatically reduce the volume of produced water injected into disposal wells and eliminate this as a cost of producing oil and gas. This will reduce the energy loss due to this operation by as much as 20 percent.
- Minimize the cost and risk of the environmental impact of producing oil and gas by dramatically reducing the total use of chemicals in the recovery and treating process.
- Make better use of natural and financial resources by lowering the cost of environmental compliance.
- Reduce the demand for surface water resources by domestic and industrial users, which conflict with the maintenance of

endangered species and wild rivers.
- Reduce some or all of the costs associated with the underground disposal of produced water including maintenance, acidizing, drilling new disposal wells, regulatory and administrative activities.

The technical benefits of produced water treatment include:

- Improve the efficiency of thermal oil recovery by decreasing the amount of steam required to heat the water along with the oil in the reservoir.
- Reduce the potential for reservoir damage by disposal injection.
- Reduce the recirculation of injected water into the oil producing horizons.
- Lower the energy demand for oil field operations through reduced water production and handling.

PRODUCED WATER RECOVERY WILL INCREASE DOMESTIC OIL PRODUCTION

In many oilfields, injected produced water flows to producing areas and increases the water content of recovered oil. For example, in the San Ardo Oilfield in California where produced water is reinjected, the water cut was less than 1 percent in the 1940s, but now is nearly 95 percent. Thus, water removal is the key to increasing production. If the reservoir could be dewatered, an estimated 150 million barrels of additional oil could be developed from this oilfield alone.

In reservoirs with thermally enhanced recovery, produced water reuse will also reduce heat requirements. By increasing the steam quality, the amount of steam required can be substantially reduced. Because these heat requirements represent a significant cost and recoverable oil reserves are based on production economies, more oil may be recoverable from existing oilfields.

EXAMPLES OF PRODUCTION WATER PROJECTS

There are two examples of production water projects that have been or are nearing completion. The first project is near Wellington, Colorado. This project is treating oil production water as a new water resource. This new water resource will be used to augment shallow water aquifers to prevent injury to senior water users. The oil company is embarking on this project to increase oil production. A separate company will then purchase and utilize this water as an augmentation water source. This water will eventually be used to allow the Town of Wellington and northern Colorado water users to increase their drinking water supplies significantly. In this example, the Town of Wellington can increase their water supply by 300 percent due to this new water source.

Another example of the beneficial use of production water is the San Ardo field near Monterey California. Research of this production water system is being conducted by Kennedy/Jenks Consultants of San Francisco, California. This oil field is currently utilizing 50,000 barrels per day for steam, but has over 100,000 barrels per day of water available for beneficial reuse. The end users of this water could be agriculture, groundwater recharge for salt barrier intrusion and environmental reclamation.

A third example would be the coal bed methane production waters that are being developed in the west. These waters need to be removed in order to develop the resource of the coal bed methane. This is a difficult water to dispose of due to the mineral content of the water. Technologies have been developed to treat this water, but the beneficial use of this water has not been researched or developed. Potential uses of this water are for municipal augmentation of a new water resource, industrial and agricultural interests as well as environmental enhancement through the creation of wetlands and in-stream flows.

A NEED FOR PRODUCED WATER RESEARCH

I believe that there is a real need for production water research. Presently, there is a lack of information on the amount of effort required to produce this water. I have been working on this effort in Colorado for over 5 years. Most of this time was spent obtaining regulatory approvals and working on the legal aspects of our project. I believe that the United States Bureau of Reclamation in conjunction with the United States Geological Survey is in the best position to provide this research. The USBR is the one agency that has a significant amount of technology information on desalting of brackish waters and is an agency that currently has access to the end users. The USGS is an agency that understands how this water can be utilized and what water quality constraints might be required of the technology developed. In addition, there will be a need to prove to the energy industry that these technologies are feasible and will assist in the development of these new energy resources.

As HR 5110 states, there is a need for a collaborative effort to identify the obstacles in the development of this water resource and to provide research and demonstration plants to implement this in the future. This is a role of our government

and will allow for the future use of this resource.