

PETROLEUM POLLUTION ABATEMENT

Sam F. Shakely

Oklahoma Corporation Commission, Oklahoma City, Oklahoma

Pollution — the word brings to mind a variety of abuses that man has perpetrated on his fellow man. He has fouled the air, polluted streams and lakes, and made vast dumping grounds out of once scenic areas.

Water is impossible to destroy. Eventually, all water evaporates and later returns to the earth as rain or snow in a relatively pure state. Through this never-ending cycle there is just as much water now as there ever was, but the amount of water does not increase.

Industry and population have expanded, thus increasing man's water needs. By withdrawing water from streams in greater quantities and depositing too much untreated or improperly treated waste, we can upset the balance of nature's built-in renovation processes for conserving water quality. Wet deserts are the possible result in some of our streams and lake, for even though they are still full of water, the water can become so polluted that it supports no life at all.

America's future is dependent upon the quality of water we use and re-use. Today, we use almost 400 billion gallons of water per day in the United States, and it is estimated that only 650 billion gallons of water per day are available for development. By the year 2000, we shall need more than 1,000 billion gallons of water per day, more than twice the amount being used at present. In order to meet these rising needs, it is necessary to preserve the quality of every gallon of water so that it can be safely used several times over.

Water pollution control is the answer to the problem. To keep our water of high quality, methods of prevention, abatement and control of water pollution must be studied and understood. Citizens must be willing to support programs and objectives in water quality control and management; everyone must take an interest in keeping our water pure. Prevention would have been much more desirable than the corrective action that must now be taken, not only to

hold our own, but to roll back the vast pollution that has accumulated due to man's greed and unconcern for future generations.

Pollution and pollution control are popular topics for general discussion. It is regrettable that the tremendous amount of publicity has resulted in a feeling of an approaching "doom's day." As has been widely publicized, during the last 40 years Lake Erie has been polluted to such an extent that the ecology has been permanently changed and the once prosperous commercial fishing industry is gone forever. Polluted water signs are present on popular picnic and swimming beaches — all because of pollution by man, including the industrial and municipal wastes from Detroit, Toledo, Cleveland, and Erie. The Cuyahoga River in Cleveland is the only river declared to be a fire hazard, it actually catches fire and burns several times a year.

Scare headlines in the papers, such as the sinking of the Torrey Canyon off the English coast and the oil seeps in the Santa Barbara Channel, have brought indignant responses based on emotion and opinion, rather than upon scientific investigation and fact. John E. Kinney, a Sanitary Engineering Consultant, has stated that "history will probably label our present times the era of emotionalism." "This is manifest, in its most virulent form, on our campuses," he said. "The second ranking example of 'the era of emotionalism' probably is to be found in conservation. It is heartening to note a leveling off in the emotional binge, both on the campus and in the field of water quality, where reason and rationality are beginning to replace fear as a motivating force." Mr. Kinney was particularly concerned about the effects of confusion over what he terms three types of pollution: actual pollution, political pollution, and hysterical pollution.

Each of us must be concerned with what we can and must do to prevent pollution, with a view to doing the best job we know how rather than the present approach of

how much pollution the environment can sustain. John Maynard Keynes long ago spoke of the paradox of aggregation — that the definition of rational self-interest is different for the individual than for the community. If one's car is polluting the atmosphere, the addition to the general pollution is so infinitesimal that there is no rational incentive to forbear from driving, or to spend money on an anti-pollution filter.

Pending legislation should make us all realize that pollution will be controlled, either by a self-policing policy to clean up our own mess, or by direction of the Federal Government. Stricter regulations on all federal leases by the Department of Interior is a reality. Present regulations apply only to federal leases off the California coast in the Santa Barbara Channel, scene of the disastrous pollution from the January 28, 1969 blowout. There is no doubt but that the regulations will be extended to other offshore drilling areas, including Alaska, Texas, and Louisiana. Regulations will call for on-site inspections, both scheduled and unscheduled, by the U.S. Geological Survey, and for changes in surface casing requirements to provide tougher standards.

New standards will necessitate additional costs that the operators can ill afford. For instance, in California exploratory drilling cost the oil companies \$603 million for 71 federal leases. Not a single major producing well resulted; therefore, there is little margin for additional drilling costs under the new regulations.

My remarks will be primarily associated with the problems existent in Oklahoma and the steps that have been taken for abatement of pollution.

POLLUTION AND ITS CONTROL IN OKLAHOMA

Early operations in Oklahoma and other, older, producing states were conducted with no effort made for subsurface disposal of produced water. Poor house-keeping with resultant loss of oil was the rule rather than the exception. The combination of prolific production and high profits did not lend itself to expenditures necessary to control pollution. No effort

was made to treat tank bottoms, and burn pits were in daily use on every lease. It was not until September 8, 1955, that the General Rules of the Oklahoma Corporation Commission were amended to include pollution regulations.

Secretary of the Interior Stewart Udall, in accordance with the Water Quality Act of 1965 and the Clean Water Restoration Act of 1966, requested each state to adopt Water Quality Standards for interstate and within state waters. On February 28, 1968, the Secretary approved the Water Quality Standards for Oklahoma with a recommendation for an anti-degradation statement for streams having existing quality better than the standards, and recommending that all water pollution control be under a single state agency.

As a result of the Secretary's recommendation, the Department of Pollution Control was created effective May, 1968. The Department is composed of one board member each from the Oklahoma Water Resources, State Department of Health, Oklahoma Wildlife Conservation Commission, State Board of Agriculture and the Oklahoma Corporation Commission, and acts as a coordinating and surveillance board, with each individual agency being responsible for pollution control in its own sphere of operation.

The present rules of the Oklahoma Corporation Commission for pollution abatement and subsurface disposal, have statutory authority and are summarized in Rule 801 entitled "Prohibition of Pollution" which states "Pollution of surface or subsurface fresh water by deleterious substances used in connection with exploration, drilling, producing, refining, transportation or processing of oil or gas is prohibited."

Salt water storage and subsequent disposal constitute the major pollution abatement problem of any state regulatory agency, and Oklahoma is no exception. Oklahoma has a "no pit" requirement which states simply that any pit which contains salt water shall be emptied. Earthen storage ponds by statute are allowed; however, use can be regulated by standards, limitations and conditions so as to prevent pollution. Pits are per-

mitted only when they are constructed of, or sealed with, an impervious material; they must have been inspected and a permit number must have been issued. Exempted from permits are emergency and burn pits. Pits which are unlined or have defective lining and contain salt water must be emptied, and their use discontinued. In Oklahoma, the only satisfactory means of salt water disposal is by sub-surface disposal wells. Oklahoma was one of the first states to recognize the need for salt water disposal wells; over 4,000 salt water wells have been permitted to this time.

Early in 1969, the rules were changed to allow administrative approval of salt water disposal and injection wells, in place of the public hearings previously required. At present, all disposal must be through tubing set with an adequate packer with pressure not to exceed 0.4 psi surface pressure per foot of depth. This is an arbitrary limitation which will prevent pressures from approaching fracture pressure, with resultant loss of control. The completion of a disposal well should be in such a manner as to assure that the injected fluid will be confined to the injection zone and that no damage will occur to the fresh water zones. The surface casing should be set below all fresh water zones and cemented to the surface. Care should be taken to prevent channeling, and the use of scrapers and centralizers should be considered. The long string of casing can be set above or through the injection interval and cemented to the surface with at least enough cement to provide an adequate seal. The cement job should be verified by temperature or bond logs. All injection should be through tubing set on a packer. The annulus can be loaded with an inhibited fluid; however, in every case the tubing-casing annulus should be monitored for leaks.

POLLUTION COMPLAINTS

An average of 175 pollution complaints are handled each month by four districts comprising the field organization. These complaints originate with land owners, other regulatory agencies, and as a result of internal investigations.

When a complaint is brought to our attention, the district manager contacts the field supervisor for the particular area and requests an investigation. As a result of the facts obtained, the operating company is informed of the violation and is requested to take corrective action. This is always done at the lowest level possible, and it is sometimes possible to obtain compliance by a conversation between the pumper and field supervisor. If this is not possible, a formal complaint is sent to the operator setting out the complaint and recommending the necessary corrective action. This usually results in compliance. However, in cases requiring additional action, the entire complaint file is sent to the Oklahoma City office. The operator is notified by telegram regarding the complaint and the corrective action that is required, with a time limit of 48 hours to advise what is being done, at the same time being advised that if compliance is not forthcoming a shutdown order will be issued. A shutdown order is what the name implies, and while we seldom physically go on a lease and actually shut it down, the same result is obtained by notification of the crude oil purchaser that no additional oil will be purchased from the property. Compliance is usually obtained.

We have another means of obtaining compliance which is used in the event that the lease is non-productive, i.e., a Show Cause Hearing. The operator is notified to appear before the Commission and show cause why a Commission Order should not be complied with. An official Order is entered and if he does not comply he is guilty of contempt which is punishable by fine.

One of the major problems facing the Commission is that of unplugged wells which are purging oil and salt water. Many of these wells were owned by individuals or small operators who are deceased or without funds to plug the wells.

Much of the subsurface pollution which has occurred has been associated with water flooding operations, especially in the older producing areas where the wells were drilled by cable tools with no cement being used, since the cementing process had not then been perfected. These wells did not result

in any pollution of subsurface waters for 20 to 30 years. However, in the mid 30's, water flood operations were instituted to recover additional crude oil. The water, usually salt, was introduced under pressure in excess of normal pressures and, unfortunately, was not confined to the zone being flooded. The water went the path of least resistance and in many cases polluted fresh subsurface water zones.

This water under pressure has also broken out in old abandoned wells, which frequently are located on land which is not under lease, with the original operator being unknown or deceased. These present a different and often difficult problem. To assist in getting such wells plugged, certain legislation has been passed allowing an adjoining operator to enter on the land and plug the wells in question without assuming liability for the well, either past, present or future.

The regulations and disposal of refinery effluent comes under the jurisdiction of the Corporation Commission. We work very closely with the refiners in Oklahoma to assure that no toxic wastes are discharged

and that all liquid hydrocarbons are retained. The refiners have a volunteer organization named the "Oklahoma Oil Refiner's Waste Control Council" which meets quarterly to discuss problems and new methods and techniques for waste water treatment. The Department of Pollution Abatement is an ex-officio member of this organization.

To assist the refineries in waste control expenditures, a tax credit has been established which provides a direct tax credit against Oklahoma Income Tax of 20% per year until the credit has been satisfied. The Corporation Commission verified the expenditures for submittal to the Tax Commission for credit.

It is up to the oil industry to ascertain what course of action will be followed: whether the industry will voluntarily clean up its own mess, to assure that every effort has been expended to do the best job possible, or if State and Federal regulations must be imposed to obtain compliance. Make no mistake about it, pollution will be abated, either by the industry or by legislation, the decision is yours.