



4-Corners Plants Must Cut Emissions

Limits on pollutant emissions from coal-fired electric power plants in the "Four Corners" area of the Southwest were set by EPA on March 23.

The regulations apply to four large power plants in New Mexico, Arizona, and Utah, and they amend the plans of those States to achieve the National Ambient Air Quality Standards by July 31, 1975, as provided under the Clean Air Act.

One of the generating stations, the Four Corners Plant in New Mexico, is already in operation; three others, San Juan, N.M.; Navaho, Ariz.; and Huntington Canyon, Utah; are under construction. They are the vanguard of a complex of power stations planned for the area to generate electric power by burning strip-mined coal and transport it by high-voltage lines to fast growing urban areas of the Southwest. Plants not yet under construction will be

subject to "new source" review procedures under the Clean Air Act to assure that they conform to standards for the Four Corners Air Quality Control Region.

All four plants are required under the new regulations to curtail their sulfur oxide emissions by 70 percent. In addition, the Utah plant must control its particulate emissions to 0.075 pounds per million BTUs of heat input.

Scrubbers Needed

To meet the sulfur oxide limits the power plant owners will have to install alkaline scrubbers or equivalent control apparatus, EPA declared in a preamble to the detailed regulations. Experience from demonstration testing and pilot studies indicates that such scrubbers are capable of providing at

least 70 percent control for plants that burn relatively low-sulfur coal like that found in the Four Corners area, the Agency said.

Plant owners will have to submit, within 120 days, detailed schedules for compliance, i.e. a list of steps to be taken and a time schedule for designing, building, and installing the necessary emission control equipment.

Since such compliance may take more time than the 27 months from now to the 1975 deadline set in the law. Administrator William Ruckelshaus granted an extension of seven and a half months, that is, until March 15, 1976, for full compliance in all respects.

This is 16½ months less than the tentative extension he indicated last summer he would grant for the Four Corners Air Quality Control Region.

Calculations Disputed

The regulations were the subject of public hearings last fall at which several utility companies took issue with EPA's calculations on the effects of their plant emissions on the region's ambient air. Ruckelshaus rejected these arguments, saying the calculation methods were valid and reasonable and offered the best available indication of the emission limits necessary to achieve the desired air quality.

He agreed, however, that "unavoidable malfunctions" of emission control systems could result in temporary violations, and he said the Agency was working on regulations to deal with equipment breakdowns and malfunctions.

Ruckelshaus said EPA would require the power companies to install and operate stack gas monitoring devices and to report periodically to State and Federal authorities on control equipment's effectiveness.

Separate Standards Planned for Light Duty Trucks

Proposed rules setting emission standards for light duty trucks were announced by EPA last month, after a Federal appeals court ruling that such trucks should not be included with passenger cars in the Agency's regulations.

Light duty trucks are defined as motor vehicles with gross weights of 6,000 pounds or less, designed primarily for transporting property and capable of seating no more than three persons.

Such trucks emit significant amounts of air pollution in urban areas

and constitute about 11 percent of all light duty vehicles sold nationally, said William Ruckelshaus, EPA administrator. The agency believes they are generally as susceptible to emission controls as are passenger cars.

The final standards to be set — after a 30-day period for public comments — will be at least as stringent as the current 1973-1974 model year emission standards, which new light duty trucks already meet, and possibly as stringent as the 1975 standards for passenger cars, Ruckelshaus said.

Ely, Minn., Starts Lake Restoration

A new waste water treatment plant designed to restore a "dying" lake has started operation at Ely, Minn.

The \$2.3-million facility is expected to remove more than 99 percent of the phosphorus from the city's waste water before discharging it into Shagawa Lake.

If the full-scale demonstration plant works as planned, only 150 pounds of phosphorus will enter the lake each year, according to Robert M. Brice, National Environmental Research Center, Corvallis, Ore. the project chief. No other tertiary treatment plant has yet attained this level of phosphorus reduction.

Lake in Jeopardy

Shagawa Lake has deteriorated in the last 70 years, and scientists believe that reducing its intake of nutrients, particularly phosphorus, can help arrest this eutrophication.

The restoration program is based on a study begun in 1966 which included the building of a pilot treatment plant, with floating test basins in the lake itself, to learn the effects of different degrees of nutrient removal on the lake waters.

The 2,340-acre lake drains north into Superior National Forest and the Boundary Waters Canoe Area, an unspoiled wilderness region. Ely's permanent population of 5,000 swells to more than 20,000 in the summer months.

The Ely phosphorus removal project is believed to be the first attempt to restore a lake while continuing to discharge highly-treated waste water into it. The project will be operated by EPA for three years, at an annual cost of about \$575,000, as a model that might be applicable to other lakes with similar problems.

At the end of the three-year demonstration period, the plant will be turned over to the city.

Related Studies

Meanwhile, EPA scientists at Corvallis and associated laboratories are

engaged in studying other possible ways to prevent or reduce lake deterioration.

At Diamond Lake, Ore., nutrient diversion will be evaluated, in cooperation with the U.S. Forest Service. This lake has extensive campgrounds and much recreational use. As a result, its algal growth has increased and the lake has become eutrophic. A sewage interceptor system is being installed to convey all waste water from camping areas away from the lake. This work is about 50 percent complete. Extensive physical, chemical and biological analyses of the lake water are under way to determine the rate and extent of recovery when all such nutrient discharges are diverted.

Laboratory and pilot scale studies are also under way on immobilizing nutrients after they enter lake water. Called "nutrient inactivation," this method would employ physical or chemical means to make the dissolved nutrients, such as phosphorus, unavailable to waterborne plant life. Various aluminum compounds, clays, and rare earths have been tested in the laboratory for their effectiveness on phosphorus and for possible detrimental side effects. One pilot scale test with sodium aluminate has already been carried out.

Nutrient inactivation seems promising for lakes with low flow-through rates, that is, long residence times and little incoming water to replace that which is high in nutrients.

Agency Vows to Preserve Nation's Unique Wetlands

Preservation of the Nation's wetlands was formally established as an EPA policy last month by Administrator William Ruckelshaus.

In a statement released to the press and published in the Federal Register, Ruckelshaus committed the Agency to apply the policy in all its activities to the full extent of its legal authority.

"Wetlands represent ecosystems of unique and major importance and require extraordinary protection," he said. He defined wetlands to include marshes, swamps, bogs, and any low-lying land subject to daily or seasonal flooding. They are habitats for fish and wildlife, high in recreational and esthetic value, and vital elements in natural resource conservation, he said.

Fresh-water wetlands help in the natural purification of streams and lakes, maintain and recharge groundwater supplies, and support adjacent and downstream ecosystems. Salt-water wetlands are nurseries for many species of commercially valuable fish and shellfish and help protect coastal areas from storm damage.

Ruckelshaus listed four aspects of EPA's wetlands policy:

- To minimize alterations in the natural flow of water in wetlands and to protect wetlands from adverse dredging or filling, solid waste disposal, siltation or the addition of pesticides, salts or toxic materials.
- Not to grant Federal funds for the construction of municipal waste water treatment facilities which may interfere with wetlands except where no alternative of lesser environmental damage is feasible.
- To consult with the Department of the Interior in determining the probable impact of pollution abatement programs on fish and wildlife in wetlands.
- To recommend public hearings in the event of projected significant adverse environmental impacts on wetlands.

EPA Dedicates an Artificial River

A laboratory facility to simulate the complex ecosystem of a river or lake on a scale never before achieved was formally dedicated March 7 in Athens, Ga.

Called "AEcoS" — for Aquatic Ecosystem Simulator — the unique equipment at EPA's Southeast Environmental Research Laboratory will be used to study the changes that take place in the microscopic plant and animal communities in water under widely varying, but carefully controlled conditions, as pollutants are added to the water and remedial measures taken.

At the dedication ceremony, Dr. Stanley Greenfield, EPA assistant administrator for Research and Monitoring, closed a switch that started an experiment in the growth of algae and bacteria in the simulator. It was the first full operation of the complex equipment after a month of trial runs and operational tests. The facility cost \$1 million and took nearly two years to design and build.

Bridging a Gap

AEcoS aims to bridge the gap between small-scale experiments in laboratory vessels and field studies of natural rivers and lakes. Laboratory studies can be closely controlled but are not realistic in scale and may not be realistic in effects. In field studies the problems are very real but little experimental control is possible.

The heart of AEcoS is a water-filled flume 57 m (64 yds.) long, 45 cm (18 in.) wide, and 60 cm (24 in.) deep. The flume can be supplied with ultrapure water at flow rates of up to 7,600 liters per day. As the water moves down the "artificial river" bacteria or other organisms can be injected, as well as physical or chemical pollutants, and the interactions observed and recorded.

The flume is housed in a special room whose temperature, humidity, and light intensity and quality can be controlled to simulate virtually any combination of naturally occurring conditions.



Dr. Walter M. Sanders, left, chief of Pollutants' Fate Research, and Bruce Ferguson, biologist, stand beside the Aquatic Ecosystem Simulator at EPA's Athens, Ga., laboratory. More than 800 fluorescent lamps overhead, plus 100 infrared lamps can duplicate virtually any intensity and quality of sunlight on the artificial 57-meter stream beneath. Lighting and other environmental conditions are computer controlled.

All changes desired in the condition of the water and its surroundings can be computer controlled for round-the-clock experimental operation.

Dr. Walter M. Sanders, chief of SERL's Pollutants' Fate Research, said the simulator will be used with mathematical models of ecosystems to study "the mechanisms and interactions between the natural biotic communities and water quality under various environmental stresses." The later will include pesticides, heavy metallic compounds, and other pollutants found in natural rivers.

Improving the Models

Use of the simulator should help to validate and improve the theoretical

models that have already been developed by environmental scientists, he said, and speed the solution of water quality control problems.

Dr. David W. Duttweiler, SERL director, said that although AEcoS cannot reproduce all conditions found in the natural environment, "it provides EPA with an aquatic research capability that, to our knowledge, is not duplicated anywhere in the world."

Dr. A.F. Bartsch, director of EPA's National Environmental Research Center in Corvallis, Ore., also took part in the dedication ceremonies, after a luncheon at the University of Georgia's Center for Continuing Education. The Athens laboratory is located at the University's Research Park and is one of nine laboratories associated with NERC-Corvallis.

Clean Water's Dollar Value Elusive

The people of the United States will spend about \$5 billion this year to control water pollution. Are we getting our money's worth?

No one knows for sure, according to Dr. Dennis P. Tihansky, an economic analyst for EPA's Office of Research and Monitoring, because the benefits of clean water are so hard to measure in dollars.

But it is probable that future benefits from pollution control will exceed costs in some parts of the Nation, he said, although there is likely to be a level of control beyond which cost increases overtake corresponding gains in benefits.

Moreover, the very question of a cost-benefit analysis will be moot if pollution goes unchecked and the ecological stability of the National water resources is destroyed.

Tihansky studied the sparse technical literature on clean water benefits and found estimates ranging from \$2.2 to \$12.8 billion for annual damages, nationwide, from polluted water in 1970 (see table). These estimates exclude the benefits already realized by abatement efforts. In that year the total spending for water pollution control, by government agencies and private industry, was \$3.6 billion, according to EPA estimates.

The highest benefit figure came from the National Wildlife Federation, which did not divide its \$12.8 billion estimate into categories. The lowest figure, from Resources for the Future, Inc. credited \$1.4 billion to increased recreation and \$0.7 billion to increases in the value of bordering lands, for a total of \$2.2 billion.

The intermediate estimates were derived from regional studies, extrapolating them to the Nation as a whole, with corrections for water quality and consumption, population, and levels of economic activity. All values were adjusted to 1970 as a base year.

"The wide range of estimates illustrates the complexity of measuring benefits," Tihansky said. "The National Wildlife Federation used subjective ratings by a panel of economists. The others were based on specific calculations. For instance, the Resources for the Future study used recreation benefits per capita from a Federal study of the Delaware River estuary in 1966, multiplied by the national population."

solved. Many economists believe that recreation cannot be evaluated, that it is a public good without a competitive market price. Others calculate the amounts spent by fishermen, campers, and tourists, or they ask people what they are willing to pay for clean water.

"Willingness-to-pay poses special problems. In an interview or questionnaire, the respondent can exaggerate the value; if he were actually taxed or forced to pay this amount, he might object strenuously. Saying and doing can have different economic meanings."

Esthetic value is another aspect that eludes measurement, Tihansky said. Usually a panel of experts is asked to rate esthetic values in relation to other, more tangible benefits. One sanitary engineering firm, for example, found esthetic gains from water pollution control to vary from 60 to 100 percent of more concretely measurable benefits. "To date, no consensus exists among economists on a better 'guesstimate,' nor is a more rigorous calculation of regional esthetic values widely accepted."

Tangible and Intangible

"The difference between tangible and intangible benefits is still unre-

Measurable Types

Tihansky said the types of water pollution most amenable to monetary measurement of damages (and hence monetary estimates of control benefits) were: hardness and dissolved solids (which increase cleaning costs); turbidity, acidity, and biochemical oxygen demand (which require treatment before industrial as well as domestic uses); fecal coliform bacteria; and floating materials.

Caution must be exercised in interpreting benefit estimates, Tihansky said, because "they are based on gross assumptions... and they exclude perhaps the most important benefit categories — esthetics and ecological stability."

"As more data are collected and theory developed to measure benefits, these estimates will be refined and accepted with greater confidence. The Environmental Protection Agency and many private organizations are currently engaged in such research efforts."

Water Pollution Damages

Annual Benefits From Water Pollution Control
(dollars in billions)
Adjusted to base year 1970

	Recreation	Land Values	Category of Damage		Other*	National Total
			Domestic Water Supply	Industrial Water Supply		
National Wildlife Federation, 1970	—	—	—	—	—	\$12.8
Derived from Bramer's Ohio Valley study, U. of Pittsburgh, 1960	\$2.4	—	\$0.9	\$0.5	0.1	3.9
Derived from Barker's Ill. Dept of Transp Study, 1972	1.8	—	0.2	0.3	—	2.3
Resources for the Future, Inc., 1966 (Anthony Fisher)	1.4	\$0.7	—	—	0.1	2.2

*Commercial fisheries, irrigation, health

Trash-Fuel Plant Given More Funds

EPA has approved an additional expenditure of \$570,000 to improve a demonstration plant that burns municipal waste as an auxiliary fuel for generating electricity.

The plant in St. Louis, Mo., has been operating successfully for eight months as a joint project of the city government, the Union Electric Co., and EPA to show on a full scale how valuable resources of energy and material may be recovered from household trash.

The project has attracted nationwide attention from electric utility executives and municipal officials, some of whom are considering adapting the St. Louis system to their own operations.

Correcting 'Bugs'

The additional EPA commitment announced last month is designed to correct some of the "bugs" that have developed in the preparation of trash for burning and to upgrade the facilities for recovering salable ferrous metal scrap (principally tin cans) from the waste fuel stream.

A contract has been awarded to Rader Pneumatics, Memphis, Tenn., for installing an air classifier to improve the separation of heavy materials from the ground-up trash. These materials include glass and other ceramics, large pieces of rubber or plastic, and chunks of metal that sometimes escape being crushed and may jam the pipes through which the trash is blown into the boiler. They also cause undue wear of the feeder lines. The classifier will use a whirlpool of air to separate the smaller, lighter particles from the larger, heavier ones. It will cost about \$350,000 and will be installed in about two months.

The additional \$220,000 will go for equipment to improve the efficiency of ferrous metal recovery: an additional magnetic separator, a mill, conveyors, and other devices. The American Iron and Steel Institute will help the City of St. Louis in paying for this equipment, and a National Steel Co. subsidiary, the Granite City Steel Co., Granite City, Ill., has tentatively agreed to buy the ferrous scrap from the upgraded operation.

Arch G. Scurlock Jr., EPA project officer, said the St. Louis technique of mixing municipal solid waste with coal as a generating plant fuel could be applied in many cities to reduce the overall cost of solid waste disposal and extend the life of sanitary landfill sites.

Many Visitors

More than 50 utility company engineers from 30 states and Mexico attended a seminar in St. Louis last fall and inspected the demonstration project, and there has been a continuing stream of individuals and small groups visiting the city's shredding plant and the utility's generating station.

The shredding and ferrous scrap removal takes place at a city plant that used to be an incinerator. Raw waste is hauled in by truck, ground up into small pieces, and passed through a magnetic separator. The new equipment will be installed here to optimize these operations.

Then trucks haul the ground-up

waste to Union Electric's Meramec generating station about 15 miles away, where it is mixed with powdered coal and blown into a 140-megawatt boiler. The trash-to-coal ratio may vary from 10-90 to 15-85 percent in heating value.

The processing plant can handle about 300 tons of waste per eight-hour day. This capacity represents about one-fifth of the city's solid waste production. The utility so far has been using the waste as auxiliary fuel only part-time, burning an average of 100 tons per day. City officials hope this total can be raised as more experience is gained in the operation of the system.

The mixed fuel produces a fly ash (fine sand-like particles removed from the boiler's smoke stack) that is virtually indistinguishable from pure coal fly ash and salable as filler material or concrete aggregate. But the bottom ash from the mixed fuel is not usable for spreading on icy roads because it contains pieces of metal and glass.

States Will Have to Regulate Complex Air Pollution Sources

Responding to a court order, EPA will soon require all States to review the air pollution effects of shopping centers and other commercial developments, sports arenas, amusement parks, and drive-in theaters before issuing construction permits for such facilities.

The Agency said it would propose regulations for such "complex sources" by April 15 and would promulgate them in final form by June 11.

The complex-source regulations would become part of each State's formal plans to implement the provisions of the Clean Air Act.

The action followed a ruling Jan. 31 by the District of Columbia Court of Appeals in a civil suit against the Agency. This suit challenged the completeness of air quality protection plans that regulate the pollutant emissions of stationary sources (power plants, factories) and mobile sources (motor vehicles) but fail to regulate

complex sources. Such complex sources can affect air quality indirectly, principally by attracting vehicle traffic and congestion and general urban and commercial development.

Although EPA has not officially identified the facilities it considers "complex sources" of possible air pollution, a preliminary list includes, in addition to those listed above, residential, industrial, or institutional developments; recreational areas; highways; water and sewer lines; and oil, gas, and power lines.

States will be required to have legally enforceable procedures for reviewing the location of such complex sources before they are built and for preventing construction if it should interfere with the attainment or maintenance of national air standards.

EPA has asked all States to determine now whether they have adequate legal authority, and if not, to take steps to secure it.

Sulfur Oxides Linked to Bronchitis

New data showing that sulfur oxide pollution in city air increases the incidence of chronic respirator disease was recently revealed in studies made as part of EPA's Community Health and Environmental Surveillance System (CHESS).

"There now exists a body of evidence that oxides of sulfur contribute to such diseases, said Dr. Robert S. Chapman, a physician and research epidemiologist at the National Environmental Research Center in Research Triangle Park, N.C.

Chapman spoke at a meeting of the American Academy of Allergy in Washington recently. His paper summarized CHESS surveys made in the New York, Chicago, and Salt Lake City areas and in smelter communities in Idaho and Montana.

All the surveys found sulfur oxide pollution associated with higher rates of prevalence of chronic bronchitis, a typical respiratory ailment. In New York and Chicago, where sulfur oxide pollution was accompanied by fairly high levels of particulates, the combined effects of the two pollutants rivaled those of cigarette smoking, he said.

Study Methods

The CHESS program is a long-term series of statistical studies of the incidence of disease in areas subject to certain kinds of air pollutants. Each area is divided into separate communities or population groups that vary in pollution exposure but are matched in as closely as possible in other respects.

Participants in the studies gave data on how frequently and severely they suffered from chronic bronchitis. They also reported on their smoking habits and smoking history, age, sex, socioeconomic status, length of residence, previous residence, and occupational exposure to respiratory irritants.

EPA scientists combined these data with air pollutant exposure estimates from the best available air monitoring data and industrial emission records for each community or neighborhood.

The data were analyzed to separate and measure the influence of air pollutant levels, smoking habits, age, sex,

proximity to pollution sources, and other relevant factors. Cigarette smoking was the predominant factor everywhere.

In the Utah study, where a single copper smelter accounted for most of the sulfur oxide pollution and particulate levels were low, the bronchitis prevalence due to pollution alone was found to be unexpectedly high: for women, one-tenth as important as smoking, for men, one-fifth as important. This effect, Chapman said, is much stronger than had been suggested by previous studies.

And for all groups similar in sex, age, and smoking habits, the bronchitis prevalence rates were significantly higher for persons living near the smelter.

Similar results were found in the Idaho-Montana survey, Chapman said. The effects of smoking and of pollution were "very nearly additive," and the prevalence due to pollution about one-fifth that due to smoking, for both sexes.

Big City Effects

In the New York study, covering two high-exposure communities in the city and a low-exposure one on Long Island, there was a consistent excess of chronic bronchitis among males and among smokers. The relative importance of pollution was much higher than in the western cities. For women the relative prevalence due to pollution was two-fifths of that due to smoking; for men the ratio was greater than one. This suggests, Chapman said, that the combined effect of sulfur and particulate pollution in New York "may influence the development of chronic bronchitis nearly as strongly as moderate cigarette smoking does".

The Chicago study dealt with military inductees from areas of high, medium, and low pollution exposure, and it differentiated between races. For both blacks and whites, cigarette smoking and degree of pollution exposure exerted strong effects on respiratory disease symptoms. The two factors seemed to be additive for whites but not for blacks, and the relative prevalence due to pollution

was more than one-third for whites and greater than one for blacks.

A fifth study in Chattanooga, Tenn., attempted to measure the effect of nitrogen oxide pollution. The city has a large single source of this pollutant, a munitions plant, and relatively low levels of other air pollutants. But no significant differences were found in respiratory illness that could be attributed to nitrogen oxide exposure.

Chapman's paper will be published by EPA after minor technical revisions are made.

19 Firms Working On Effluent Limits For 27 Industries

The Environmental Protection Agency last month hired 19 consulting engineering firms to help it set guidelines for liquid waste discharge practices in 27 high-polluting industries.

Data from the 27 studies are expected to be ready by early summer. They will be used by the Agency in determining — for each industry — the amounts and the chemical, physical, and biological characteristics of the effluents that industry will be permitted to discharge into waterways.

Under the Federal Water Pollution Control Act Amendments of 1972, EPA must publish effluent guidelines for the 27 industries by October 19.

The law requires existing industries to apply the "best practicable" control methods by July, 1977 and the "best available technology economically achievable" by July, 1981, both to be defined by EPA.

By next Jan. 14, EPA must set similar standards for all new industrial plants in the 27 categories.

Setting the industrial effluent guidelines is the responsibility of EPA's Office of Water Planning and Standards, which plans to consult with all interested parties in evaluating the data supplied by the 19 engineering consultants and the guidelines themselves before their final adoption.

EPA Reports on 2 Years of Enforcement Activity

During its first two years the Environmental Protection Agency has tried "to reverse the traditional orientation of its predecessor agencies and to engage, directly and forcefully, in a full range of enforcement actions," according to John R. Quarles Jr., assistant administrator and general counsel of the Agency.

In "The First Two Years," a 280-page report issued last month, Quarles cited EPA's "fair but firm" policy to seek voluntary compliance before resorting to enforcement procedures.

"As the aggressiveness of our enforcement program has become widely recognized, these informal conferences to obtain voluntary compliance have been increasingly productive," he said.

From about 100 enforcement actions taken by EPA's predecessor agencies up to the end of 1970, the cumulative total was nearly 1,300 at the end of last year, the report said. Most of these were water pol-

lution cases, including many under the Refuse Act of 1899, whose revival, Quarles said, greatly facilitated water pollution enforcement.

The Agency has also initiated a number of highly important cases under the Clean Air Act of 1970, and during the past year has markedly accelerated the enforcement of the Federal pesticides laws, he said.

The report deals separately with water, air, and pesticides enforcement. For each area, legal authority and policies are reviewed and selected case histories given, as well as case-by-case tabulations of all actions taken and their status on Dec. 31.

In an introduction, Quarles describes how the Agency has decentralized its enforcement program and personnel.

Each of the 10 regions was described as fully self-sufficient and capable of handling technical and legal aspects of case preparation, negotiations, and public hearings.

REGULATIONS ON OIL SPILLS COMING SOON

Regulations designed to prevent oil spills from occurring and to assure that clean-up procedures are ready when spills do occur will be proposed within the next few months by EPA.

Henry Van Cleave, chief of the Agency's Division of Oil and Hazardous Materials, told a government-industry conference in Washington last month the regulations would apply to all oil storage and handling facilities unrelated to transportation that are capable of accidental discharge of oil into U.S. waterways.

Excluded from EPA jurisdiction, he said, would be transportation-related facilities, which will be regulated by the Department of Transportation; facilities for buried storage of crude oil of less than 1,000 barrels capacity; heating oil tanks of less than 500 gallons; and facilities that have been approved under the waste water discharge permit system.

Van Cleave told the conference his group estimates that 10,000 oil spills occurred last year, with a total spillage of more than 10 million gallons. How much of this stayed in the environment is unknown, he said, but "estimates based on the state of the art in cleanup technology" indicate that only 20 percent was cleaned up.

The lag in technology can be overcome through better planning, faster response, and more effective use of cleanup methods now available, he said.

Key provisions of the regulations now under study include:

- Facility owners must submit SPCC plans (for spill prevention control and countermeasures) through State officials to EPA regional administrators for certification.

- Plan guidelines require the use of accepted engineering practices, operational procedures, and personnel training.

- Plans must be certified by a registered professional engineer.

- Violators are liable to civil penalties up to 5,000 for each violation. The conference was sponsored by the American Petroleum Institute, the U.S. Coast Guard, and EPA.

Recent EPA Publications

Guidelines for Technical Services of a State Air Pollution Control Agency, 291 + x p, Nov. 1972. Analyzes the needs of a statewide air pollution control agency for technical services, particularly laboratory work, to fulfill its responsibilities under Federal and State law and to support the work of local agencies. Practical suggestions are given for air quality monitoring, laboratory methods, data handling, and the gathering of legal evidence under various organizational options. Air Pollution Technical Information Center, EPA, Research Triangle Park, N.C. 27711.

Patent Abstracts, United States, Solid Waste Management, 1945-69, 452 p, 1973. Summarizes 890 domestic patents for solid waste management machines and devices, arranged by 16 subject categories. Brief descriptions and representative drawings are given

for each, with the names of inventors and sponsors (if any). Indexed by assignee, inventor, patent number, and subject. OSWMP Publications, EPA, Cincinnati, Ohio 45268.

Patent Abstracts, International, Solid Waste Management, 1945-69, 437 p, 1973. Companion volume to that listed above, gives 1,061 patents from 20 foreign countries, similarly organized and indexed. SWMP Publications, EPA, Cincinnati, Ohio 45268.

Beneficial Use of Storm water, 266 + xii p, Jan. 1973. Studies the technical and economic feasibility of using small storage reservoirs throughout a community to control storm water pollution, with various types of treatment to provide sub-potable or potable water for community use. Simulation concludes that such treated water could supply a large portion of

(Continued on back page)

Recent EPA Publications

(Continued from page 7)

the community's fresh water needs. Government Printing Office Washington, D.C. 20402, \$2.85.

Treatment of Ferrous Acid Mine Drainage with Activated Carbon, 123 + ix, Jan. 1973. A laboratory study of a method of removing iron from acid drain water to permit cheaper neutralization of the water with limestone. Passage through a column of activated carbon (made from bituminous coal) remove the iron, but the cost of the catalyst-adsorber appears to be prohibitive. Government Printing Office Washington, D.C. 20402, \$2.10 postpaid, \$51.75 at GPO Bookstore.

Toxicology of Atmospheric Sulfur Dioxide Decay Products, 42 + vi p, July 1972. A review paper on the health effects on animals and men of the principal decay products of airborne sulfur dioxide: sulfuric acid mists and sulfate particulates. Conclusions: (1) irritation potency depends on particle size as well as on the amounts of particulates in air, and (2) sulfur dioxide oxidation products are generally more potent irritants than the gas itself. Air Pollution Technical Information Center, EPA, Research Triangle Park, N.C. 27711.

The Challenge of the Environment:

a Primer on EPA's Statutory Authority, 43 p, Dec. 1972. Briefly describes the Federal laws on which the agency's programs are based, and the goals, policies, and features of each program area. Prepared by the Office of Legislation. Public Inquiries, EPA, Washington D.C. 20460.

Don't Leave It All to the Experts, 20 p, Nov. 1972. A pamphlet on the citizen's role in environmental decision making. Public Inquiries, EPA, Washington, D.C. 20460

Improving Water Quality Management in Nonmetropolitan Areas, 75 + iv p, Jan. 1973. Findings and recommendations for small city water management policy, based on a survey of small urban areas in Oregon, Wisconsin, and South Carolina. Cooperating with EPA in the study were the Department of Housing and Urban Development, the Economic Development Administration (Commerce), and the Farmers Home Administration (Agriculture). Office of Air and Water Programs, EPA, or from Government Printing Office, Washington D.C. 20402, 95 cents postpaid, 70 cents from GPO Bookstore.

Development and Demonstration of Nutrient Removal from Animal Wastes, 340 + xvii p, Jan. 1973. Reports on laboratory and pilot plant

evaluation of three kinds of processes: chemical precipitation of phosphorus, ammonia removal by aeration, and nitrification (of ammonia) followed by denitrification by microorganisms. Cost data and projections are given for many of the processes cited. Government Printing Office, Washington, D.C. 20402, \$3.45 postpaid, at GPO Bookstore.

Disposal of Cattle Feedlot Wastes by Pyrolysis, 99 + v p, Jan. 1973. Thermal decomposition of dried steer manure produced a mixture of organic compounds and burnable char, but cost projections show the process would be uneconomical. Fuel for the pyrolytic reactor is almost twice the value of the recoverable tars and oils. Government Printing Office, Washington, D.C. 20402, \$1.25 postpaid, \$1 at GPO Bookstore.

Guide to Research in Air Pollution, 386 p, Dec. 1972. A listing of nearly 2,500 research projects known to have been active in 1972, arranged by State and nation and indexed by 14 subject categories and by names of principal investigators. This guide is the eighth in a series that began under the Public Health Service and the second under the auspices of EPA. Air Pollution Technical information Center, EPA, Research Triangle Park, N.C. 27711.

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