EPA bulletin

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ENVIRONMENTAL PROTECTION AGENCY LIBRARY REGION

Train Takes Oath as EPA Chief

Russell E. Train was sworn in Sept. 14 as the second administrator of the Environmental Protection Agency. Earlier, the Senate voted, 85 to 0, to confirm his appointment.

The former chairman of the Council on Environmental Quality (CEQ), an advisory post, Train moves to leadership of an executive and enforcement agency at a time of critical change. After his nomination was announced late in July, he said that the "first early excitement" of the environmental movement is over, and the Nation must now settle down to the hard, tough work of carrying out its commitments.

"EPA is an independent regulatory agency with a strong independent character. I made that clear to the President, and he agrees with me," said Train, promising vigorous enforcement of antipollution laws.

LAWYER, CONSERVATIONIST

Train is 53 years old, a lawyer, former judge, and active conservationist.

As chairman of the CEQ since it was established early in 1970, Train was President Nixon's principal adviser on environmental matters. He led the Council's work of setting up the impact-statement system for reviewing the environmental effects of all major Federal government actions before they are undertaken.

Train said he had sought the appointment to succeed William D. Ruckelshaus, now Deputy Attorney General of the United States. Train said "Ruckelshaus got EPA off to a great start. . . But I'm my own man and expect to be developing my own programs." Train said he welcomed the shift from an advisory to an executive role in environmental protection.

Train is a lifelong resident of Washington. He was graduated from Princeton University in 1941, served five years in the Field Artillery during World War II, advancing from second lieutenant to major, and then earned a law degree at Columbia University.

–photo by Ernest Bucci

EPA Administrator Russell E. Train takes oath of office Sept. 14 from Attorney General Elliott Richardson while Mrs. Train holds the Bible.

IN FEDERAL SERVICE

He was admitted to the District of Columbia bar in 1949 and for the next eight years served in a number of legal staff posts for Congressional committees and the Treasury Department.

President Eisenhower appointed him in 1957 as a judge of the U.S. Tax Court, a post Train resigned in 1965 to become president of the Conservation Foundation. He was a founder and first president of the African Wildlife Leadership Foundation and vice-president of the World Wildlife Fund.

President Nixon named him as an Undersecretary of the Interior in 1969. He has represented the United States at several international conferences on conservation and environmental matters.

Train was married in 1954 to the former Aileen Bowdoin. They have four children.

New Rules Encourage Public Action

Though Comments Are Scanty

You can invite people to take part in water pollution control, but you cannot make them do so.

That rueful conclusion was in the background when EPA recently adopted regulations to encourage public participation in carrying out the Federal Water Pollution Control Act Amendments of 1972.

To the disappointment of some EPA officials, there had been scant public participation in setting up the rules for public participation.

The regulations were formally adopted Aug. 17, about six months after they had been proposed, and during the 60-day period provided for public comments and suggestions only 90 comments were submitted throughout the country.

"Is the American public really interested in pollution control? Sometimes we wonder," wrote Frank Corrado, public affairs director for Region V, Chicago, in the regional newsletter.

"This meagre response took place in spite of a very serious attempt by EPA and major citizen groups to involve the public in the commenting process," said Corrado. "It is particularly disheartening in the light of the intentions of Congress to encourage public participation by inserting such a 'public section' in the law."

The new regulations emphasize the public hearing as the chief tool for public participation in all stages of water pollution control projects and actions. The regulations outline policy and general requirements, including:

- Sufficient advance notice mailed to interested persons and groups and to news media, supplying agenda and other elements of the hearings.
- Hearing times and locations set to facilitate attendance and testimony by interested and affected persons and organizations.
- Documents pertinent to the proposed action made available in advance of the hearing.
- Hearing records made available for public inspection for a reasonable time to allow submission of supplementary statements.

Specific requirements are spelled out in the program regulations.

Evidence of efforts to enlist public comment must be included in State agency reports to EPA on water cleanup plans, construction grant applications, and State or area regulations. If the public input is considered inadequate, EPA "may disapprove or suspend action . . . or require the sponsoring agency to obtain additional public participation, prior to final action."

Of the 90 comments concerning the new regulations, 52 were from private citizens or citizen groups and the rest from State and local governmental bodies. Many changes were made in the final regulations in response to the comments, notably in strengthening public involvement at the State level, encouraging public reporting of violations, and reducing redundancies and unnecessary paper work.

The paucity of comments on public participation rules may be due to their abstract and technical nature. " The amendments adopted last fall fill 98 pages, and that's just the law itself," said Corrado. "Regulations and guidelines to spell out how the law will be applied will run to hundreds of additional pages. To engage the interest and active concern of citizens in such abstract legal principles is uphill work."

There are usually lots of comment and plenty of interest in local and specific water pollution issues. Last winter in southeast Florida more than 350 persons attended hearings on the use of ocean outfalls to dispose of treated sewage waste water. More than 100 comments, both oral and written, were made at three hearings, and the transcript filled 1,465 pages.

NPDES Is Prime Target For Public Involvement

The Federal Water Pollution Control Act calls for public participation in the "permit system"—officially known as the National Pollutant Discharge Elimination System (NPDES)—which is in the process of being taken over by the States.

The regulation of waste discharges into surface waters is critical to the Act's ultimate success and should be of direct interest to the public.

Public involvement in NPDES is required when a State first asks to take over the program in its borders and proposes its rules and procedures for issuing or denying permits.

The public is involved again whenever a State agency with permit authority (or EPA in the absence of a State program) takes steps to issue a permit.

Last May California was granted permit authority, the first State to win it. By mid-September four other States had completed formal application for such authority, and hearings had been set for them: Connecticut, Kansas, Michigan, and Oregon.

Eight States have applications in various stages of completion. They are Delaware, Idaho, Maryland, Mississippi, Pennsylvania, Texas, Virginia, and Washington.

The law's deadline for having the NPDES in operation is Dec. 31, 1974.

The EPA Bulletin is published monthly by the Office of Public Affairs to inform State and local environmental officials of EPA's research, standard-setting, and enforcement work.

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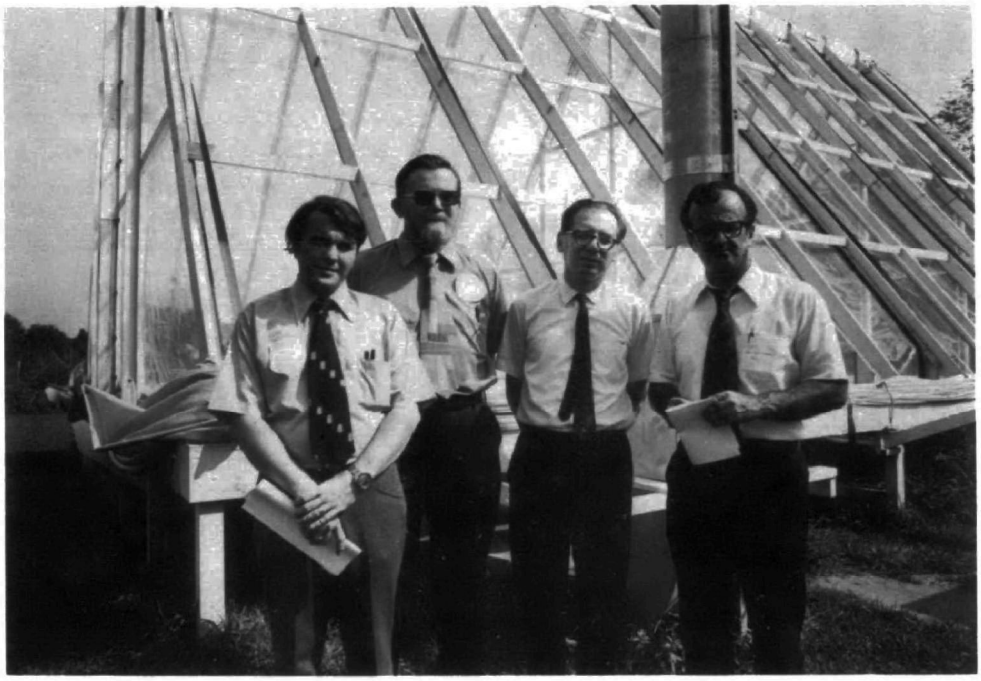


This "smog chamber" was dedicated Aug. 13 at Pittsboro, N.C., for air pollution studies by EPA and University of North Carolina researchers. From the left are Drs. Donald Fox and Lyman Ripperton, UNC, Chapel Hill; and Drs. A. Paul Altschuller and Basil Dimitriades of EPA's North Carolina Research Center.

Smog Chamber Helps Study of Air Pollutant Interactions

Using a new outdoor "smog chamber," scientists from EPA and the University of North Carolina are investigating the interactions of three kinds of atmospheric pollutants that make up urban smog.

The chamber is designed to study smog formation on a scale larger than can be accomplished in the laboratory, to find out more about the complex reactions by which emissions of hydrocarbons and nitrogen oxides, on exposure to sunlight, are converted to photochemical oxidants. All three are components of smog, and the chemistry of their interaction is not fully understood.

The cooperative project is particularly concerned with synergistic effects (e.g., when two or more pollutants combine to produce an effect that is greater than the sum of their separate effects) and with conflicting control actions. (Some kinds of control of hydrocarbons from vehicle engines increase the output of nitrogen oxides.)

To conduct field experiments under controlled conditions, EPA and the University cooperated to build the smog chamber at Pittsboro, about 16 miles southwest of Chapel Hill and Research Triangle Park. The chamber resembles an A-frame vacation house sheathed in clear plastic. It is 30 feet wide, 40 feet long, and 20 feet high, enclosing a volume of 1,200 cubic feet. Gas supplies, instruments and a computer are housed in an adjoining small hut.

Scientists can control mixtures of the three pollutants in the chamber and expose them to sunlight. Dr. Basil Dimitriades, EPA project officer, said the chamber's size and outdoor location make it possible to create conditions that closely resemble those in the atmosphere of a polluted city.

The UNC researchers have designed and assembled a complex array of scientific instruments and have programmed their operations on a computer. The computer actuates the instruments, charges the chamber with the correct mixture of pollutants, and subsequently monitors the chemical reactions that take place.

STATE ORDERS NOx CONTROLS ON OLD CARS

Starting January 1, California will require owners of 1966- to 1970-model cars in 16 metropolitan counties to install devices to reduce nitrogen oxide emissions.

In three big-city areas (South Coast Air Basin, San Francisco Bay, and San Diego County), installation is already required on resale or first California registration of vehicles of these five model years. This program started Oct. 1.

The installation program, first ordered by State authorities in May, was halted soon after it began, when it became evident that five of the six approved devices caused the engines' exhaust valves to deteriorate.

The devices are to two types: vacuum spark advance disconnect plus some engine adjustment, and exhaust gas recycle plus spark retard.

After a restudy of the devices' effectiveness, the State Air Resources Board determined that the reported valve damage occurred only at sustained high speeds (above 60 MPH), when the spark retard caused engine overheating. The manufacturers have modified their devices and their installation instructions to correct this deficiency.

Installation will be spread over a ten-month period starting in January, according to the final digit of the vehicle's license plate.

The Board is seeking to limit the scope of the program, now required by law for all 1966-1970 vehicles, by the time of motor vehicle registration in 1975. The Board believes that in some areas of the State having no air pollution problems the retrofit program would not be cost-effective.

The retrofit devices price is set by law at not more than $35, plus a tax on parts only. The devices reduce nitrogen oxide emissions by an average of 40 to 55 percent, and their fuel penalty in city driving averages 3 to 10 percent.

$11.2-Billion Air Cleanup Cost Seen

Five years from now the annual cost of curbing air pollution under the Clean Air Act will total $11.2 billion, a new EPA study estimates.

Control of mobile emission sources—mainly cars and trucks—will take $6.5 billion, more than half the total. Stationary fuel burning, including steam-electric power stations, will account for $3.4 billion, and pollution controls in 27 different industries will cost $1.3 billion, the study said.

Capital investment in air pollution control pursuant to the Clean Air Act will total $23.3 billion by fiscal 1978 according to the report. This sum is cumulative over the eight years that will have elapsed since the Act took effect in 1970.

The $11.2 billion annual cost expected in fiscal 1978 includes all interest, amortization, and depreciation of capital investment as well as current operation and maintenance costs for that year, but it does not include the cost to government agencies for pollution control monitoring and enforcement.

The gist of the report, "The Cost of Clean Air," is summarized in the adjoining table. Shown are the present amounts of five kinds of pollutant emissions in tons per year from various sources, the percentage decreases expected from control measures called for in the Act, and the estimated costs in cumulative capital investment and annual carrying charges.

"The Cost of Clean Air" is the latest in a series of reports to Congress submitted by EPA in accordance with the Clean Air Act's requirement to make annual five-year forecasts of pollution control effectiveness and costs.

Unlike previous reports in the series, the new one includes cost data not only for the types of emissions for which EPA has promulgated national air quality standards, but also for: (1) newly adopted performance standards for five stationary and industrial sources, (2) newly proposed standards for seven other stationary sources, and (3) three specific hazardous pollutants.

The study's estimates of impacts, benefits, and costs are based as far as possible on actual regulations in State implementation plans submitted to and approved by EPA.

NEW BASE YEAR

The latest report employs a new base year, 1970, permitting the use of data from the latest national census, and all costs are given in 1970 dollars.

The report cites the "uncertainties involved in forecasting even five years into the future." The evaluations are based on present technology, and no allowance is made for innovation. "Rarely in this century" says the report, "would such a five-year extrapolation have held true."

Five pollution sources were listed as "not controlled," and no emission reductions or control costs were estimated for them. They include accidental fires (forest fires, building fires, and some agricultural burning), that are substantial pollution sources not amenable to process control; minor industries (coking, carbon black) for which the only apparent remedy is new technology; and the sand, stone, and limestone industries, that produce only particulates on a local scale.

"The Cost of Clean Air" was submitted to the House and Senate Committees on Public Works and will be printed as a Senate Document.

Non-Degradation Rules Seek To Protect Clean-Air Areas

Four possible ways have been proposed by EPA to prevent "significant deterioration" of air quality in regions having air cleaner than Federal standards require.

The Agency will issue regulations embodying one or more of the proposals after considering testimony given at public hearings held recently in Washington, Atlanta, Denver, Dallas, and San Francisco, and written comments received at the Agency through Oct. 15.

The so-called "non-degradation" rules are required by a U.S. District Court order, affirmed by the Supreme Court, that the Clean Air Act requires the prevention of significant deterioration of air quality in areas where the air is cleaner than is needed to meet the standards set by EPA to protect public health and welfare.

EPA's final regulations will represent a policy of controlled industrial growth, rather than "no growth," in clean-air areas.

The four proposals are:

- Quality Increment Plan—for maximum allowable increases in sulfur dioxide and particulates in all areas where 1972 levels were below Federal ambient standards. These would be, for SO_2, 14 micrograms per cubic meter (annual average), 100 μm^3 (24-hour average), and 300 μm^3 (3-hour average); for particulates, 10 μm^3 (annual), and 30 μm^3 (24-hour).
- Emission Limitation Plan—ceilings on emissions of certain pollutants, measured from new sources or 1972 baseline levels, whichever is greater. For sulfur dioxide these would be 10 tons annually per square mile of area, or 20 percent over the baseline; for particulates, 3 tons per square mile or 20 percent over baseline levels.
- Local Definition—States would determine for each new source whether it would cause significant deterioration. But EPA must approve the State's procedure and reserves the right to cancel any approval of construction.
- Deterioration Zones Plan—States would classify areas into two zones, the first having very strict requirements, essentially banning industrial development, and the second permitting sulfur dioxide and particulate increases to the levels of the Quality Increment Plan. State public hearings would be required before establishing the strict zones.

Annual Pollution Emissions by Type and Source, Expected Decreases by 1978, and Estimated Costs

Emission Sources	Annual Emissions Without Further Control (in thousands of tons)					Expected Decreases in Emission Levels in Fiscal Year 1978 (per cent)					Total Control Cost (1970 dollars in millions)	
	Particles	SO_x	CO	HC	NO_x	Particles	SO_x	CO	HC	NO_x	Cumul. Investment	Annual Cost in FY 1978
All Mobile Sources	900	1,150	159,300	27,850	16,250	0	0	14	7	8	13,920	6,465
Solid Waste Disposal	2,981	–	5,320	7,283	–	93		88	87		512	242
Sewage Incinerators	12	–	–	–	–	98					12	2
Industrial Boilers	6,867	7,774	–	–	2,069	82	79			40	879	1,342
Steam-electric Power	4,083	28,150	–	–	16,053	88	81			15	2,900	1,860
Sta. Combust. Sub-total	13,943	35,924	5,320	7,283	18,122						4,303	3,446
Metals:												
Iron and Steel	690	–	4,092	–	–	93		0			526	179
Gray Iron Foundries	61	–	586	–	–	80		90			581	168
Ferroalloys	111	–	–	–	–	98					249	66
Primary Copper	79	4,451	–	–	–	95	81				818	178
Primary Lead & Zinc	51	570	–	–	–	96	50				45	12
Primary Mercury	15	–	–	–	–	93					1	1
Primary Aluminum	75	–	–	–	–	96					796	209
Brass, Bronze	12	–	–	–	–	97					14	3
Secondary Lead	16	–	–	–	–	92					16	4
Secondary Zinc	7	–	–	–	–	98					8	2
Secondary Aluminum	1	–	–	–	–	7					3	2
Fuels Industries.												
Coal Cleaning	71	–	–	–	–	94					27	3
Petroleum Refineries	225	4,403	10,490	169	–	60	98	69	95		335	46
Petroleum Prod. & Storage	–	–	–	2,043	–				60		159	0
Natural Gas	–	540	–	–	–		96				44	12
Solvent Dry Cleaning	–	–	–	16	–				10		2	0
Agriculture & Forests:												
Grain Handling	1,306	–	–	–	–	98					537	113
Feed Plants	233	–	–	–	–	98					22	4
Forest Products	84	–	275	23	2	80		85	0	0	71	7
Kraft (Sulfate) Pulp	960	–	–	–	–	92					108	46
Construction:												
Asbestos	707	–	–	–	–	84					8	3
Asphalt Batching	2,184	–	–	–	–	72					306	70
Cement	432	–	–	–	–	91					184	73
Chemicals:												
Lime	687	–	–	–	–	88					45	13
Nitric Acid	–	–	–	–	115					90	17	5
Phosphate Fertilizer	348	–	–	–	–	91					40	23
Sulfuric Acid	–	830	–	–	–		69				169	29
Industrial Sub-total	8,355	10,794	15,443	2,228	117						5,130	1,269
Sources Not Controlled:												
Coking	153	437	555	183	2							
Carbon Black	237	–	–	–	–							
Accidental Fires	4,877	194	21,150	3,623	1,593							
Sand and Stone	2,935	–	–	–	–							
Limestone	390	–	–	–	–							
Sub-Total Not Controlled	8,592	631	21,205	3,623	1,593							
National Total	31,790	48,499	201,268	40,986	36,082	–	–	–	–	–	23,353	11,180

Sewage Plant Uses Farm as 'Filter'

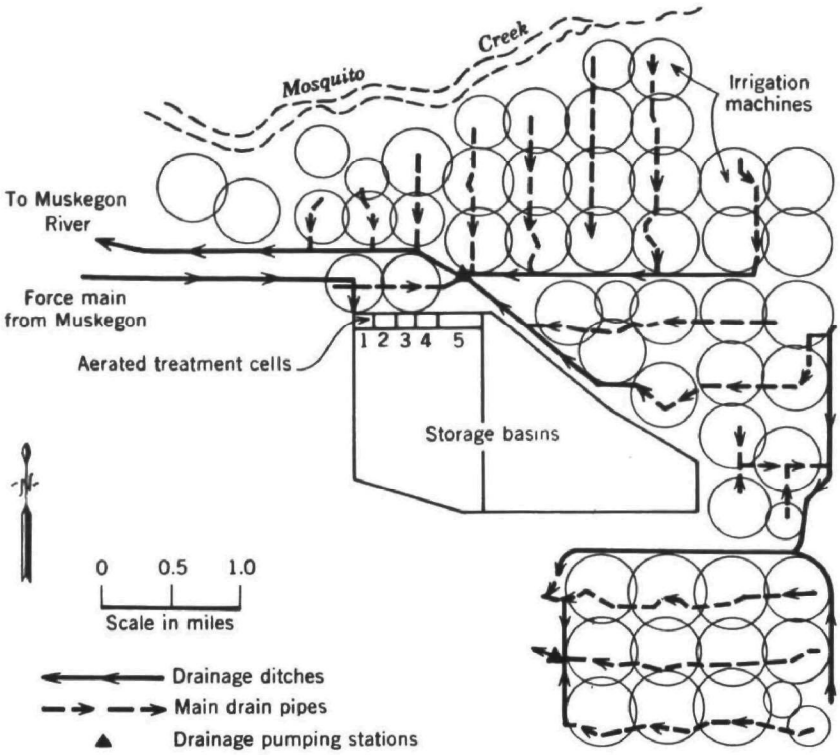
The Nation's largest sewage recycling system, which will use 10,000 acres of cropland as a "living filter", started operations this summer in Muskegon County, Michigan.

Sewage from the City of Muskegon, nearby towns, and several large industrial plants is now being pumped to the new $42-million plant 11 miles east of Muskegon for secondary treatment, storage, and (starting this fall) irrigation of farmland as a gigantic natural filter.

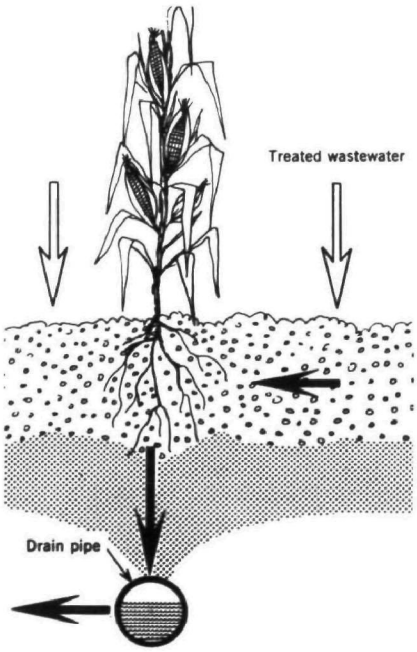
Four old municipal treatment systems have been shut down and several direct discharges from industrial plants halted, eliminating the discharge of polluted wastes into lakes and streams that drain into Lake Michigan.

When the new system is operating at full capacity it will handle all domestic sewage from the county of approximately 150,000 persons, and all industrial waste water from five major industries. It is designed to serve the county's requirements at least through 1992, when the population is expected to be 170,000 and the average sewage flow 43.4 million gallons per day.

The Muskegon system uses sewage effluent (after the equivalent of secondary treatment) as irrigation water on cropland under carefully controlled conditions. The soil-plant complex will act as a living filter to remove nutrients and any remaining bacteria or other contaminants. The filtered water, collected by buried drains, receives the equivalent of tertiary treatment and can be discharged to natural surface waters without degrading them.



Sketch shows Muskegon's "living filter" layout. Raw sewage goes first to aerated treatment lagoons (1, 2, and 3), then to settling lagoon (4) and outlet lagoon (5). Chlorinated effluent is then pumped to spray rigs (circles). Dotted lines show drainage system. Storage basins hold effluent in wet seasons and winter.



Living filter of plants and soil provides tertiary treatment, removing nutrients, decomposing organic matter, and neutralizing other pollutants in the water.

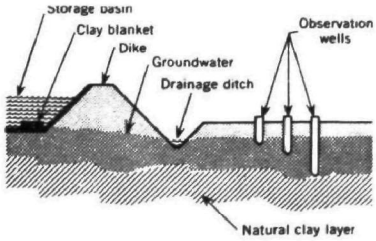
AERATION FIRST

The raw sewage goes first to a series of three aeration lagoons, each 32,400 square meters (8 acres) in area and 4.6 meters (16 feet) deep. Floating aerators and turbine mixers near the lagoon bottom keep solids in suspension and speed the bacterial breakdown of organic matter. After three days the sewage is pumped to one of two large storage lagoons totaling 6.9 million square meters (1,700 acres). Here solids settle out, and the waste water has received the equivalent of secondary treatment.

The liquid effluent is then chlorinated to kill pathogenic organisms and sprayed on nearly 8,000 acres of adjacent farmland through rotating spraying machines like those used in irrigation farming.

The county let contracts this summer for the installation of the first spray irrigators, and they will begin operating some time this fall. It will take four or five months for the storage lagoons to fill up.

The storage lagoons are carefully constructed to keep the sewage effluent from seeping into the ground-



Basin and lagoon dikes are lined with clay and surrounded by ditches to control seepage into groundwater. Wellpoints permit continual monitoring.

water. Lagoon side walls are coated with impermeable soil cement, and a 120-meter-wide blanket of clay has been laid at the edge of each storage lagoon. Any seepage through the bottom's central area will be diverted by a natural clay stratum 18 meters down and must travel horizontally through at least 120 meters of filtering sand. Moreover, a drainage ditch surrounding the lagoons will intercept such seepage, and it will be pumped back into the lagoon.

In the final "living filter" treatment, the chlorinated effluent water will be sprayed on porous, sandy, soil that is low in natural nutrients. Crops will use some of the water and most of the nutrients. Remaining organic matter will be decomposed by soil bacteria. Suspended matter and heavy metals will be absorbed by clay particles. The complex natural filtering process will also remove viruses, decomposing them into harmless protein.

DRAINAGE CONTROLLED

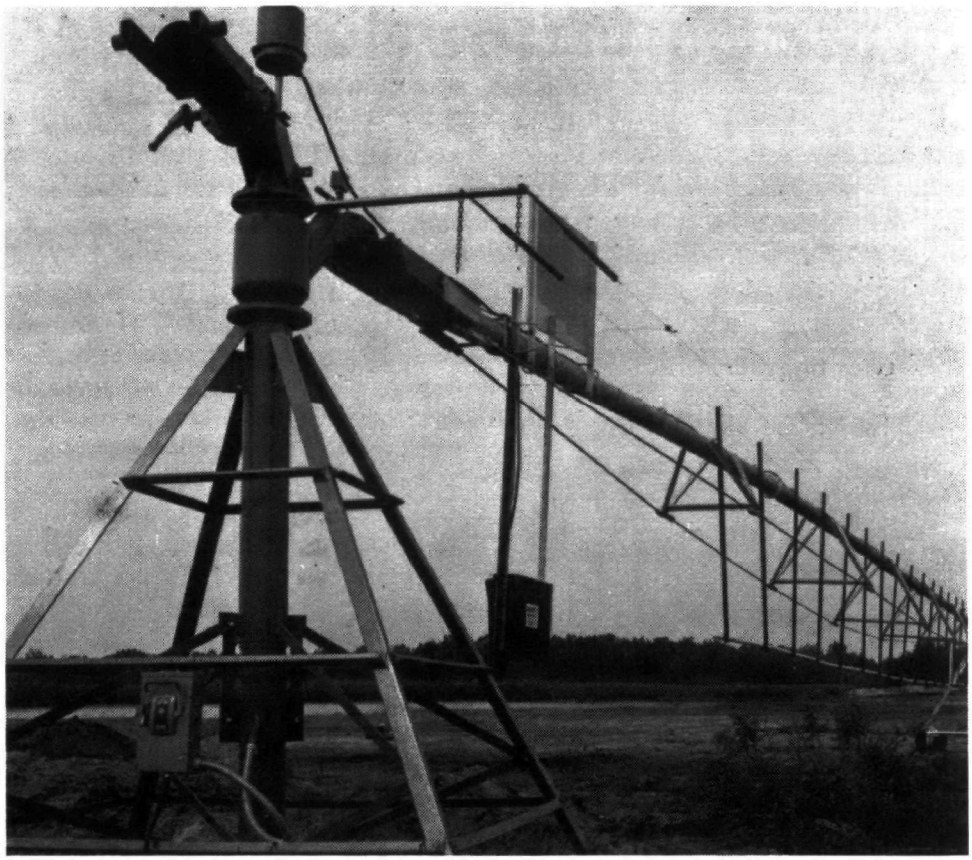
The entire irrigation area has been underlaid with preforated tile drains, collector pipes, and drainage ditches to control groundwater levels and insure that the site does not become waterlogged and unfit for cultivation. The drainage system also permits monitoring the quality of water passing through the filter. Water finally discharged to streams and lakes will meet Federal water quality standards.

Crops to be grown on the sewage-irrigated land include corn, beans, onions, winter wheat and other grains, and legumes. Comparative crops will be grown on border strips and in areas between the sprayed circles. At every stage of the farming operations, scientists from the Michigan Department of Natural Resources, EPA, and various universities will check on the quality of plants, soils, and water.

The large storage lagoons are necessary to withhold irrigation in times of heavy rain and in the winter months when the ground is frozen.

What happens to the settled solid material, the sludge? It will be dredged periodically from the bottom of the storage lagoons, and applied to border strips and between-circle areas. The lagoons are so large that system engineers think it will be five years before the first sludge dredging will be necessary.

A detailed technical article on the Muskegon project was published in the May issue of Civil Engineering, the magazine of the American Society of Civil Engineers. Authors are three men from EPA's Region V Office in Chicago: Eugene I. Chaiken, and Stephen Poloncsik, sanitary engineers, and Carl D. Wilson, physical scientist.



Spray rigs like this one will apply treated effluent to soil through downward, low-pressure nozzles to minimize air dispersion. Rig may have a radius up to 397 meters (1300 ft) and rotate once a day or more slowly.

New Law Controls Building In New Jersey's Coastal Area

A new State law regulating development and construction on New Jersey's seacoast went into effect Sept. 20.

Called the Coastal Area Facility Review Act, the measure is designed to protect the shore environment by providing for approval by the State Department of Environmental Protection (DEP) before any major construction.

The new law regulates the types of construction that will be permitted in the coastal zone—from Raritan Bay just south of Staten Island to the Delaware Memorial Bridge—including electric power plants, harbor and dredging operations, manufacturing facilities, and all housing developments of 25 or more dwelling units.

Any person or company proposing to construct such facilities in the coastal zone must first file an application with the Department and an environmental impact statement detailing the expected adverse effects on water, air, shoreline, and wildlife and describing what steps will be taken to minimize such effects.

Departmental decisions may be appealed to a Coastal Area Review Board consisting of the Commissioners of Labor and Industry, Community Affairs, and the DEP.

Pesticide Office Moves Fast Against Rabid Bats, Skunks

Are you threatened by rabid bats or skunks? Is a particular farm crop endangered by pests that can only be controlled by an environmentally harmful pesticide?

In emergencies like these, EPA's Pesticides Programs Office is prepared to move quickly to approve limited, local application of a pesticide not registered for that particular use.

Requests for such emergency clearance should be made to the nearest EPA Regional Office The pesticides officer there makes sure the request is properly documented as to need and supervision before forwarding the request to headquarters.

Recent emergency clearances dealt with bats in California and Pennsylvania, rabid skunks in Texas, and Montana, an outbreak of the Colorado potato beetle in New York, and a plague of thistle caterpillars in North and South Dakota and Minnesota.

Rabies in wild animals, particularly bats, occurred this summer in Santa Clara County, Calif., and 27 rabid bats were found. EPA granted the county health department's request to use DDT on the bat rookeries, on a site-by-site basis, administered by the county agricultural commissioner under the State's permit system. A seminar was held to train local pest control operators, and the commissioner was authorized to use 200 pounds of 50% DDT in wettable powder form up to Oct. 31. A complete report is required at the conclusion of the project.

In Concho County, Texas, and portions of Menard and McCulloch Counties, permission was given to use a strychnine alkaloid in eggs to control rabid skunks. This project is being supervised by the State Veterinary Public Health Division and will also end on Oct. 31. A similar treatment was allowed in seven counties of northeastern Montana.

On Long Island, N.Y., a temporary permit was granted to use carbofuran on 15,000 acres of potato fields infested with the Colorado potato beetle. Only one application at half a pound per acre was allowed.

In the Dakotas and Minnesota, a heavy infestation of thistle caterpillars, which change to Painted Lady butterflies, was countered by a temporary permit to use toxaphene. The sunflower seed crop on nearly 500,000 acres was threatened.

Use of DDT to control bats in a private home in Chester County, Pa., was allowed, under supervision of State public health officers. These bats were not rabid, just bothersome.

Industry Controls Ahead of Schedule In Chattanooga

Control of industrial air pollution in Chattanooga, Tenn., is ahead of schedule, according to the Chattanooga-Hamilton County Air Pollution Control Bureau.

All sources met the first reduction of visible smoke emissions to Ringelmann No. 2 by the deadline last fall, and most have now reached the Ringelmann No. 1 level, which will not become mandatory until July 1, 1974, a year before the Federal deadline, the Bureau announced.

Of the 191 stationary air pollution sources registered in the city and county, 140 now meet all applicable requirements of the air pollution control regulations, 23 are working on compliance plans or have applied for permits, 19 are operating under temporary permits while debugging newly installed control devices, and four minor sources are operating under variances while working on their emission controls.

The five remaining sources, however, are engaged in litigation with the Air Pollution Control Board, appealing Board rulings, suing, or being sued. All five are major sources of air pollution: four manufacturers and an Army ammunition plant.

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