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Ecology 1

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Ecology I & II

"If you visit American city,
You will find it very pretty.
Just two things of which you must beware –
Don't drink the water, and don't breathe the air.
Pollution, Pollution. Wear a gas mask and a veil.
Then you're all right, long as you don't inhale.
Fish gotta swim, and birds gotta fly,
But they don't last long if they try.

Every day, it seems, we see more evidence that these lyrics by Tom Lehrer, an educator-turned-entertainer, are rapidly changing from a semi-humorous overstatement to an accurate reflection of reality. It is encouraging that in recent months there has been a fantastic rise in public awareness of, and interest in, the problems of pollution – especially encouraging to those laymen and experts who were involved in fighting the problems of pollution long before it became the "in" cause. In this issue and the next, we will present articles by experts in several aspects of community pollution.

It is tempting to fall into the trap of considering pollution as someone else's problem, to take the attitude that all we have to do is make NSP use cleaner production methods or make the gasoline companies stop using lead in their products. While controls over industrial pollution are necessary, they cannot be the final solution. In the final analysis, our pollution problem can be solved only when enough people make the attitudinal shift from "Pass a law to control **them**" to "What can **I** do?".

How many of us are willing to make the necessary sacrifices – to limit the number of children we have to one or two; to drive small cars, or even (heaven forbid!) ride bikes or walk short distances; to do with less than the national average of 16 electric kitchen appliances per home; or to take the time to return glass and metal waste to re-cycling plants? How many?

The gentlemen who will share their expertise in certain aspects of pollution in these two issues of the **Medical Bulletin** have dedicated themselves to this cause, but their efforts cannot succeed without the assistance of each and every one of us. When we come right down to it, pollution is a **personal** problem.

DAVID M. LAM
Minnesota Medical Student

On the cover:

Colin Anderson (standing), son of Arnold S. Anderson, Med. '43, and his friend Allen Edgren, clean up Minnehaha Creek on a day off from school. (Minneapolis Tribune Photo)

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The Rise & Fall & Rise of the Environmental Health Threat

BY GAYLORD W. ANDERSON, M.D.
Dean Emeritus
School of Public Health
University of Minnesota

Protection from environmental hazards has always been essential to man's survival. Primitive man made clothing and found or constructed shelter to protect him from the weather and predatory animals. Originally, protection was an individual responsibility. However, as community living developed, such measures became tribal or group activities, promoted and controlled by the recognized leaders — that is, by government.

Community living introduced new hazards. Namely, man soon added to the natural hazards of the environment through his body processes. Parts of the Mosaic Code clearly show early recognition of environmental hazards of man's discharges and the need for procedures to prevent or minimize such risks.

The Industrial Revolution at the end of the 18th and beginning of the 19th century brought increased hazards of communal life as man began to move from the relatively uncontaminated rural areas into the cities and towns where the mere aggregation of people increased the contamination and resultant hazards of the environment. Migration of people from the farms, where only some of the water was contaminated, to the cities, where community-wide supplies depended upon sewage-laden rivers, brought about a sharp rise in the incidence of gastro-intestinal disease. Crowding of people into defective housing caused an upsurge of infection due to contact or respiratory association. The self sufficiency of the farm had meant that food had been relatively uncontaminated. In cities, distribution of food through a multitude of dealers unaware of inherent hazards and frequently calloused as to cleanliness or purity inevitably led to illness of the unsuspecting consumer. The filth of the city added to the hazards of urban living. While man had learned many centuries earlier to protect himself from a hostile natural environment through provision of clothing and shelter, he had now created new environmental hazards that increased his risk of illness and premature death. As in earlier centuries, hazards of the environment were the principal causes of death and life expectancy was short.

The birth of the public health movement around the middle of the 19th century marked a turning point in man's relationship to his environment. Previously, he had been forced to accept his environment as he found it and defend himself through construction of protective devices. For the first time in history he began to regulate the environment itself. Prevailing medical theory ascribed illness to the inhalation of toxic miasmas and vapors arising from decaying filth. Cleanliness of the community was, therefore, the logical first step in any program to promote health. Public health agencies during the middle of the 19th century were, therefore, organized around programs of environmental sanitation. The discoveries of bacteriology during the last quarter of the century provided rational explanation of the role of filth as a factor in the spread of disease and enabled man to distinguish between "clean dirt and dirty dirt." At the same time, they provided a sound basis for the development of such protective measures as water purification, pasteurization of milk, and control of insect vectors of disease. Man was now engaged in organized programs to regulate his environment.

That these programs were effective was clearly demonstrated by the decline of such diseases as typhoid fever, typhus, cholera, malaria, and plague, spread of which was directly related to the environment and by substantial reductions in tuberculosis and infant mortality, conditions in which environmental hazards were highly important contributing

factors. Year after year, these death rates declined. In many areas these diseases all but disappeared, and what little remained could be kept under control by programs that did no more than hold the line. The result was the growth of a degree of complacence on the part of professional personnel who felt that they could now turn their attention away from environmental sanitation and toward problems of a more personal nature. In the medical schools and even in some schools of public health there was a feeling on the part of many persons, including both students and staff, that time spent on environmental sanitation was wasted time and that this subject matter could be drastically reduced or even deleted from the curriculum. The public was also lulled into a sense of complacence, illustrated perhaps by the familiar phrase from the musical comedy *Oklahoma*: "Everything's up to date in Kansas City, they've gone about as far as they can go."

The decline of diseases due to the environment meant that for the first time in history the major causes of illness and mortality were diseases apparently related to physiological changes in the individual, conditions such as cardiovascular disease, diabetes and cancer. These were not new problems, but they had been of less obvious importance than were those conditions due to the environment and at the same time offered more difficult problems of control. It was inevitable that public health agencies would reduce their attention to environmental hazards (which were presumably under effective control) and turn their attention to these other causes of mortality. Environmental sanitation budgets were reduced and the money diverted into such programs as maternal and child health, chronic degenerative diseases and mental health. At the time these seemed to be logical changes.

Unfortunately this "honeymoon" of complacence was to be rudely shattered. Chemical rather than mechanical technology became the dominant force in the industrial and social life of the community. Transportation, industry, and even the home added chemical pollutants to the air. Liquid wastes were poured into streams and lakes. Agricultural research brought to light a wide range of pesticides which, while agriculturally effective, add to the pollution of the waterways, soil, and possibly the food produced thereon. Nuclear discoveries and the growing utilization of nuclear energy contributed new hazards to the environment. Even noise had become a potentially serious hazard for a large segment of the population. So long as industry was dominantly mechanical, as had been the case throughout the 19th century, the few wastes that were discharged into the environment seemed of little significance. However, as time passed and we reached the middle of the present century it was becoming obvious that new problems of environmental sanitation had emerged and that to an increased degree man was rapidly poisoning his environment.

Unfortunately, the threat to health presented by these changes was too often overlooked and even denied, not only by the general public but even by professionally qualified and trained personnel. As recently as 1965, a nationally prominent sanitary engineer ridiculed concern for stream pollution on the grounds that water-borne gastro-intestinal diseases had been all but eliminated and denied the importance of air pollution since no one had proven it to be harmful to man. In making such statements for national consumption, he was obviously closing his eyes to the danger of cumulative effects. It is true that, aside from a few somewhat isolated and quite dramatic episodes, there is little evidence to show conclusively the relationship between air pollution and health. It is likewise true that there is no evidence that people drinking water from streams containing small quantities of carcinogens have higher death rates from malignancy than do those drinking less contaminated water. This does not prove, however, that such contamination in air or water is blameless, for present concentrations have not existed over long periods of years. The concentrations of 40 or 50 years ago were very slight compared to those of the present time. The mere fact that there is yet no proven physiological damage does not prove that people can endure the present concentrations for 40, 50, or 60 years without damage to their health.

The time for effective action is before these poisons are taken into the body through air, water or food. Unfortunately, there is little prospect that poisons once released into the environment can be effectively removed as are pathogenic microorganisms contaminating a water or milk supply. The only foreseeable hope for success is through measures to prevent or at least minimize the discharge or escape of pollutants which may poison the environment. □

A typical sloping feedlot. Note how the liquid waste products collect at the low end of the feedlot. In many cases, the wastes then empty into a natural waterway or county ditch.

Livestock Feedlots Are Pollution Source

BY PATRICK BOSLEY, M.D.
Lyon County (Minn.) Health Officer

If you think the pollution crisis is a lot of crap, you may be right — and in the crudest sense of the word.

Not only does man pour the waste products of his own body into his rivers and lakes, he adds those of the animals he raises for food. The latter source of pollution, farm animals, in particular the feedlot problem, is the subject of this report.

A feedlot is an enclosed area where large concentrations of livestock are gathered to be fed and watered. A feedlot is also an enclosed area where large concentrations of livestock are gathered to foul the area with their body wastes. There are many excellent feedlot operations, where animal wastes are absorbed into the soil or otherwise prevented from fouling our lakes and rivers. There are many others that are poorly fenced and many that slope sharply toward a county ditch, lake or river.

In a detailed presentation to the Minnesota Senate Agriculture Committee recently, I tried to show that many feedlot owners in Southwestern Minnesota have dug direct connections to rivers, streams and lakes, piled excess manure on the edge of the rivers, allowed their cattle to go directly into public lakes, fed their animals on frozen lake surfaces in winter, and left dead calves and cows on riverbanks and at the bottom of lakes, and otherwise violated laws and common decency in the disposal of animal wastes.

Should I have also specifically outlined the con-

comitant invitation to disease? I did not have time to outline the studies carried out by a dedicated group of young professors at Southwest State College in Marshall, Minn., on the alarming levels of nitrate and sulphate contamination in human drinking water in farm wells. I did not draw on the report of the Farm Animal Waste and By-Product Management Conference held in Wisconsin in November of 1969. I did not bring along the report of the United States Secretary of Agriculture and the Office of Science and Technology, dated January 15, 1969. There should be no need. The latter report, entitled "Control of Agriculture-Related Pollution" was prepared in response to a White House directive to the Congress of the United States. Federal agencies concerned with problems of agricultural wastes contributed to the report. It should have been of substantial value in program planning and development, legislative activities and management of the environment in general.

Our state Agriculture Committee should certainly be aware of the existence of all the above mentioned documents. Or, maybe they are not aware.

Why should I or anyone else believe that man could be very concerned about proper disposal of animal wastes when he often displays an incredible lack of concern about the disposal of his own waste products.

To a physician practicing in a rural Minnesota setting, it is blatantly obvious that we have lost control of our rivers and lakes. Due to the uncontrolled, and largely unquestioned, human and animal waste disposal practices in the past, we have lost the use of Lyon County's three main rivers, the Redwood, Cottonwood, and Yellow Medicine. They are nothing more than sewers. They are indeed *yellow* medicine.

We have successfully transformed most, if not all, of the county's nearly 100 lakes and 10,000 acres of lake water surface into massive cesspools, inconsistent with even the oldest State Board of Health standards. The Minnesota State Board of Health has been in existence for nearly a century. The community of Balaton, in Lyon County, has, for perhaps an even longer time, used 382-acre Lake Yankton as its own private cesspool. This lake is filled, to a large extent, by feedlot runoff, agricultural waste, insecticide, pesticide, fertilizer, and so on. Mind you, it is also diluted at times by rain. Its once clean, sandy shore is a disgrace of solid waste. Its water is to a large extent liquid waste. Little positive action has been taken by the State Board of Health to correct these problems.

We have even found a way to more efficiently foul our public water by legislating another waterway into existence. I refer to the ubiquitous county ditch which serves as a tributary from feedlot to river in many instances.

In a recent meeting, at Marshall, Minn., a subcommittee of the Senate Agriculture Committee, specifically authorized to hear relevant problems concerning these ditches, was alerted to the fact that the community of Garvin uses the start of County Ditch 29 as the end point of their human sewage disposal system. This really means that raw, untreated, human sewage with a massive B Coli count and toxic nitrate level of 17.0 is present at the *start* of this county ditch.

The State Board of Health report made in mid-1970 is enlightening: "The sample was run in 50 milliliter portions. Each of the two petri dishes were literally covered with coliform colonies. Consequently, total accurate counting was impossible. However, over 900 colonies were counted with certainty."

The Minnesota Pollution Control Agency (PCA), incidentally, then told a local newspaper, "Even if the Garvin report comes up in the next month or two, action will not be taken right away."

What no one seems to appreciate is, however, that County Ditch 29 goes to the Cottonwood River, as do other county ditches to the other rivers. The county ditch collects run-off either directly, or indirectly, from farmlands along the way. In the area where this county ditch joins the Cottonwood River is Garvin Park. This is a new County Park. Plans are being drawn up for a new artificial lake in this area. Where will this lake get its clean water?

Just a short distance away the State Park of Camden receives the Redwood River. Has anyone been in the least bit disturbed by the fact that Ruthton, Florence, Russell, (until their new system is fully operative) and probably all the farms on the way, empty raw, untreated, human and animal sewage into the river before it reaches Camden State Park? Inside this State Park, until I requested their removal, were new outdoor toilets *on the river bank!* These were installed by the State of Minnesota. Now do you appreciate why we have no rivers or lakes

left in Lyon County? They are all sewers or cesspools. Who cares anyway? The Pollution Control Agency has still taken no action on the Garvin problem, and has forgotten altogether the January, 1971, deadline imposed on Ruthton for the submission of detailed plans for development of a new sewage disposal system. (When I checked with the PCA at the end of March looking for copies of Ruthton's plans, I found that plans had not been submitted and that the PCA had forgotten about the deadline. They have now been reminded.)

As long as certain farming operations, and communities, can see no public health hazard in the indiscriminate and illegal disposal of their own human feces and urine into public waterways, they certainly will not be concerned about the solid and liquid wastes of their cows.

It does not help the situation to point out that in 1966 the total human population of Lyon County was about 22,000 and the cow population was 88,000. If you use a cow-to-human conversion factor of 13 for solid waste output and 10 for liquid waste output, those cows are the equivalent of an additional human population of almost 1.5 million! Remember, this takes no account of solid waste from any other farm animal, particularly extensive and expanding hog operations. Since 1966, the cattle population has increased and the human population has probably decreased. Recent census figures may bear this out.

Marshall, the Lyon County Seat, with a population of about 10,000, almost half the county total, incidentally, illegally empties its effluent from its so-called lagoons into the Redwood River. Testing of this effluent before it enters the river is a new practice for them, although the State Board of Health instructed them to do his many years ago. The B Coli count of the river water *before* this effluent enters it is, on occasions at least, 110,000 per 100 milliliters. (Sometimes higher.) The "accepted standard" for effluent discharge (if you can really understand what *that* means) used to be no more than 1,000 per 100 milliliters for a B Coli count. New PCA standards are more stringent. So, even if you were discharging legally to this Redwood River, you would, at the very least, need *clean* water to be added from your lagoons.

What is the significance of reducing the B Coli count of sewage to "accepted standards" and then putting it into water with a count of 110,000 per 100 milliliters? What "accepted standard" of pollution are we going to be made to accept? Why should lagoons for human sewage be legally allowed to empty into a river? This is illegal for feedlots. (The PCA has recently given Marshall a deadline of May 1 to submit a detailed report and two years to submit detailed plans for correcting the lagoon situation).

The Biochemical Oxygen Demand is already over 30 in the river itself, at times. The local Country Club, until a few months ago, emptied its human sewage directly into the river. To point out that this really is illegal created only an emotional outburst and "mind your own business" for comment. But, nevertheless, the job was finally completed by the county health officer. Whose business is it anyway?

There are small communities, including Russell and Balaton, that have, in the last year, invested more than half a million dollars in improving their human sewage disposal systems.

There are many farmers who take advantage of the help of the Agricultural Stabilization Conservation Service, and other agencies, to improve their feedlots.

There are many dedicated groups and individuals constantly working toward improvements.

The Lyon County Commissioners have been more than cooperative in trying to solve this problem. But there are many problems, financial, political, and social. I don't know what the solution is. I can only give you some idea of the problems. Your suggestions would be most helpful.

I can only encourage you to support the most stringent feedlot regulations possible before it is too late. When we have these regulations, then we must begin tackling the real problem — enforcement.

Enforcement of these regulations will always be the biggest problem. We have had well documented public health regulations for almost 100 years that would have prevented this tragedy. If the regulations had been implemented by the State Board of Health and by physicians, with courage and determination, there would be no problems. Now we don't even bother to teach our students such preventative medicine anymore. How can the recent graduates care about such aspects of public health? It's an old-fashioned, outdated concept — or is it?

You don't need rural physicians do you? All you need are the "Super Specialists," and we should keep

as many of these as possible at the University for as long as possible, where we can shield them from reality and allow them to pursue their own esoteric problems indefinitely.

It was Darwin who drew our attention to the fact that, in order to survive, a species must adapt itself to changes in the environment. This is all too true. But the alarming fact now, even in this decade, is that unless we make some pretty drastic and rapid changes in our environment there is a more than even chance that our own species will not survive. We cannot adapt. We must change the environment. I wish Darwin were here to help show us the way.

A human being should see his powers of self analysis as a very special privilege in the struggle to adapt to his environment. If we have to change to survive, we should, at the very least, be granted a choice of methods. The theories have been set forth. What now of practice? □

Who cleans up the ice when the cows wander off the island? Answer: The lake in spring. Most of the waste products left on the island will wash into the lake, too. This particular feedlot on Lake Fremont was reported to the Minnesota Pollution Control Agency a year ago by the State Board of Health. It may become a test case of the strength of feedlot regulations which became effective March 8 of this year. The owner will be given six months to move his feedlot off the island.

Power, Pollution, Politics and People

BY DONALD E. BARBER, Ph.D.
Environmental Health,
School of Public Health,
University of Minnesota

"Atomic energy presents a hazard of unparalleled dimensions," says W. A. Boyle, president of the United Mine Workers.

"Nuclear energy is the cleanest, safest and largest energy resource we have and it has come along just about in time," says G. Hoyt Whipple, professor, University of Michigan.

Minnesotans are faced with the problem of deciding for themselves where the truth lies. What follows are thoughts and opinions which may help you decide whether nuclear power is friend or foe.

This article deals only with the threat of ionizing radiation from nuclear power, except to note here that nuclear power plants contribute to thermal pollution of the environment just as does any other industrial plant or process. Unfortunately, thermal pollution can also take the form of "heated" arguments. Perhaps we should have a little more warmth in our homes and less political heat when it comes to safeguarding our environment. Thermal pollution from all sources is a real problem which I leave to others to discuss.

There is no question that the demand for electric power will continue to increase in Minnesota. Not a day goes by without advertisements of various kinds in our newspapers for this or that kind of gadget or appliance which requires the use of electric power. Minnesota and the country as a whole are on the verge of an electric power crisis unless means are found to generate enough electric power to meet the relentless demand. The assumption that people will permit power to be rationed to them as a means for decreasing power consumption is as naive as assuming that they will forsake their cars to save the air. The question is how shall it be generated most efficiently without endangering ourselves through pollution of our environment? Many different fuels are used to run generators, notably water, gas, coal and nuclear sources. The nuclear debate throughout the country has already emphasized that our fuel resources for producing power are dwindling rapidly and, except for nuclear power, may be depleted in a few hundred years.

Our understanding of the biological effects of radiation is much more extensive than our knowledge concerning the effects of toxic chemicals in our environment. This detailed understanding has led the International Commission on Radiological Protection (ICRP) and the National Council on Radiation Protection and Measurements (NCRP) to recommend radiation protection standards with a conservatism that is unprecedented. Many would regard this conservatism unreasonable in any other field. We find critics demanding further proof that radiation exposure would not pose a danger to the health, safety and well being of our citizens and wildlife despite the presence of data on the biological effects of radiation covering a time span of more than 20 years and the investment of many millions of dollars in research work.

The ICRP and the NCRP have used a rational approach to the development of conservative radiation exposure standards. There are a number of other ways that one might go about developing standards:

1. Base permissible exposures on the absolute minimum that technology enables us to achieve without regard to whether or not the expense of doing so is necessary.

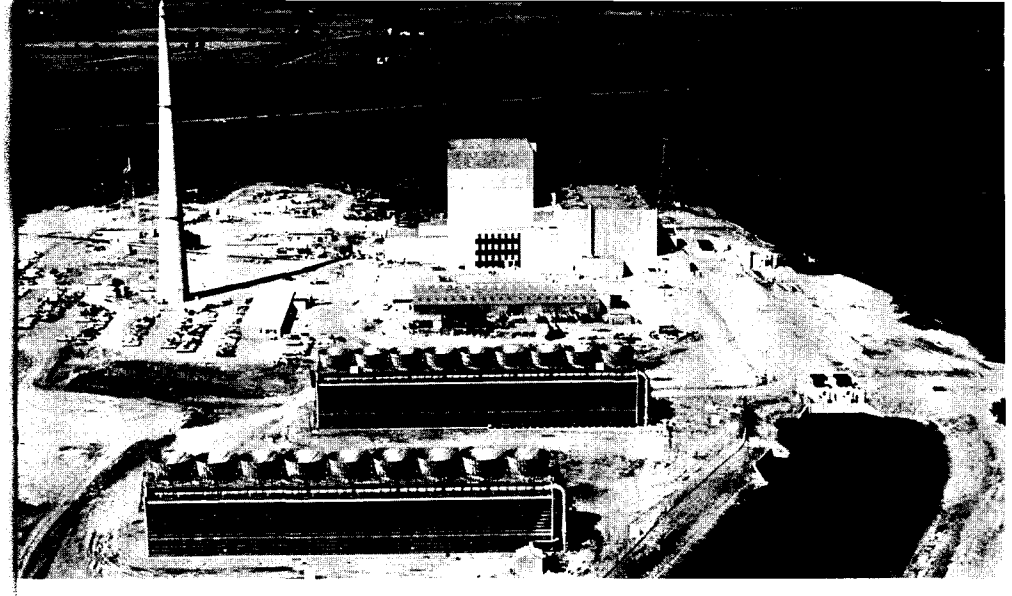
2. Establish permissible effluent standards at levels that are measurable with present technology. (These will change with time as the ability to measure contaminants changes.)

3. Establish the standards according to production cost.

4. Base the standards on an extremely sensitive segment of the population exposed and apply it to all individuals in the total population. (This type of approach however would require that we stop the sale of sugar to safeguard the health of diabetics.)

5. Set the standards at levels that will actually be experienced so that nothing needs to be done.

6. Throw darts at a board containing numbers.



NSP's 545,000-kilowatt Monticello (Minn.) nuclear generating plant. The large building in the background houses the atomic reactor. The two structures in the foreground are cooling towers to reduce the temperature of heated water from the plant's condensers before the water enters the discharge canal into the Mississippi River.

From the health viewpoint the ICRP and NCRP recommendations make much more sense than any of these alternatives.

When examining statements concerning the tens of thousands of additional deaths due to leukemia and genetic disorders predicted as a result of exposure to low-level radiation one should note that opposition to pollution, of whatever kind, has replaced things such as the delivery of health care and support of the flag as the safest of all political platforms. However, most of those who play the numbers game and make positive, alarming statements concerning the number of deaths that will result from low-level radiation exposure suffer from a misunderstanding of the basis for the radiation protection standards. Although the assumption may be wrong, the ICRP and NCRP have adopted the conservative and safe assumption that *any* amount of radiation exposure may be harmful. *This assumption is the basis for established radiation standards.* If risks are indeed involved at all at these low levels of radiation exposure they are far smaller than the every day risks of life such as crossing the street or climbing the stairs in your home.

The nuclear world is one that is far better from the esthetic and safety viewpoint than any one we have experienced to date. Even Stuart Udall, former Secretary of the Interior has indicated that if the choice were between going nuclear completely and "pumping out and ripping out all of the fossil fuels in the next 100 years and consuming them, quite frankly, as one environmentalist, I would go nuclear." If we are to escape continual fouling of our rivers and air with overburdens of biological material, toxic chemicals and gases there is no alternative at this point in time but to take advantage of nuclear power to produce a better environment in which to live.

If we insist that radiation protection standards be so restrictive as to seriously hamper the development of nuclear power under present standards we will have produced an environmental risk far greater than any from radiation exposure.

Abrupt interruptions of power have already been demonstrated to lead to disaster. In the words of Dr. John Gofman, "A public stampede due to unfounded fears can lead to political and social disaster that might outweigh tremendously even the most pessimistic assumptions concerning radiation hazards."

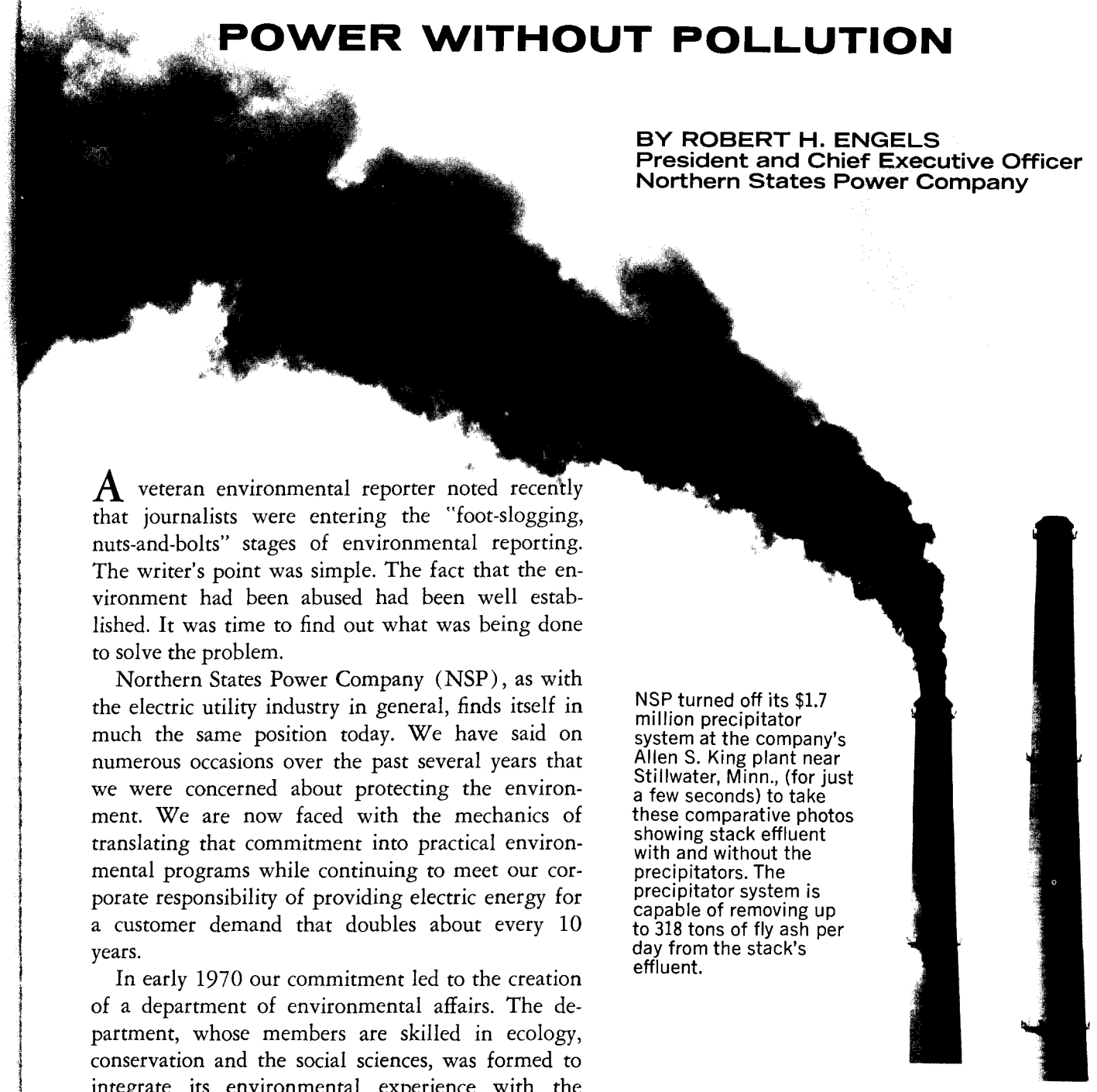
We should also be concerned about the risk to our health and welfare associated with the alarming statements made by a few at the expense of many especially when these pronouncements have no basis in fact. We accept the fact that bacteria, viruses, and toxic agents can be detrimental to health and even cause death; but, it has only been recently that we have become aware of a growing body of evidence of significant psychological components in disease etiology, especially with respect to coronary disease and cancer. We must be on guard for emotional toxicity as well as physical toxicity in our every day environment.

Nuclear reactors *do* pose a threat to man and must be carefully controlled. I can only hope that what we have learned about nuclear reactor safety will be extrapolated to other industries and that those industries will make a deliberate effort to do as well as the nuclear power industry has thus far.

The current controversy concerning nuclear power may turn out to be the biggest put-on since Tiny Tim —siphoning time, effort and money away from more pressing environmental problems. The choice of priorities is ours. □

NSP's CHALLENGE:
POWER WITHOUT POLLUTION

BY ROBERT H. ENGELS
President and Chief Executive Officer
Northern States Power Company



NSP turned off its $1.7 million precipitator system at the company's Allen S. King plant near Stillwater, Minn., (for just a few seconds) to take these comparative photos showing stack effluent with and without the precipitators. The precipitator system is capable of removing up to 318 tons of fly ash per day from the stack's effluent.

A veteran environmental reporter noted recently that journalists were entering the "foot-slogging, nuts-and-bolts" stages of environmental reporting. The writer's point was simple. The fact that the environment had been abused had been well established. It was time to find out what was being done to solve the problem.

Northern States Power Company (NSP), as with the electric utility industry in general, finds itself in much the same position today. We have said on numerous occasions over the past several years that we were concerned about protecting the environment. We are now faced with the mechanics of translating that commitment into practical environmental programs while continuing to meet our corporate responsibility of providing electric energy for a customer demand that doubles about every 10 years.

In early 1970 our commitment led to the creation of a department of environmental affairs. The department, whose members are skilled in ecology, conservation and the social sciences, was formed to integrate its environmental experience with the many aspects of corporate decision making.

The department's first major project was organizing a Citizen's Advisory Plant Siting Task Force, consisting of delegates from numerous conservation and environmental groups, civic organizations, governmental agencies and NSP. The Task Force meets regularly to discuss sites for new plants, and to discuss what type of plant should go where.

While the Task Force approach in no way surrenders the autonomy and the obligation of NSP to make its own decisions, it does reflect the willingness of the company to listen, to learn and to respond.

In the area of pollution abatement, it has become increasingly obvious to NSP that the public is asking

for more than a dollars-and-cents accounting of control measures. At the same time, huge expenditures cannot be blithely dismissed out of ignorance, naivete or cynicism. NSP spent more than $21 million for pollution control during the 1960s. The largest single allocation in NSP's 1971 Minneapolis division budget — almost $5 million — is for air quality improvement facilities at the Riverside generating plant.

Allocations for air quality improvement equipment at NSP's High Bridge generating plant in St. Paul total about $9.5 million, or about 60% of the total St. Paul division budget for 1971.

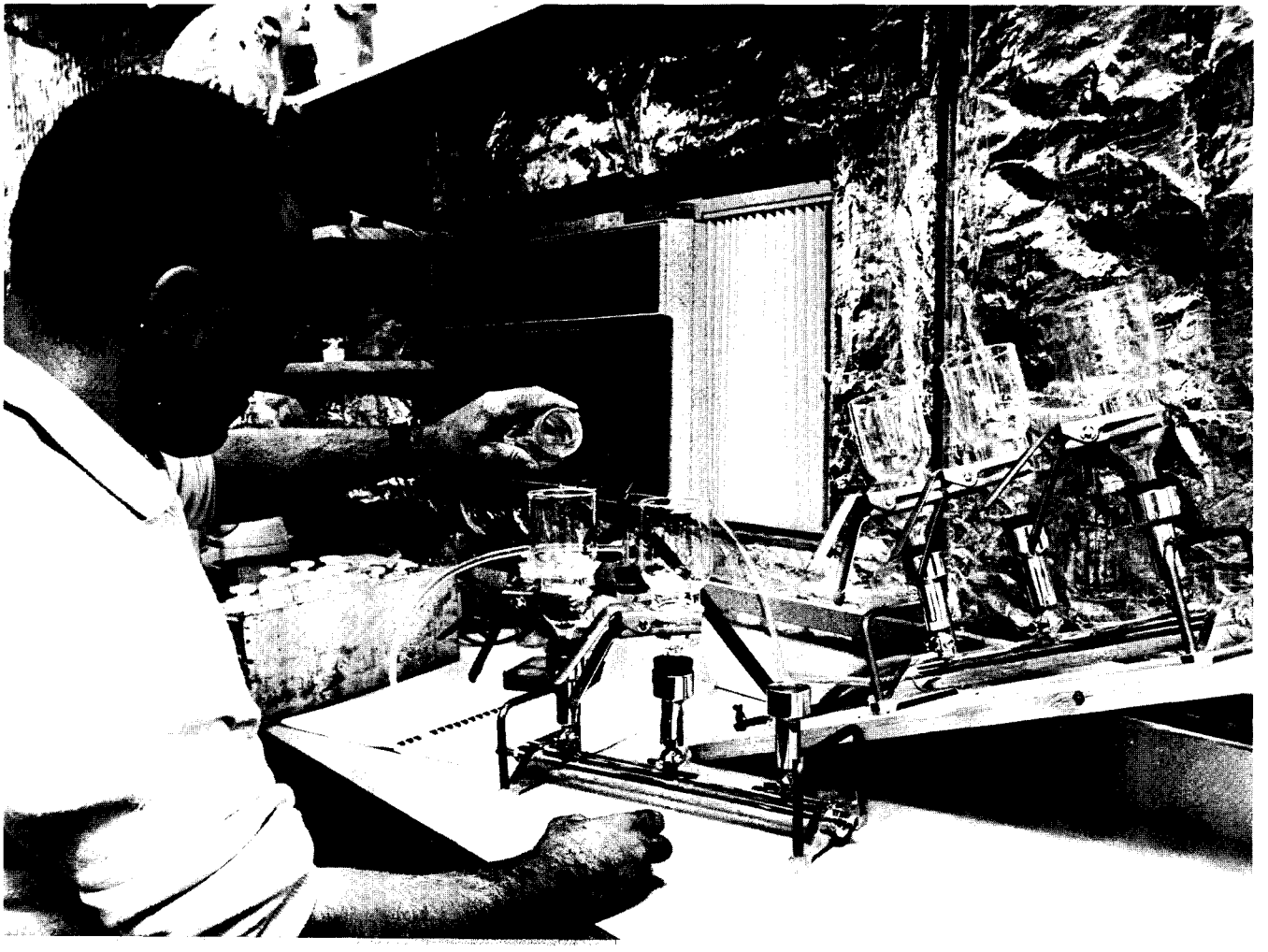
As part of our program to make our plants as pollution-free as is technically possible, NSP has assumed a position of leadership in the construction of nuclear-fueled generating plants. Nuclear plants are cleaner than fossil-fueled plants because the products of combustion— dirt, soot or particulate matter — are eliminated.

NSP's 545,000-kilowatt Monticello nuclear plant and the two 550,000-kilowatt units of the Prairie Island Plant will comply strictly with the rigid water temperature limitations that have been established by the Minnesota Pollution Control Agency. NSP has spent $5 million to install cooling towers at Monticello and almost $14 million for cooling towers at Prairie Island.

The Atomic Energy Commission has set radioactive discharge standards that will ensure public safety. The standards are identical whether the release is from medical facilities or nuclear power plants. The limits are based on recommendations of the International Commission on Radiological Protection, which has been the world's leading authority on radiation protection since 1928.

The AEC permits no release of radiation which would add more than 500 millirems of radiation per year to the amount the facility's closest neighbors already receive from nature.

Edward Miller, NSP's ecological monitoring consultant at the Prairie Island nuclear generating plant near Red Wing, tests a sample of Mississippi River water taken from near the plant. Miller is acting head of the Biology Department at St. Mary's College, Winona, Minn.



The radiation now existing naturally around the Monticello plant averages 95 millirems a year, with a fluctuation range of about 45 to 135 for low and high.

The Monticello plant was designed to add only about 5 millirems per year to this fluctuating natural background.

No effects on health have ever been observed for radiation as weak as this, or even for the U.S. average natural background of 200 millirems, or Denver's 400 millirems, or India's maximum of 12,000 millirems, or Brazil's maximum of 26,000 millirems per year.

Turning to the real world for comparison, 5 millirems is such a small increase that it is duplicated by the natural rise and fall of background radiation, or when a Minnesotan vacations three weeks in the Rocky Mountains near Denver, or when he flies across the continent round-trip on a jet, or watches television one hour a day throughout the year.

To determine the effectiveness of water and air-quality control efforts, NSP is conducting extensive air, water, aquatic life, and soil monitoring programs in the vicinities of its new plants.

Monitoring is begun at least two years before a plant goes into operation enabling scientists to compare pre-operation and post-operation data to determine if the environment has been altered, and if so, to what extent.

The programs are designed under standards developed by federal and state agencies, and are supplemented by several state and federal monitoring projects and studies.

The challenge of achieving a pollution-free power system will be met through expanding research and development efforts. NSP's research and development expenditures in 1970 totaled about $500,000. The 1971 research expenditures will total more than three times that amount.

The primary focus of the projects is on the environment. For example, NSP is currently co-operating with the Federal Water Quality Administration in laboratory studies of the temperature effects on fish and other aquatic organisms at the Allen S. King and Monticello generating plants.

In the area of air quality, NSP is one of 16 utilities financially supporting a sulphur dioxide removal study being conducted by Babcock & Wilcox and Esso Research. Related to all of these is a computer simulation program being developed to calculate the total effluents produced by NSP plants.

NSP's environmental concerns are diverse and complex. With power consumption doubling every decade, and with the need for new and bigger power plants, the company's environmental efforts will grow substantially. We plan to meet the environmental challenges of the future with imagination, experimentation, innovation and a genuine concern for the public good.

We live here, too. □

Bert Clark, NSP environmental chemist, examines an air sample filter at one of eight radiological monitoring stations surrounding the Prairie Island (Minn.) nuclear plant. The filters are examined by radiation experts at the Minnesota Department of Health. The health department's role at NSP's plants is financed by NSP.

Will Detergents Wash Out Our Lakes?

BY REXFORD D. SINGER
Associate Professor of Environmental Health
School of Public Health
University of Minnesota

In recent months, a number of cities have passed ordinances that prohibit the sale of detergents containing phosphates, limit the phosphate content of detergents that can be sold, or require ads and packages to list all ingredients and their respective percentage in the product. These ordinances apply primarily to the sale of detergents for household laundry use. Similar laws are also being considered by many other city councils and state legislatures throughout the United States. How effective will these laws be in improving the quality of our lakes and streams?

The attack on detergent phosphates has been accompanied by news stories claiming that phosphates "poison" our waters and that the removal of phosphates from detergents will prevent pollution. Such information may lead people to believe that phosphates are a toxic contaminant and that eutrophication is synonymous with pollution.

Phosphorus, along with nitrogen, carbon and certain other trace elements, is a nutrient that enriches our lakes and streams. This process of enrichment of surface waters with nutrients is termed eutrophication. It is a natural process which enables plants to grow in the water and thus provide food for fish. While the other nutrients are also necessary, most scientists agree that phosphorus is the limiting or key element for basic biological reactions. Algae growth has been shown to closely parallel the amount of phosphorus in water. Although phosphates are not harmful to people, plants or fish, they are a source of phosphorus.

What is of concern is accelerated eutrophication, or overnourishment. When abundant nutrients are available, growths of algae and other aquatic plants became excessive and upset the ecological balance in the lake. Such dense growths produce floating scums and bad odors that make water undesirable for recreation and other uses.

Phosphates are added to detergents as a "builder" to improve the efficiency of the cleaning agent by softening the water, by suspending dirt particles, and by emulsifying grease and oil. Phosphates are nontoxic, safe for fibers and fabrics, and do not interfere with other aspects of water or waste treatment.

One of the effects of promoting legislation to ban or limit phosphates in detergents has been to force the detergent industry to hastily seek a substitute. Thus far only one such substitute, nitrilotriacetic acid (NTA), has been proposed. NTA proved to be non-toxic in short-term experiments, and the industry invested millions of dollars in converting to its use. After discovering undesirable effects when it combines with other metals in contaminated drinking water, the Public Health Service persuaded the detergent industry to abandon NTA pending further studies on its potential for long-term damage to man or complex ecological systems. Therefore, at this time the detergent industry is still without an acceptable substitute. Even so, the alternative still exists for the industry to market either non-phosphate and non-NTA detergent, or ordinary soap, or both. (However, one also might speculate on the performance of modern washing machines and dishwashers in coping with soap residues!)

Another approach to reducing the amount of phosphates entering our lakes and streams is the development of phosphate removal technology at municipal waste treatment plants. Although such technology is presently available, its use will require modification of existing waste treatment plants and, therefore, further expenditures of tax dollars. The advantage of such an approach to phosphate removal is that it attacks all the phosphates in municipal wastes regardless of origin as long as they pass through the waste treatment plant. This approach at least recognizes that there are other sources of phosphates that enter our water systems in addition to those contained in detergents.

Another significant source of phosphates is human excrement. It is estimated that each person contrib-

utes three to four pounds of phosphates annually. Considering that Minnesota has a population of approximately 3,800,000 persons, at least 11 million pounds of phosphates are contributed to our environment annually from human wastes only.

Even if all the phosphates could be removed from domestic and industrial wastes, our lakes and streams still could not be protected entirely. In the United States, animal wastes amount to approximately *two billion tons* annually and most of these are spread over the land for disposal. When such wastes are spread over frozen ground they usually are carried off to our lakes and streams with runoff water in the spring. Although the detergent industry uses about one million tons of phosphates annually, the use of phosphates in agricultural fertilizers has increased from two million tons in 1950 to approximately 4.7 million tons in 1969. It is estimated that from one to two billion tons of sediment reach our major streams annually. It can be assumed that a high percentage of these sediments would come from agricultural areas and would be rich in phosphates.

Although many agriculturists claim that all but an exceedingly small amount of the phosphorus is held in a "locked in" or insoluble state in sediments, it nevertheless serves as a nutrient to organisms living in those sediments and may well be broken down by those organisms to a soluble state. If this fact can be confirmed through adequate research, it may well be that our lakes and streams are assured of having a menacing supply of phosphorus available for many years to come.

Although legislation controlling the use of detergent phosphates may be a step in the right direction, it is only one step down a long road. It cannot in any way be considered as the whole solution to excessive eutrophication.

The final question that must be asked concerns the order of our priorities. How much of our time and money should be expended to maintain clean lakes and streams when there are any number of contaminants in our environment that are known to be hazardous to man's health which receive little or no attention?

Must we wait until a catastrophic loss of human life creates an adequate "crisis" before we are willing to protect man from his environment and the environment from man? □

Detergents, Phosphorus, Environment

BY THOMAS E. BRUNELLE, Ph.D.
Manager of Corporate Research
Economics Laboratory, Inc.

WILLIAM M. PODAS
Vice President of Research and Development
Economics Laboratory, Inc.

FOR the second time in a decade, the detergent industry is being charged with an assault on the environment. First it was "biodegradability"; and today it is "eutrophication." One is sometimes led to believe that these two concepts related to the environment are the sole possession of the detergent industry.

Biodegradability has ceased to be an issue since virtually all detergents have been biodegradable for the past five years. Any attempts by the detergent industry to explain the complexity of the eutrophication issue is looked upon as a self-serving effort in behalf of confusion and delay.

A eutrophied lake means a well nourished lake in respect to nutrient levels needed to support growth of aquatic life. "Cultural eutrophication" or accelerated eutrophication due to human influence is really the concern.

The increased rate of eutrophication is generally manifested through the appearance of massive blooms of nuisance algae. What are the nutrients that get to a body of water to establish the process of eutrophication? Most discussions center around the chemical elements of carbon, oxygen, nitrogen, and phosphorus, but nuisance algae require from 15 to 20 different nutrient elements for growth. The chemical element of phosphorus in the form of sodium tripolyphosphate is the link between the complex phenomenon of cultural eutrophication and the detergent industry. The detergent industry is a large volume user of phosphorus with over a million tons (expressed as sodium tripolyphosphate) used per year. In most cases the detergent phosphates end up

in waste water. Ordinary biological sewage treatment only removes a small fraction of the phosphate.

No one will argue that phosphorus is not essential for nuisance algae growth. The question is, is it the controlling factor?

Generalities on phosphorus as the limiting nutrient in cultural eutrophiation should not be overdone. What is true for one region is not necessarily true for another region. Phosphorus is recognized as a limiting nutrient for blue-green algae growth in some areas, while other elements, such as carbon and nitrogen are limiting nutrients in other regions.

Since phosphorus is implicated in cultural eutrophication, we should ask if the detergent industry is the only source of phosphorus? The answer is no. The detergent industry consumes only between 13-14% of the yearly phosphorus production. Over 70% of the yearly phosphorus production goes to the fertilizer and animal feed industries. A small percentage also goes into foods and pharmaceuticals. If the detergent industry removed all the phosphates from detergents, would this alleviate man-accelerated eutrophication? Material balances have been run on some bodies of water to establish what contributions of phosphates arrive from what sources. For an urban center adjacent to a body of water, the phosphorus entering breaks down in the following contributions:

MUNICIPAL

Human and Vegetative Sources	27%
Detergents	28%
Inflowing Waters	13%
Rural Run-off	11%
Urban Run-off	6%
Industrial	4%
Other	11%

Even though detergents contribute about 50% of the phosphorus in municipal sewage, the detergent contribution is down to 25-30% of the total phosphorus entering the receiving waters due to the other contributing sources. If it were possible to remove phosphorus completely from detergents, we would be limiting only 25-30% of the phosphorus contribution to the lakes in an urban setting. In a rural setting, the contribution from detergents is less and in some cases nonexistent. Since algae require very little phosphorus for growth (as little as 0.5 pounds, or less, per 100 pounds of dry algae), the remaining phosphorus entering from the other sources is sufficient to maintain a condition of accelerated eutrophication provided other essential nutrients are present. Man-accelerated eutrophication is really more complex to solve than merely removing phosphorus from detergents.

We have some materials which will act as partial replacements for phosphates but they are still in testing programs. NTA was considered the leading candidate as a partial replacement for detergent phosphate, but it has now been sidelined by order of the government, pending further study.

The public is so conditioned to understand the word detergent to mean household heavy-duty laundry products, that little recognition is given to the specialty detergent applications. This field is generally recognized by the detergent industry as "I and I", for "Industrial and Institutional." Within this "I and I" application, there are over 500 product types containing detergent phosphates in some form, such as egg cleaner sanitizers, hospital germicides, CIP (cleaned in place) cleaning techniques of the dairy and food processing industry, and specialized cleaning applications of Agribusiness.

It is possible to bring about a formula change quickly in a general household laundry detergent, but "I and I" specialty detergents were designed for a special use and a change in formula (phosphate reduction or removal) may render it ineffective.

The criteria for cleanliness in an "I and I" detergent is different from the "whiter than white" concept for household clothes washing. We speak in terms of microbial cleanliness, reduction of bacterial count, quality of bulk milk for Grade A use, etc. Composition of many of these "I and I" type products are presently regulated by federal, state, and local requirements. Licensing and special labeling may be required by such agencies as the Food and Drug Administration, Meat Inspection Division (USDA), and the Environmental Protection Agency (EPA), and any change in formula would require time consuming re-approvals. To treat a specialty product used in an essential sanitary step in food or beverage service on the same basis as a household laundry item in mass use seems to disregard an important element of public health protection.

The detergent industry's conversion in 1965 to biodegradable detergents was possible because technology was available to bring about the change. In the case of phosphate replacements we do not have this technology as yet.

Economics Laboratory continues to search for phosphate replacements and formulation changes to bring about effective cleaning and sanitizing agents for the markets we serve. However, we feel it would be a great disservice to

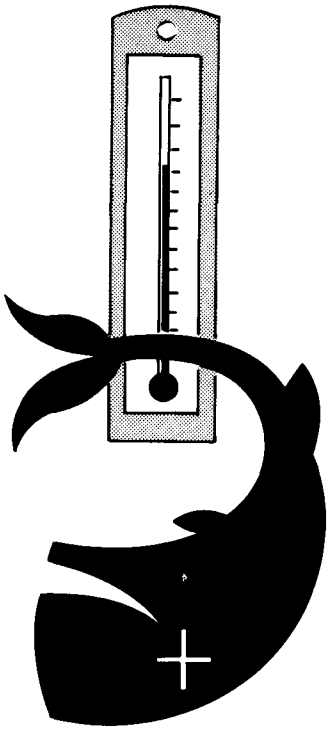
put into the market place something which would reduce the levels of cleanliness we now maintain and possibly create an even greater environmental problem.

Why do some new producers supply phosphate-free products while the major companies cannot seem to? The introduction of new products on a small scale involves neither a challenge to current raw material capacity nor risks a mass affect on the environment. It is one thing to introduce a clothes washing product as being phosphate-free, and it is quite another to know whether it will come up to the current American standards of performance.

The challenge of clothes washing can be contrasted to the "I and I" specialty products formulated for tasks from washing airplanes to surgical instruments to realize there is a distinct difference in defining what is clean.

It would seem that several courses of action are open. When feasible, all wastes should be diverted from lakes. Where diversion of waste water is not possible, improved waste treatment technology can be applied. Physical chemical processes have been developed to affect high removal of all nutrients. The city of Detroit is completing the construction of a one billion gallons-per-day sewage treatment plant which is unique because of the waste pickle liquor from nearby steel mills that will be used as a precipitating chemical for phosphates. The city of Rochester, N.Y., has moved aggressively to provide treatment facilities which will affect high removal of nutrients from waste water. The total treatment costs are above the conventional primary-secondary systems currently being used, but their overall efficiency in terms of organic and inorganic waste removal is dramatically superior. No doubt we will be seeing more and more plants of this type, simply because of increasing population densities, regardless of what happens to detergent phosphate input levels in the future.

We look at proper waste handling and sewage treatment as a more comprehensive and reasonable solution to cultural eutrophication than the removal of phosphates from detergents. □



QUICK-SILVER QUANDARY

BY
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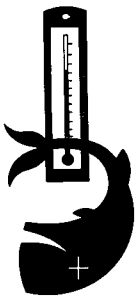
OUR bodies contain tiny amounts of all kinds of substances — and no wonder, when one considers the uncountable kinds of foods human beings consume and the many opportunities for contamination on the long road from farm to dinner table. Biochemists are sharply skilled in the detection of these substances, but they are not always able to tell us just which of the trace substances are really needed for body health and which are in the body by physiologic sufferance. Ability to withstand many kinds of toxic assault has doubtless contributed, through mutation and other influences, to our modern genetic constitution. In truth, unless better evolutionary concepts supersede Darwinism, our voracious consumption of unphysiologic compounds, via mouth, lungs, and skin, will surely lead — if not to destruction — to the development of a race characterized by its high resistance to noxious influences, perhaps to become known to future anthropologists as *H. resistans.* If this comes about, it will be yet another demonstration of man's success, biologically, through his adaptability (a characteristic of the utmost evolutionary importance), which he shares with rat and insect, weed and lichen.

Whether the body needs mercury for any of its chemical processes is not known, though in small amounts it is ubiquitous in nature, including soil and seawater. Various salts of mercury have been used medicinally for many years, and in an earlier age me-



tallic mercury was a form of therapy for constipation. Studies place the ambient range of daily mercury intake of average persons between 5 and 20 micrograms. What proportion of these amounts enters the body as contaminant or as an inevitable consequence of eating foods and breathing air is not known. Dental amalgams make their contribution, and a fresh filling emits more mercury than an old one.

That too much mercury in the body is disastrous to health has been known for generations. The element is a cellular poison and its specific actions apparently are the inhibition of enzymes and the precipitation of proteins. Acute poisoning, as from the inhalation of fumes or the ingestion or absorption of mercuric compounds, causes hemorrhagic gingivitis, gastritis, colitis, and nephritis. Oliguria develops within a few days and progresses slowly, over 10 to 14 days, to anuria and death. In chronic mercury poisoning, the picture is exceedingly variable, as would be expected, depending on individual susceptibility and the route, degree, and duration of exposure. Whereas the occupational or emergency physician is alert to the possibility of acute mercury poisoning, the generalist and internist are challenged by the chronic, insidious form, which is much more difficult to detect.

In a review of the symptoms of chronic mercury poisoning, it is fashionable to start with the Mad Hatter. He shook, he was irritable, and he asked riddles that had no answers. If his inanities were pathognomonic of anything, it must have been endemic, or contagious, or both, as the philosophical observations of his table-mates were not strikingly more profound. But we must bow to history: hatters did go mad. Mercuric nitrate was used in the hatting industry of the 1800's, in the processing of felt and fur; workers took in the mercury evidently by inunction or inhalation. Symptoms and signs included headache, nausea, vomiting, loss of weight, gingivitis (with loss of teeth), tremor, pains in the arms and legs, and an erratic gait. Just what degree of toxicity was required to initiate the classic psychic symptoms is not known, but mad hatters were irascible, depressed, fearful without cause, and violent without provocation. American medicine has recently been reminded that other symptoms include blindness, deafness, coma, and genetic damage.

There are infrequent autopsy reports on cases of uncomplicated mercurialism. Changes include stomatitis, gingivitis, mandibular necrosis, gastritis, necrosis of the renal tubular epithelium, and degeneration of the myelinated fibers of the lateral columns.

If in North Central America we have a serious mercury problem, physicians will be interested in a brief review of the steps which have led to public and legislative awareness of the possibility. Between 1953 and 1958 — it is all very recent — cats, dogs, and seabirds around Japan's Minamata Bay lost their eyesight, ran around aimlessly, and died. In varying degree, 110 persons evinced similar symptoms; about a third died, and those who survived displayed definite personality changes. The flesh of fish taken from the bay was found to contain mercury in the proportion of 102 parts per million (0.05 ppm is considered safe). Mud at the bottom of the bay contained 22 to 59 ppm. The offending industry was identified as a vinyl-chloride factory which used mercury as a catalyst and discharged mercuric salts into the waters of the bay. Since the main Japanese dietary source of protein is fish, the ring was closed and the problem was solved.

Japan contributed again to international appreciation of the mercury danger by its Niigata incident of 1965. A plastics plant emitted residues found responsible for the death from mercury of five persons and the serious illness of 21 others.

Despite the stern warning in a Swedish symposium as early as 1966, the mercury issue did not catch fire publicly in the United States until the Ernest Huckleby affair, which occurred in New Mexico in early 1970. Huckleby's hogs died without obvious cause. Severe chronic mercury poisoning developed in three of the ten Huckleby children, and the pork they had been eating showed a high mercury content. Tests revealed that six other farmers of the area had 347 hogs whose flesh contained more mercury than usual. The hogs had been fed husks and chaff from "dressed" seed. The plot thickened.

In 1914 two German chemists demonstrated that a bothersome smut (botanic, not sociologic), which interferes with germination, could be controlled by

dusting wheat, oats, and barley seeds with a compound of mercury. This use of mercury as a fungicide became a basic principle in plant hygiene, and the "dressing" of seeds for fungicidal effect enjoyed worldwide acceptance. The treatment of grain seeds is carried out in closed systems; occasional procedural errors cause acute mercurial toxicity, as occurred in London in 1940, when severe symptoms involving the central nervous system developed in four seed workers.

Industries conspicuous in their use of mercury include (and there are probably many more) those manufacturing electric apparatuses, electrolytic cells, industrial control instruments, paints, and pharmaceutical and dental products; chlorine and caustics plants; paper companies (mercury prevents "slime"); and laundries (mercury prevents mold). Mercury costs $7 per pound, so no one has accused these industries of wasting it purposely. Some loss of mercury in effluvia is apparently unavoidable in the prevailing method of manufacture of chlorine, in which half a pound of mercury is lost for each ton of chlorine produced. A high-output plant such as Dow of Canada loses an average of 30 pounds of mercury in an average day, and 200 pounds per day at peak periods. Huge amounts, perhaps tons, are discharged into the air as vapor by smokestacks from coal- and oil-burning furnaces and gold and lead smelters, worldwide.

Most of the mercury lost in industrial effluents is in vaporous or metallic form. It has long been assumed, either tacitly or cleverly, that metallic mercury, like some other heavy metals, is relatively inert and certainly harmless, buried deep in the muddy bottoms of lakes and streams. The modern ecological shocker is that metallic mercury apparently does not lie down for the sleep of the ages on timeless water bottoms. Evidence accumulates that microorganisms convert ("biotransformation") metallic mercury to methylmercury, a cumulative poison, which by way of algae makes ingress to the great food chain by which minnow, moose, and man are nourished. Moreover, Swedish investigators report that in the liver of fish and mammals, inorganic mercury can be converted to methylmercury.

In 1969, walleyed pike taken from Lake St. Clair and the St. Clair River, between Huron and Erie, showed 1.6 to 8.0 ppm of mercury in their flesh. Fish-eating residents of the area were subjected to hair-content analysis (hair concentrates mercury), and 75% showed 50 to 100 ppm. The area has been closed to commercial fishing.

In 1970, high levels of mercury were found in fish taken from the Chippewa and Flambeau Rivers of Wisconsin. Residents of the area have been warned not to eat local fish more than once a week.

Because of the mercury content of several kinds of fish, Alabama has recently closed 50,000 acres of its waterways to commercial fishing. Tuna, swordfish, and whale meat from many areas have been found to exceed by manyfold the maximal "allowable" concentration.

During 1970 the U.S. Department of Justice sued eight corporations for mercury pollution of waterways. Arguments rage; bold steps have been taken and more have been promised. Sludge ponds and other facilities have been built to reduce the escape of metallic mercury and mercuric compounds. A spokesman for the Department of the Interior states that mercury pollution has already been reduced by three-fifths.

Many problems remain and are perhaps yet to be identified. Thorough surveillance of the problem of mercury pollution in the United States will require the monitoring of 134,000 square miles of inland waterways, a hopeless task for the small force and the limited funds available. Research is severely hampered by the wide discrepancies between man and laboratory animals in the area of tolerance and toxicity. The metabolism of mercury is complex and the latent period of acute mercury poisoning suggests a slow rate of chemical cleavage. The most meaningful biochemical determinations are yet to be agreed upon. Which measurements give the best indication of incipient or frank toxicity? Concentrations of mercury in blood, muscle, brain, kidney substance, and urine are strikingly different. What is the cumulative propensity of mercury? In which species does this occur, and with what significance for man and other animals?

Does 1.0 ppm in swordfish and tuna represent a significant hazard to occasional users of these food sources? Will the tons of mercury said by some to coat our lake bottoms ever become "used up"? Could they somehow be dredged up or covered over, or will the concentrating action of food chains constitute an unending threat to our national health?

And have you read about cadmium and nickel? □

Alumni Notes

Lyle A. French, Med. '39 Named VP of Health Sciences

Dr. French digs in at the April 1 groundbreaking ceremonies for unit A of the new Health Sciences complex at the University.

Dr. Lyle A. French, chairman of the department of neurosurgery at the University of Minnesota, has been named vice president for health sciences by the University Board of Regents.

Dr. French has been acting vice president since last July when the Regents brought the various health sciences programs at the University under a single administrative structure. (*Medical Bulletin*, July-August, 1970).

As vice president for health sciences, Dr. French is the chief administrative officer of the schools of dentistry, medicine, nursing, and public health, University Hospitals, and the college of pharmacy. (The college of veterinary medicine, although allied with his administrative unit, will maintain its present status.)

Recently chief-of-staff at University Hospitals, Dr. French received his M.D. degree from the University in 1939 and his M.S. and Ph.D. degrees in neurosurgery in 1946-47.

He accepted the health sciences vice presidency because he was intrigued with the "mission statement" for the health sciences issued by the Board of Regents. The statement calls for a university involved in and responsive to the needs of the community it serves; in research, training and development of systems of health care and delivery.

Dr. French sees much promise for the closer cooperation of the various health care sciences, with greater emphasis on the development of a health care team concept of researcher, physician, dentist, pharmacist, nurse, dietician, public health expert and other health care specialists working more closely together for the mutual benefit of the community and the entire health care field.

ALUMNI NOTES

1911

Moses Barron was recently honored by the Twin Cities Diabetes Association. A 1920 article by Dr. Moses is credited with giving Dr. Frederick Banting the idea that he used to isolate insulin for the first time in 1921.

1919

Leo G. Rigler is namesake for the Leo G. Rigler Center for Radiologic Research recently established in UCLA's center for the health sciences.

1920

Leroy J. Larson received the Minnesota Medical Alumni Association's Harold S. Diehl award in 1970. He has practiced in Clearwater County, Minn. for 47 years.

1921

Lawrence Richdorf recently received the Barnabas Bowl award from St. Mary's Hospital, Minneapolis, where he is an emeritus staff member. Dr. Richdorf, 80, established a regular pediatric care unit at Glen Lake, Minn., administered the first insulin given at University Hospitals and helped to establish the Minnesota Heart Association and the American Legion Professorship Fund. He is a charter member of the Minnesota Polio Commission and an emeritus associate professor of the University of Minnesota Medical School where he taught part-time for 39 years.

1928

John F. Briggs was recently honored by the Minnesota Heart Association for 40 years of voluntary service to cardiac care at Ramsey County Hospital, St. Paul. Dr. Briggs was one of the founders of the Minnesota Heart Association and served as its second president in 1948.

1930

Abe B. Baker is the new president of the Epilepsy Foundation of America. Dr. Baker is chairman of the department of neurology at the University. In 1970, he became president of the American Neurological Association. He is a founder and past president of the American Academy of Neurology.

1931

Bror F. Pearson had the honor of having the newest elementary school in Shakopee, Minn. named after him. (The new school later won an award for superior design at the American Association of School Administrators' meeting in Atlantic City). Dr. Pearson has practiced in Shakopee for 36 years and has been a member of the school board for 15 years.

Harold O. Peterson

1933

Harold O. Peterson received the Gold Medal of the American College of Radiology at its 48th annual meeting. The Gold Medal is the highest award conferred by the College for distinguished service to radiology over a period of years. He is professor of radiology and former chairman of the department of radiology at Minnesota.

1934

H. O. Morgan was honored by his community of Amboy at "Dr. Morgan Day." He has served the Minnesota community for 35 years.

1937

H. C. Freedman has a change of address: University of California Medical School-Davis, Sacramento Medical Center, 2315 Stockton Blvd., Sacramento, Calif. 95817.

1941

Harold G. Ravits is president of the Ramsey County Medical Society, St. Paul, Minn.

Forrest Adams

1943

Forrest H. Adams is the new president of the American College of Cardiology. Dr. Adams is professor of pediatrics and head of the division of cardiology in pediatrics at the University of California, Los Angeles School of Medicine.

Sewell S. Gordon has been named a Fellow of the American College of Radiology.

Henry Quist is the new president of the U of M Medical Alumni Association.

V. Richard Zarling was recently named a vice president of the Muscular Dystrophy Association of America.

1946

Robert A. Good, chairman of the University of Minnesota department of pathology, has received the Albert Lasker Medical Research Award and $10,000 honorarium for 1970. Dr. Good was honored for 27 years of study of immunology. Since the Lasker award was first given 25 years ago, 21 of its recipients have won Nobel prizes. Dr. Good was featured in an article in *Newsweek* magzaine Nov. 23, 1970.

1956

John A. Gronvall has been named dean of the University of Michigan Medical School and director of the medical center.

1958

Frederick V. Featherstone has been named deputy associate administrator for operations, Health Services and Mental Health Administration, of the U.S. Department of Health, Education and Welfare.

1962

Douglas D. Mair has been appointed a consultant in pediatric cardiology at the Mayo Clinic, Rochester, Minn.

Donald A. Stenzel has received board certification in Anesthesia.

1965

Wallace Rogers spent six months at the Albert Schweitzer Hospital in Haiti, on a leave of absence from his University of Vermont pathology residency.

Ralph E. Rydell has been appointed a chief resident associate in neurologic surgery at the Mayo Clinic, Rochester, Minn.

1967

Carolyn Levitt has been named the first director of ambulatory pediatrics at Children's Hospital in St. Paul.

1970

J. David Peterson is a member of an international team of climbers assaulting 29,028-foot Mount Everest this April. He has promised a photo report to the *Medical Bulletin.*

John A. Gronvall
NAMED DEAN

ALUMNI DEATHS

John T. Anderson—1941

Died of cancer March 14, 1971, at Hennepin County General Hospital, Minneapolis.

Emil Bergendahl—1945

Died at age 49 of a heart attack while on a skiing vacation in Colorado. Dr. Bergendahl had been associated in the practice of otolaryngology in Fort Wayne, Ind.

John V. Farkas—1939

Died July 12, 1970, at 57, of coronary occlusion of right descending coronary artery.

Charles J. Hutchinson—1917

Retired director of health at Brown University, Providence, R.I., and former professor at the University of Minnesota Medical School, died February 25, 1971.

Reuben A. Johnson—1915

Died Oct. 6, 1970, at 81, of cerebrovascular accident. Dr. Johnson was a former faculty member at Minnesota.

Herman E. Koop—1926

Died January 26, 1971, at St. Cloud, Minn., at the age of 69. Dr. Koop practiced in Cold Spring, Minn., for 45 years.

Robert C. Murdy—1921

Died Nov. 16, 1971, in Kalamazoo, Mich.

Orville N. Nelson—1919

Died in December, 1970, at St. Petersburg, Fla.

Lewis Earle Nolan—1927

Died Dec. 8, 1970, at age 69, of dissecting aneurysm.

Erwin W. Newman—1932

Died August 3, 1970, at the age of 67, in Cedar Rapids, Iowa, of myocardial infarction and arteriosclerosis. Dr. Newman was certified by the American Board of Ophthalmology.

Mark A. Olson—1970

Died Feb. 7, 1971. He was interning at Philadelphia General Hospital. Mrs. Olson has requested that memorials be directed to the student loan fund of the Minnesota Medical Foundation.

Sarah Rosekrans—1928

Died Nov. 15, 1970, in St. Mary's Hospital in Rochester, Minn., of diabetes mellitus, hypertension and cerebrovascular accident.

Clifford D. Snyder—1943

Died in Naeve Hospital, Albert Lea, Minn., on Oct. 6, 1970, at 51, of chronic nephritis with uremia.

Orvie J. Swenson—1926

Died in Methodist Hospital, Rochester, Nov. 26, 1970, at 72, of cerebral infarcts, multiple arterial emboli, and systemic lupus erythematosus.

Dale Watkins—1942

Died Feb. 7, 1971, at his home in Honolulu. Dr. Watkins was a retired naval medical officer.

RENEWAL MEMBERS: TAKE YOUR BASE
OR . . .
A BASE ON BALLS BEATS A STRIKEOUT EVERY TIME

The Minnesota Medical Foundation has been "swinging for the fences" in its drive for Centurion, or $100, memberships and may have momentarily lost sight of the importance of getting to first base.

The drive for Centurion memberships has certainly had its successes. About 300 Centurion memberships have been received.

However, we apparently lost some ground, too. With only two months left to the Foundation's fiscal year, several hundred of our long-time staunchest backers have not yet renewed their $25 annual memberships.

We realize that these are difficult times — not only for charitable organizations but for contributors. Your office overhead continues to go up and the tab at the grocery store gets bigger while the bags get lighter.

We know that you think the Minnesota Medical Foundation is important. You have given your support to the Foundation in the past.

We only wish to remind you that contributions in *any* amount are very welcome and that the standard annual membership is still just $25.

Won't you please renew your membership before June 30?

Send your check to:

Minnesota Medical Foundation
Box 193—University Hospitals
Minneapolis, Minn. 55455

Thank you.

Eivind Hoff

Eivind O. Hoff
Executive Director

COMING NEXT IN THE MEDICAL BULLETIN: ECOLOGY

2

MEDICAL BULLETIN
UNIVERSITY OF MINNESOTA

2
Ecology

Jet Pollution: The Wild Gray Yonder

The TV Radiation Picture

No-Lead Gasoline: Placebo or Panacea

Health and Air Pollution

Health and Water Pollution

Controlling Air Quality

Controlling Water Quality