

Everybody's yuk: hazardous waste management in Wisconsin. [Supplement, Vol. 5, No. 4] [July-August 1981]

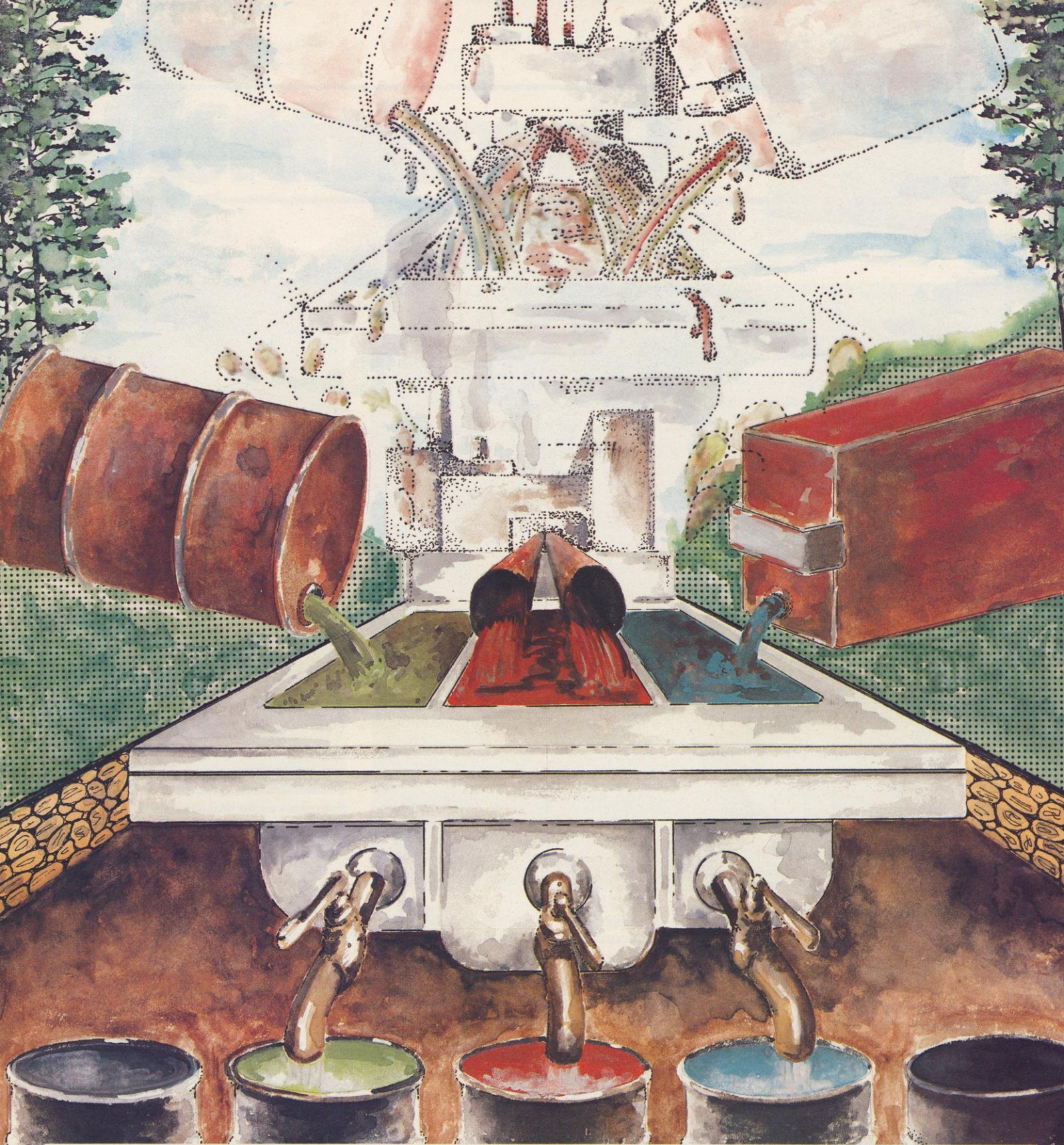
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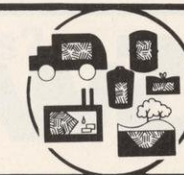
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Everybody's yuk:
Hazardous waste management in Wisconsin



The siting dilemma



STEPHEN A. ROMANO, Grants Coordinator

Finding a hazardous waste management site is complex and controversial. Problems created by poorly located and recklessly operated ones such as Love Canal have alerted citizens to the danger of improper disposal. These incidents have also heightened local opposition. Recent laws help ensure that new sites are properly engineered and placed in areas with suitable geology and hydrology. However, they have also lengthened review time on applications. From the day a new site is proposed until final approval is a two-year process if no opposition arises. Legal battles can add several years more. Conflicts often arise between urban waste producers in need of sites and rural communities with available land.

Lately, opposition has intensified and the tactics have gained both sophistication and inventiveness, even against ordinary solid waste landfills. Local zoning variances and conditional use permits have been denied. Road weight limits have been lowered to prevent construction or future waste hauling. New local ordinances have been passed restricting sites to only a few hours of operation a week — just enough for the existing town dumps. One community hurriedly purchased a potential site at bargain-basement prices and proclaimed a “park,” frustrating condemnation efforts that were underway. DNR, which reviews proposals for new sites, has had its technical decisions taken to court. Site opponents have also legally challenged such fine points as the type of public hearing provided, or the environmental assessment results. On a darker note, vandals

have damaged equipment and defaced buildings.

While siting has become increasingly time-consuming, the need for new capacity is growing. A 1979 DNR report estimated only 20 percent of Wisconsin's 380,000 tons of hazardous waste produced annually end up at facilities specifically designed to treat, store or dispose of them. New state and federal regulations for handling these wastes will increase industry's need for these services over the next several years. Use of “Superfund” to clean up abandoned dumps will further increase demand whenever buried wastes are unearthed.

Wisconsin now has only three chemical waste landfills, all in greater Milwaukee. One is no longer accepting new customers. There are no commercial hazardous waste incinerators in the state. Minnesota and Iowa have no chemical waste landfills. Even though 16 states have passed comprehensive hazardous waste siting legislation, so far none has yet produced a new site.

With steadily increasing waste generation rates, the need to resolve these impasses is acute. In Wisconsin, legislative consideration has focused on three approaches: involving the public in state permit reviews, compensating local communities which accept facilities, and overriding local land use restrictions that block development of environmentally sound sites.

A 1979 court decision, *Nelson vs. DNR* made override a central issue. In that case, the Wisconsin Supreme Court ruled that a local zoning ordinance could not be set aside to establish a landfill. However, the court hastened to add that this decision should not be taken as precedent and urged the legislature to clarify existing state law in the interest of public



Hazardous waste problems make news. Backlash from safe sites are suspect. How to pick them and be fair to and the legislature. Photo by Dave Crehore

health, safety and welfare. Since that time, towns have continued to argue that override would be an unacceptable infringement on the local right to control land use through careful planning and zoning. Cities, counties and industries in need of sites contend override is needed to counter “not in my backyard” attitudes.

Compensating communities that allow landfills has been explored as one alternative to override authority. Compensation could take the form of cash payment, tax breaks, public service improvements, free use of a facility, or agreements on hours of operation and final use of the site. Although landfills may not be welcome while operating, closed ones frequently

become parks or other open space assets.

Experience shows that compensation must be handled carefully. Local opposition may increase if residents perceive offers as an incentive to accept a “dangerous neighbor.” The first concern of most local communities is assurance that any site constructed will not pose unacceptable dangers. Equitable compensation for such things as truck traffic or noise can only complement, not substitute for, answers to legitimate public health and environmental safety concerns.

The key to resolving these conflicts may be open discussion very early in the process. From the beginning, the general public, the

operators and local officials need to share more information. Negotiating specific points of disagreement among the different interest groups offers a viable alternative to expensive litigation. In many cases, mistrust of government and a feeling that facilities were designed and approved behind closed doors have prompted violent reaction. A strained dialogue often results when local groups first become aware of a “final” proposal. Local representatives may fear appearing to “give in” if they depart from a firm veto stance, while developers may be reluctant to change detailed work completed at considerable expense.

According to Solid Waste Bureau Director Robert Krill, it is critical that information be shared at an early stage. “Citizens, local officials and the media have valid questions about site selection decisions and the alternatives considered. Projected waste types and volumes, engineering concepts used to guarantee environmental quality and opportunities for public comment are all legitimate concerns,” says Krill. Local representatives might even play a role in selecting a prime site from among several locations. “Both site developers and the government have a responsibility to ensure that accurate information is provided in a timely fashion and that forums for local input are scheduled and well publicized.”

Technical participants must also be willing to make changes in the engineering plans based on local input, where this is practical. A number of design decisions could benefit from early interaction. Where wastes will be deposited on a property has a bearing on site abandonment and final use. It also affects setback distances to adjacent properties. Screening and

fencing decisions affect aesthetics, both before and after a site's active life. Topographic features such as hills, woodlands or bottomlands may be preserved or enhanced. Finally, placement of access roads and highway turnoffs affect traffic patterns and potential nuisance conditions.

But negotiation and communication, rather than litigation, offer only promise, no guarantees. Some opposition to any proposed site will always exist. Legislation may be needed to provide a framework for negotiation, and a sense of timeliness and certainty for locating needed sites.

“If override is provided in the law, we would hope it would never have to be used,” commented Krill. “Unfortunately, it appears some mechanism is necessary to ensure that opposing parties will sit down together to settle their differences.”

Collectively, all interests have to decide what society can and cannot afford to sacrifice. Safe disposal sites will be expensive. One may be proposed near your home — probably not in your backyard, but in your community. Hazardous wastes will not manage themselves. Continued dumping in wetlands, open waters, vacant lots, farm fields and roadside ditches is not an acceptable sacrifice. It surrenders us to a life threatened by contaminated food, foul water and unbreathable air. Managing waste is the only course. The road is not dangerous, but it must be travelled carefully. That's what the state is about and it needs your support.



Swing sets yes, hazardous waste no



MARK L. HENDRICKSON,
UW-Extension Environmental
Resources Unit

There was a time when people knew what went into everything they used in daily living. Homes were made of logs; tools of wood, metal and stone. Building materials, food, clothing and transportation came directly from animals, plants and the earth. But high technology and modern living changed all that.

Hazardous wastes are an inevitable part of industrialized society, dangerous kickbacks no one wants in the backyard. The swing set, yes — but hazardous waste from making it, no. Blue jeans, televisions, newspapers, dry cleaning, automobiles, air conditioners — services and goods we demand generate the wastes we deplore.

"Whenever anyone produces anything, there is wasted energy or resources. You can't be 100% efficient. One component of wasted resources is hazardous and requires special care," says William Rock, deputy director of the DNR's Bureau of Solid Waste Management.

For years, products were manufactured without regard for what went out the industrial backdoor. "Disposal had been a matter of expedience, not right and wrong," says Rock. Now, after numerous case histories, hazardous waste is notorious as a prime environmental contaminant. The problem grew slowly, its evolution marked by increasing frequency of disposal turned sour.

What exactly are hazardous wastes? Many are man-made chemicals with a petroleum base and mysterious ingredients. They come with strange sounding names — *tetrachloroethylene* and

dibromochloromethane. Are they chemicals or dinosaurs?

Petrochemicals do not occur naturally but they are essential in the energy, textile, insulation, food additive, plastic and pharmaceutical industries. One of their peculiar traits is longevity — they have

the uncanny ability to withstand wind, sunlight, water and time.

"We all have our hands in this stuff one way or another," Rock says. "Maybe your employer generates it. Almost any large manufacturing firm has some component in its process." Hazardous waste also

Roll out the barrel. With proper equipment hazardous wastes are handled safely. This corrosive material, inadvertently dumped in a landfill is removed in a specially sealed "recovery barrel." Photo by Dave Crehore



comes from the small businesses in your community: electroplaters, body shops, metal fabricators, dry cleaners and others. Small amounts of many kinds are in everybody's home. Research and analysis laboratories and hospitals generate it. And don't overlook agriculture. Misuse of farm chemicals or improper disposal of residues and empty containers cause trouble.

You can best identify hazardous waste by four attributes:

TOXICITY — Exposure may produce acute or chronic health damage. Death, sickness, or subtle individual changes like fatigue, nervousness or irritability could be related to a toxic waste exposure. Arsenic, cadmium and mercury are on the toxic list.

CORROSIVITY — Corrosive wastes have hearty appetites. They eat steel containers, destroy tissue, and are of special concern in transport and storage.

IGNITABILITY — Ignitable wastes can catch fire during handling, storage or disposal. Such fires are not only dangerous because of heat and smoke, but also because fire plumes spread harmful particles over many miles.

REACTIVITY — During handling, some wastes can explode by reacting to water, heat, pressure or other wastes. Usually they're produced by the chemical or explosives industry.

The term "hazardous waste" can be misleading. Those DNR deals with are unique because they've been identified and defined through stringent testing and analysis. They are not something suddenly pinpointed to suit a special circumstance.

Managers classify hazardous and radioactive wastes separately. While radioactive wastes also represent significant health and environmental dangers, hazardous

OFFICIALS VIEWING POSSIBLE HAZARDOUS WASTE SITES



Cartoon courtesy of Artist Kenneth Fearing and the St. Paul Dispatch.

wastes are strictly defined as those that flow from specified industrial processes. Some hazardous wastes are infectious and can accumulate in your body, others are dangerous only if mismanaged, and others are acutely hazardous even in small quantities.

Hazardous waste, regardless of form or quantity, can cause environmental damage and threaten human health. Improper disposal has polluted streams, rivers and lakes, killing fish and wildlife and scalping vegetation. It has also contaminated groundwater, in some states so dangerously that residents had to depend on bottled water for cooking and drinking.

People from East Troy, Wisconsin can tell you about

bottled water. In 1974 a railroad car overturned, spilling 9,000 gallons of phenol into the groundwater aquifer. Phenol is an acid used as a cleaning fluid and solvent. It contaminated all the private wells people had been using. Finally, the village had to find another aquifer and build a municipal water system.

Direct exposure to hazardous wastes can produce immediate health damage — illness or death. Other damage, like a nervous system disorder or cancer, may take years to appear. According to Hank Weiss, environmental epidemiologist with the Wisconsin Department of Health and Social

Services, each hazardous waste case is different and difficult.

A specific cause-and-effect relationship between chemicals and illness is hard to establish. In many cases, only a family or two are involved.

When you're dealing with small numbers of people who are exposed to many different substances under different circumstances, it's hard to pinpoint hazardous waste as the definite cause or contributor to a health problem. Some reactions take years to develop.

Says Weiss, "It's tough for a doctor or researcher to say positively that exposure to something many years ago could have caused the medical problem today. We're all going to die, that's the bottom line. But a hazardous waste incident might just hurry it along a little."

Good management can prevent a hazardous waste incident from ever happening. That's what the Wisconsin program is aimed at.



THE RESOURCE CONSERVATION AND RECOVERY ACT

The Resource Conservation and Recovery Act or RCRA is the foundation of Wisconsin's solid and hazardous waste program. It grew out of the bicentennial year, 1976, when Congress took a look at how the nation had handled environmental problems including disposal of garbage and waste. The picture history painted was more revolting than revolutionary.

As populations grew and people became increasingly dependent on synthetic materials, the amount of waste we produced zoomed. In Wisconsin alone, about 9.5 million tons of waste must be managed each year — almost 11 pounds per day for every man, woman and child. The cost of collecting and disposing of it also grew. Between 1974 and '78 the price tag on collecting and disposing of

garbage rose 44% for small towns and 24% for cities. For 200 years marketing and advertising have pushed convenience. The result has been wasteful burial of recoverable resources. Each year, for instance, more than 150,000 tons of soda and beer containers are buried in Wisconsin soils.

RCRA set national goals for curbing such waste problems. It laid the groundwork for regulating how hazardous wastes would be transported, treated, stored and disposed of. The act also provided technical assistance and money to fund state programs. This year Wisconsin received almost \$570,000 to manage hazardous waste.

RCRA also finances research on how to use waste as raw materials or fuel.

HOME SWEET HAZARDOUS HOME

Hazardous wastes aren't bubbling up through your basement drain, but chances are they're in a kitchen cupboard. The threat isn't always from a

giant industrial dragon that breathes smoke and fire and belches poisons.

Oven cleaner, furniture polish, household pesticides,

toilet and drain cleaners and other chemicals are regularly used in most homes.

While volumes and types of these hazardous wastes aren't high, people are likely to be closer to them and misuse can be dangerous. Read the label, use the product properly and dispose of empty containers and residue in a safe manner. Mostly, this means putting the waste with your other garbage. In general, wrap the empty container in newspaper and put that bundle into a plastic garbage bag. Then get rid of it the same as any other garbage. Disposal of these wastes is usually no problem in an ordinary landfill because amounts are small and ordinary garbage has absorptive properties which can "tie up" the wastes. Large volumes of the same stuff though would probably require a secure hazardous waste site.

Most modern, everyday products used in your home have a hazardous waste component.
Photo by Jean Meyer



The hazardous waste landfill at Germantown takes waste samples from truckers before allowing disposal.
Photo by Jim Escalante



Good management directs various kinds of loads to separate locations in the landfill. Photo by Jim Escalante



Safely buried, barrels are sealed in clay, which prevents underground migration of the materials they contain. Photo courtesy of EPA

GATE KEEPERS

Operators of county and town landfills may have to go into training. Learning to recognize hazardous wastes, questioning people at the gate, knowing what the landfill can or cannot accept and turning away shipments that cannot be safely disposed of at the site is vital work. It may require additional skills, time and education for landfill operators.

DNR: Exorcist for old dumps



ROBIN J. IRWIN, Editorial Assistant

Back in the fall of 1977, researchers collecting fish didn't suspect anything unusual about the carp, suckers and northern pike they were seining from the Sheboygan River. Everything seemed normal and routine . . .

Like the rest of the fish collected that summer and fall, the Sheboygan River samples went into labeled bags and were tucked away in a freezer, to be ground up and analyzed over the following winter and spring. But when chemists at the State Hygiene Lab checked out these particular fish, results went right off the scale. Tests showed some contained more PCBs than any fish ever before tested, anywhere in the country.

At first, researchers didn't trust their own results. They double-checked the findings, sent fish managers back to collect more samples. The second tests verified the first. Somehow, somewhere, PCBs were poisoning the Sheboygan River in tremendous quantities.

Within two days, DNR and State Health officials clamped a total ban on much of the lower Sheboygan watershed, advising people not to eat fish from more than 129 miles of river and tributary streams.

Meanwhile, a team of investigators combed the river, looking for the source. They sampled sandbars and storm sewers, sewage plants, foundries and major industries. They collected more than 2,000 fish samples. Working their way upriver, researchers found progressively higher concen-

trations of PCBs in bottom sediments until — just 100 yards downstream from Tecumseh Products, a diecasting firm in Sheboygan Falls — they found the largest amount of all. Carp living in that section of river showed the highest concentrations yet. Further upstream, PCB levels dropped to near zero.

Homing in, the investigators contacted officials at Tecumseh and, with the company's cooperation, began to pinpoint the source of the pollutant. At first, they found no trace of the chemical in materials still being used at the plant. But out back along a low dike bordering the river, they discovered that the soil was saturated with oil containing PCBs. Some samples ran as high as 120,000 parts per million (ppm). (State and federal governments consider anything above 50 ppm hazardous.)

Finding improperly stored hazardous waste and disposing of it safely helps protect the public. Photo courtesy of EPA



Without knowing it, until 1971 Tecumseh had used hydraulic oil containing PCBs in its diecasting machinery. The chemical's heat-resisting properties made it ideal for the purpose. And at Tecumseh, it was common practice to clean up any spilled oil with a sawdust-like absorbent, then dump it "out back," along the dike.

To the company's credit, Tecumseh took full responsibility for cleaning up the contaminated dike — digging up the soil, packing it into barrels, storing it in a safe place. In the end, the company excavated more than 72,000 cubic feet of soil that it put into storage, awaiting safe and final burial.

When most people think of hazardous waste "dumpers," they picture a midnight bandit who surreptitiously unloads dangerous materials into the environment, someone who thinks only of saving a few bucks at society's expense. But most hazardous waste "incidents" happen more innocently, like the story at Tecumseh Products, where something that shouldn't have been released into the environment, unwittingly was.

Take the case of Frank Reetz. For years, Reetz picked up waste oil and spent chemicals wherever he could get them, from anybody who wanted to get rid of them. He hauled the barrels home and burned the materials in an old drain-oil stove in his garage/automotive shop near Black Creek. The stuff burned hot and long — free heat, he thought.

"I ladled that gooky stuff into the bottom of paint cans in the stove and, cripes, it burned for half a day," Reetz told the *Milwaukee Journal*. "I thought it was OK to do."

He thought it was OK, that is, until he found out what was in



Exhumed hazardous wastes that were illegally buried are tested for chemical identification. Midnight dumping is a bigger problem when only a few safe and legal disposal sites exist. Photo by Dean Tvedt

PAST DISPOSAL HAZARDS

What happened to Wisconsin's hazardous wastes in the past? Where were they disposed of and what is being done to find them?

All the old wastes ever buried or dumped can't be excavated. The Bureau of Solid Waste Management currently licenses almost 1,200 landfill sites. It's estimated there may be as many as 4,000 abandoned ones. In addition there are industrial lots, ditches and "back forties." Because Wisconsin's solid waste management program didn't start until 1967, records from before that are incomplete or nonexistent. In most cases, types of wastes disposed of are not listed, so there are

few clues for starting hazardous waste investigations. Nor can it be said for certain that buried wastes we know about are threatening human or environmental health.

Due to these uncertainties, the state's program is aimed at preventing problems from today's hazardous wastes, not primarily sleuthing for yesterday's mistakes.

However, the past has not been ignored. DNR investigators have often been able to ferret things out by searching the files. Files indicate kinds of manufacturing that has occurred and sometimes pinpoint past disposal spots. These are then probed for

signs of trouble: discolored vegetation, odors or stains. Sites can then be ranked into those that need immediate attention, those that need watching and those unlikely to cause further problems.

DNR also regularly monitors groundwater movement and composition around many known disposal sites for signs of chemical contamination. Fish and other animals and plants are monitored for chemical traces. Citizens are urged to recall past waste disposal activities that may have been hazardous and are encouraged to take part in the "Wisconsin is Watching" campaign to report illegal waste dumping.



Improper disposal of hazardous wastes can contaminate wells. A water sample to test purity will determine whether it happened here. Photo by Dean Tvedt

Corps had sprayed waste oil on its parking lot at the boatyard to hold down dust. At some time, some of that oil contained PCBs. Before the story ended, the Corps scraped up enough contaminated soil to fill 20 dump trucks, each containing 15 cubic yards of polluted dirt. The trucks carried the material to an approved PCB landfill near Cincinnati, Ohio.

The total cost for disposal of the PCB-contaminated soil at Fountain City ran to more than \$125,000. And that's another recurring fact of life when hazardous waste dumps are discovered — clean-up is *always* expensive. Costs for cleaning up the dike at Sheboygan Falls have been estimated at as much as \$1 million when the final tab is tallied.

Despite the expense, in most cases industries responsible for generating or dumping improperly handled hazardous wastes take on the responsibility for cleaning them up . . . even if the dumping was inadvertent or legal at the time it happened. Clean-up and disposal are expensive, but litigation and loss of public good will are even more costly in the long run.

So far no company or individual in Wisconsin has been convicted of violating hazardous waste laws. In fact, only rarely are charges filed. Hazardous waste investigators have traditionally been more concerned with cleaning up the mess than prosecuting "offenders." Almost invariably, cases have been settled out of court.

Hazardous wastes are a by-product of modern living, and hazardous waste dumps are the penance we pay for nonchalantly taking them for granted.

In a sense, Wisconsin is lucky. Unlike other states, tremendous quantities of extremely hazardous materials have never been produced here. Other states may turn up other "Love Canals" as time goes on, but it's unlikely Wisconsin will ever be saddled with problems anywhere near that

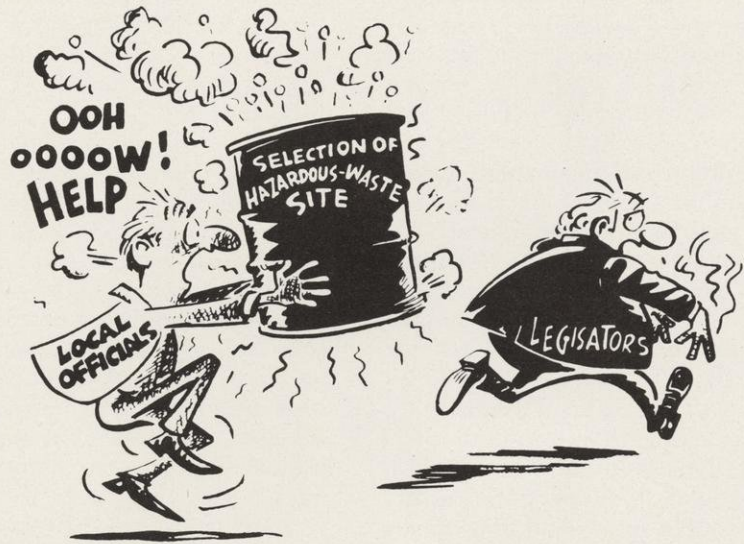
those barrels. Hazardous waste specialists who investigated the site found that most of the material was dangerous because it was extremely flammable — stuff like spent solvents, paint waste and grease, in addition to the relatively harmless drain oil. But in among the barrels there was also one from a company that regularly disposes of trichlorethylene — a suspected carcinogen that breaks down into hydrochloric acid and phosgene, a poisonous nerve gas used during World War I. If that stuff had gotten loose, the results could have been tragic.

Reetz said he felt so guilty about doing something that might have endangered his family and neighbors that he readily agreed to pay to have the remaining barrels shipped to a hazardous waste landfill.

In a case at Fountain City, on the Mississippi River north of La Crosse, someone phoned in a tip to Warden Douglas Radtke. The caller said that fluid from transformers and hydraulic equipment was being dumped on the ground at the US Army Corps of Engineers boatyard. Subsequent investigation showed that the

magnitude. And we're lucky in another sense, too. Most manufacturing, and hence most hazardous waste, is located in the southeastern section of the state. Heavy layers of clay underlie the soil there, and hazardous wastes dumped in or over clay are unlikely to migrate through the soil to seriously pollute groundwater or endanger public health.

The sins of the past will undoubtedly continue to plague us from time to time as old dumps come to light. New laws will help prevent future abuses, but only one thing will truly lick the problem of carelessly dumped hazardous wastes . . . a new awareness that everything in the environment must go somewhere, and nothing ever goes away.



Cartoon courtesy of Artist Kenneth Fearing and the St. Paul Dispatch.

WISCONSIN IS WATCHING

Just two weeks after DNR revved up its campaign to catch illegal hazardous waste dumpers, the state hotline began an incessant jingle. A steady stream of callers were reporting suspected incidents. Most were false alarms, but all were investigated. The "Wisconsin is Watching" effort had alerted a lot of eyes.

For example, on a Tuesday afternoon an anonymous call came in. It tipped the dispatcher to a manufacturer's plans to illegally bury contaminated waste on the firm's property. The caller advised state officials to show up unannounced early next morning.

Accordingly, at 7 a.m. two DNR investigators staked out the alleged disposal area. They watched bulldozers dig burial trenches while workers unloaded more than 100 barrels. Cameras clicked

quietly, recording the entire offense. Later tests showed the wastes contained high levels of hazardous chromium and lead. Caught redhanded, the company was required to clean up the mess before serious

environmental damage occurred.

The incident was a striking illustration of the value of citizen action.

The campaign message is: "Keep your eyes open but keep your distance. The stuff might be dangerous, so use the phone. Call Emergency Government's hotline at (608) 266-3232 if you suspect illegal dumping."

Stiff fines and penalties in Wisconsin's new hazardous waste regulations should decrease the number of dumping incidents. But Harold Hettrick, DNR's assistant chief warden, believes "Wisconsin is Watching" remains essential. "I see the campaign as going on indefinitely," he said. "One case of midnight dumping is one case too many, and we can always use the help of a vigilant public."



RECYCLING

Waste solvents buried in the earth lie useless and remain potentially dangerous for decades.

But recycling revives them. In Wisconsin, about 5.25-million gallons of spent automobile oil are collected and reused every year. The state has 20 recyclers like Hydrite Chemical Company in Cottage Grove. That firm, for example recycled nearly 10-million gallons of waste solvents in the past four years. Without recycling, those ten million gallons would now be in the ground. "For every 10 drums brought in, we find new homes for seven," says Mike Seeliger, reclamation plant manager.

The remaining 30% is either inflammable waste sent to Hydrite's incinerator in Milwaukee, or oil routed to a Milwaukee recycler, plus a small remainder that is

disposed of at a chemical waste landfill. Of 225,000 gallons processed each month, only 5,500 gallons, or about 2 %, go to a landfill.

Seeliger says that solvent recycling makes environmental and economic sense. "Industries are spending \$1 to \$2 per gallon for new material and another \$1 per gallon to get rid of it. A company can pay \$1.20 to recycle a gallon of solvent and use it again. And industries are finding that recycled solvents work as well in many industrial processes as virgin ones."

Hydrite recycles 120 solvents for industries in six states. It has hundreds of customers.

"The chemical recycling business is growing," says Seeliger. "There's no doubt that federal legislation has had a lot to do with it."

SIZING IT UP

How big is Wisconsin's hazardous waste problem? Is it a trickle, a stream or a flood?

Wisconsin's best tool so far for putting a number on the amount is a 1975 voluntary survey of state industries. Brought up to date by adding yearly growth rates since then, the estimated hazardous waste production in Wisconsin comes to around 500,000 tons per year. The survey was based on the standard industrial classification code which groups manufacturers according to the kind of processes they use. Today, better estimating tools are being developed.

The new manifest system for tracking hazardous waste flow started in November, 1980. Computerized information from special shipping forms required by law will provide better, but still incomplete information about production, handling and disposal. Why incomplete? Because, with one exception, two common disposal methods are not covered. Industries that dispose of hazardous wastes "on-site," on their own property and industries disposing of less than 1,000 kg (a metric ton) per month, so-called "small generators," are not required to report. The exception is that shipments of one kilogram or more of extremely dangerous or "acute" hazardous wastes must be manifested.

No one knows for sure how big a piece of Wisconsin's hazardous waste "pie" is disposed of on-site or by small generators. Provisions in proposed state regulations would require annual reports from every hazardous generator by 1982, regardless of size.

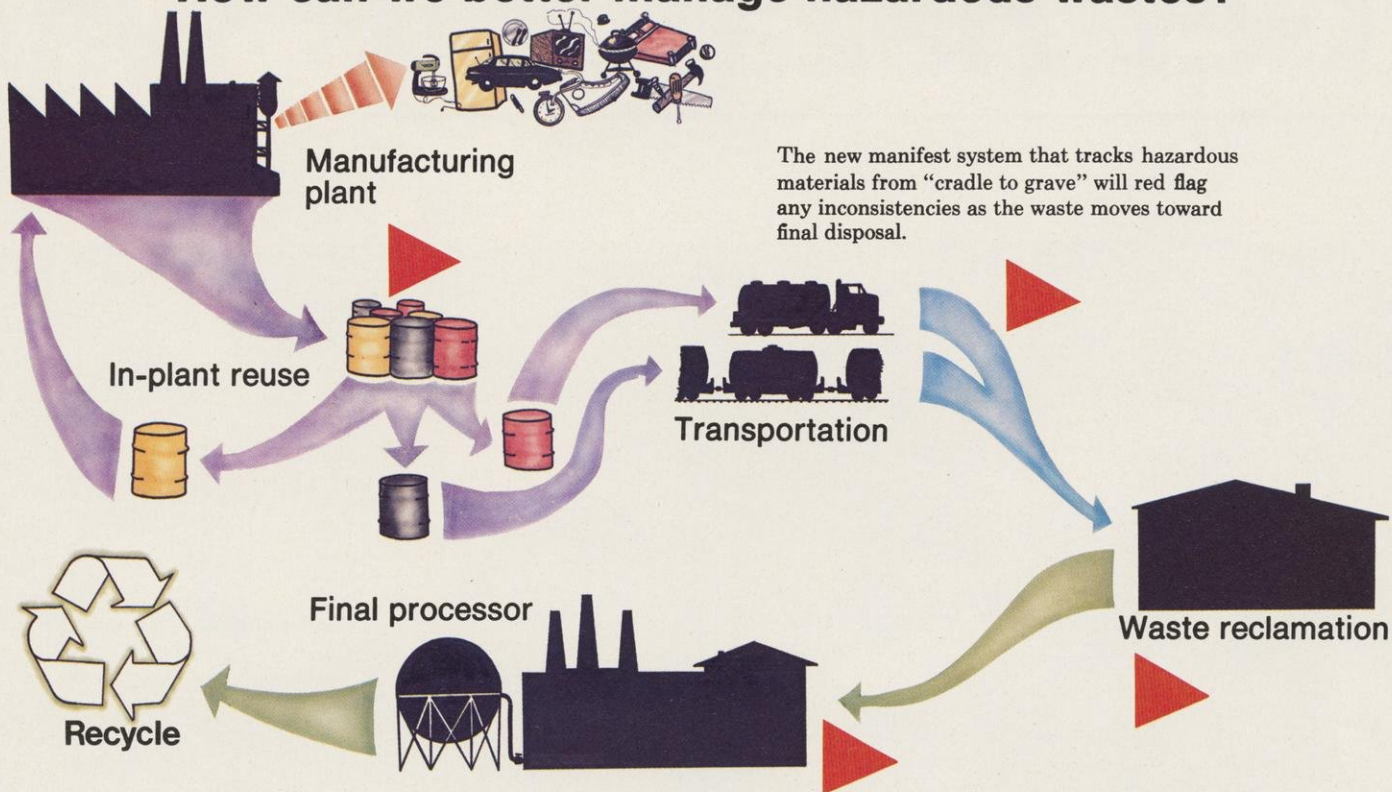
"We have to wait for these reports to find out what's happening on-site," said Robert Krill, DNR Solid Waste Bureau director. "The best DNR can do now is look

HOW MANY KINDS?

More than 100 substances used in or produced by industrial processes are on the federal list of hazardous wastes. Wisconsin must deal with about 70 of them. A few are listed here.

Arsenic trioxide	Dimethyl sulfate	4-Aminobiphenyl
Beryllium dust	2,4-Dinitrotoluene	Brucine
Calcium cyanide	2,6-Dinitrotoluene	Chlordane (alpha and gamma isomers)
Copper cyanides	Ethyl acetate	Chloroacetaldehyde
Cyanides (soluble cyanide salts)	Ethyl acrylate	Chloroform
Dimethoate	Ethylene oxide	DDT
Endrin	Ethyl ether	1,2-Dibromo-3-chloropropane
Potassium cyanide	Ethylmethacrylate	Fluoroacetic acid, sodium salt
Sodium cyanide	Formaldehyde	Heptachlor
Acetaldehyde	Formic acid	Hexachlorocyclohexane (all isomers)
Acetone	Furan	Kepone
Acetophenone	Furfural	Nicotine and salts
Acrylic acid	Hexachloroethane	Osmium tetroxide
Benzal chloride	Hydrazine	Parathion
n-Butyl alcohol	Methyl ethyl ketone peroxide	Pentachloronitrobenzene (PCNB)
Calcium chromate	Methyl isobutyl ketone	Strychnine and salts
Cresote	Methyl methacrylate	Tetrachloroethane, N.O.S.
Cresols and Cresylic acid	N-Methyl-N'-nitro-N-nitrosoguanidine	Tetraethylthiopyrophosphate
Cyclohexanone	Naphthalene	Thiuram
1,2-Dibromoethane	1,4-Naphthoquinone	2,4,5-Trichlorophenoxypropionic
Di-n-butyl phthalate	Nitrobenzene	Urethane
1,2-Dichlorobenzene	4-Nitrophenol	Zinc phosphide
1,3-Dichlorobenzene	2-Nitropropane	Barium
1,2-Dichloroethane	Phenol	Cadmium
1,2-trans-Dichloroethylene	Phthalic anhydride	Chromium (VI)
Dichloromethane	Resorcinol	Lead
Dihydroxatrole	Toluene	Selenium
Dimethylcarbamoyl chloride	Toluene Diisocyanate	Silver cyanide
1,1-Dimethylhydrazine	1,1,1-Trichloroethane	Acetyl chloride
1,2-Dimethylhydrazine	Trichloroethene	Acrylamide

How can we better manage hazardous wastes?



TRACKING IT

A blank form called a “manifest” must now be filled out by all handlers of significant amounts of hazardous waste in Wisconsin. Included are the producer, the hauler and the firm that treats, stores or disposes of wastes. Purpose of the manifest (a six-part shipping paper) is fairly simple: to track hazardous wastes from source to final resting place, “cradle to grave.”

Until now, identifying the kinds and quantities produced, transported or disposed of in Wisconsin had been largely speculative. Voluntary questionnaires and industry surveys relied on until now, didn't give

hard facts. The manifest will. By law, the types and amounts of hazardous waste, their source, where they're going and who's taking them there must now be reported. Wisconsin will now have a better profile of its hazardous waste situation. Not complete though, because industries that produce less than 2,200 pounds per month, or those that handle wastes on their own property, are not required to use the manifest.

The manifest works on a closed loop principle. Each time a hazardous waste generator ships to a firm for treatment, storage or disposal, he must fill out a form. There are blanks for

the amount and composition of waste, its origin, routing and destination.

The form accompanies the shipment to whatever waste management facility is specified by the generator. A second receiving facility may also be indicated on the manifest. Copies must be sent to DNR when the shipment leaves and upon arrival at the treatment, storage or disposal site. Transport may be by highway, water or rail. Review of the forms will red-flag discrepancies.

Prompt action can then be taken to find it.

at the Wisconsin applications for on-site treatment licenses and contact the additional 25 or so waste processors to find out what they're handling.”

Hazardous waste work certainly won't stop dead in its tracks until better figures are

available, but it will be hard to find answers. Richard O'Hara, a planning analyst with DNR's Bureau of Solid Waste Management, predicts it will be early 1983 before precise figures are known. “At that time though,” says O'Hara,

“we should have a handle on everything and be able to determine exactly how many waste disposal sites Wisconsin needs and where they should be located.”

Get hazardous waste off the ground



This 3M incinerator, located east of St. Paul in Minnesota is especially designed to handle 55 gallon drums. It burns at temperatures up to 2200 degrees fahrenheit and includes both air and water pollution control equipment. Photo courtesy of 3M Corporation

DIANE MOLVIG
UW-Extension, Environmental Resources Unit

In a world where bread and cereals come in brightly painted boxes and bags, and fruits and vegetables are offered on styrofoam trays, it's easy to forget that our ultimate sustenance is still the land. Human survival is inseparably linked to the land, yet people often abuse it. More and more erosion, more and more pavement, more and more poison

dumps are characteristic of the times.

In the modern age, land is a receptacle for industrial wastes, hazardous kinds included. But catastrophes like Love Canal have shifted attention to alternatives. "Landfills are a fast-disappearing commodity," says Peter Lederman, an engineer with the Roy F. Weston consulting firm in West Chester, Pennsylvania. "In the long haul we can't consider land as a sink for our wastes."

Landfill disposal of hazardous waste, even at properly engineered sites, should be a last resort.

Steve Romano of DNR's Bureau of Solid Waste Management in Madison, however, points out that modern hazardous waste landfills are lined with impervious clay and have leachate collectors and monitoring devices to signal health or environmental danger. "This is certainly preferable to Love Canal," he says, "where wastes were poured into a ditch, and years later shifting groundwater took its toll. Secure landfills are built to prevent such catastrophes."

"But," says Romano, "even if it's secure, those wastes sit underground and remain hazardous for

decades and we can't be totally sure what will happen to a chunk of land 50 to 100 years down the road."

So DNR encourages industry to look for other ways. With no legislative authority to require new methods, DNR's role is show and tell. "We prefer that industry solve its own problems," says Gary Kulibert, North Central District Solid Waste coordinator in Rhinelander. "We try to show industries how to help themselves without spending lots of money, and maybe even saving some."

The first step is to find out exactly what hazardous wastes are left over after a production process, where they occur and how much there is. This is called inventorying the waste stream. Once these specifics are known, alternatives to land disposal begin to be practical.

Among the alternatives are:

WASTE REDUCTION — *Manufacturing processes can sometimes be modified to eliminate or reduce quantities. Substances that result in hazardous waste can be replaced by other substances that don't. For example, water-based adhesives have been substituted for solvents in plastic wrap used in supermarkets at vegetable and meat counters. To minimize volume, hazardous waste can be kept separate from other industrial wastes. This simple step can mean drastic reductions in volume. For example, if ten gallons of hazardous lead wastes are mixed with 990 gallons of nonhazardous material, all 1,000 gallons are then contaminated. Keeping them separate from the start would mean a hundredfold reduction.*

WASTE EXCHANGE — *One industry's waste may be another's raw material. Waste exchange offers advantages to both giving and receiving industries. The*



Indiscriminate ground dumping of hazardous waste is both unsightly and dangerous. The one here was also illegal and the company forced to clean up. Better ideas are recycling and incineration. Photo by Jack Tritt

industry with waste to give away or sell avoids disposal expense; the receiving industry gets recycled material at less cost than buying new. For example, the pharmaceutical industry requires very clean raw materials and when their products don't come up to specifications, they might be used by the paint industry.

SOLVENT RECOVERY — *Many industries have found that recycled solvents work as well as virgin ones and cost less.*

DETOXIFICATION — *If hazardous wastes can't be recycled, often they can be chemi-*

cally changed into something less or even nonhazardous. For example, acids can be neutralized by passing them over limestone; alkalis can be treated with carbon dioxide.

INCINERATION — *When burned at high temperatures, many hazardous wastes break down into harmless gases. Only small residues remain, greatly decreasing landfill volume. Heat generated by incineration can be converted to energy for the industrial plant.*

Dick Hanneman of the National Solid Wastes Management Associa-

tion in Washington, D.C. says industry is increasingly aware that liability for buried waste lasts forever. "Industry must come up with methods to minimize these long-term obligations," says Hanneman.

Concern for public image is also a stimulus, says George Anderson, DNR West Central District coordinator in Eau Claire. "Industries will bend over backwards to avoid being thought of as irresponsible hazardous waste managers. They don't want the bad press."

High disposal costs are also an incentive. Secure landfill disposal is expensive — disposal costs have increased from about \$5 per ton to more than \$50 and continue to climb.

Companies that get their act together and manage wastes prop-

erly will fare better in the marketplace than those that continue to pay rising disposal costs.

One reason new technologies aren't catching on faster is that processes are often expensive. But Doug Rossberg, DNR Lake Michigan District Solid Waste coordinator in Green Bay, thinks that by spending more now, industries can save money and trouble later. "Economics dictate that industry investigate alternatives," he says. "An incinerator may cost \$150,000, but with landfill rates of \$50 to \$80 per drum, how many drums can an industry dispose of for \$150,000?"

Until recently, burying wastes has been cheap and easy. Development of other methods has lagged behind. Experts say alternate technology is still in its infancy and will need the next five years to get

rolling. Although building incineration and treatment facilities will take time, some alternatives should catch on quickly. Waste exchanges, keeping hazardous separate from other wastes and modifying processes to use different materials are a few that can start right away.

Some Wisconsin industries have already found simple, cheap solutions. One company, for example, was generating 150,000 gallons of hazardous waste each month. After substituting a new material in its manufacturing process, no hazardous waste at all is produced. Another that uses five different solvents found waste segregation to be an easy answer. Previously it dumped all wastes — solvents, ordinary garbage and other industrial wastes into a drum in the middle of the shop floor. Now each solvent goes into a separate drum to be recycled and used again.

However, even with widespread use of new methods, there will always be some hazardous waste that must go into the ground some irreducible minimum, that will have to be buried.

The less hazardous waste there is, the more we can start talking about sound ways to get rid of it.

This is in everyone's best interest. "We've got to find ways to solve the problem," says Pennsylvania consultant Lederman. "Whether we're government regulators, plant managers, corporate presidents or private citizens, we're all in this lifeboat together."



Testing barrels in a recycling plant to make sure they don't leak.
Photo courtesy of Hydrite Chemical Company



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Cover:

Hazardous waste is a component of just about every product used by modern society. It's "Everybody's Yuk." Getting rid of it has evolved from a careless uncontrolled mix of land and water disposal to a system of careful management, designed to protect people. This artist's conception shows the change.

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