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Earth Day Everyday At Washington's Greenhouse

Washington's Greenhouse has an ad in the Point Pleasant Register. In the spirit of making every day Earth Day one percent (1%) of retail sales in 1990 will be donated to the WV Highlands Conservancy and MACE (Mason Association for Clean Environment). Nursery containers will also be redeemed for .10¢.

Inspired by an article in the American Association of Nurserymen, owner Paul Washington, felt it was an idea that should catch on throughout the retail nursery business.

From beginnings as a Christmas tree farm, Washington's Greenhouse now handles native white pine and dozens of exotic shrubs and trees. Care and tending of stock takes a good deal of time, but Washington is comfortable with his inventory and enjoys good relations with neighboring nurseries.

Experienced at seeing the forest for the trees, Mr. Washington remembers when MACE was first formed to oppose a proposed incinertor. Continued vigilance on environmental issues was especially gratified in the 1989 legislative session by passage of solid waste legislation to regulate landfills, discourage illegal dumping, and other ecologically conscious bills.

1990 environmental efforts will focus on support for the Chambers ground water bill, a recycling initiative for the November ballot in Mason County, and composting as a sensible environmental activity emphasizing the handling of tree cuttings and yard wastes.

Publicizing the mandated landfill amensty day for local residents is one solution to illegal dumping. Evidence of many people going across the river to Ohio to recycle encourages the signature gathering phase of the recycle referendum in Mason County. Crucial support from Ohio neighbors in Gallia County continue to provide support for MACE activities. To become a member of MACE or for more information write to MACE, P. O. Box 142, Pt. Pleasant, West Virginia 25550.

Talking Trash

The 5th Annual Governor's Conference on Environmental Education and Litter Control represented state agency, federal agency and private industry responses to garbage. To appreciate all the wisdom that was made available, some revised concepts applicable to the trash universe need to be defined. Junk yards have been replaced by salvage yards. Recycling is a process, not a one time action. Open dumps must disappear. Sanitary landfills must be constructed to DNR specs. Solid Waste Authorities must be in place in every county by July, 1991. EPA guidelines place source reduction as a principle priority. Local solutions developed locally will be encouraged by the federal government. Only integrated solutions can be effective. NIMBY (not in my backyard) energy should be redirected towards creating solutions. And finally, all (good) waste sheds flow to markets.

Many municipalities already face high tipping fees because of shrinking landfill capacity or closed landfills. The $200,000 per acre development cost of landfills that meet current specifications also contributes to projections of increased tipping fees from the present $7 to $9 per ton to $50 per ton. The economic motivation for responsible municipalities is clear.

A full two-day agenda touched on all levels of the waste management universe. For many attending, it was the recognition of a job well done at the Wednesday evening awards banquet. State officials used the opportunity to congratulate one another and present status reports. Industry representatives outlined successful recycling actions. Private entrepreners offered ideas and sought audience feedback. Local officials presented the benefits of experience in areas of collection, recylcing and networking.

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A Field Trip In Canaan Valley

by Nancy Sturman

I have been coming to Canaan Valley for over 14 years, and now I have finally seen it.

When I came up to my lovely new home there to spend a few days of my spring break, I had no idea that I would experience a transformation of my concept of Canaan Valley.

In preparation for summer at my new home and with a desire to get to know the local community better I purchased a ***Parsons Advocate*** and began to read. On the front page was an article about the upcoming tour of the proposed Canaan Valley National Wildlife Refuge. This is a topic which interested me a great deal! In fact in the June/July 1978 issue of the ***Audubon Naturalist News*** which I was then editing, I had written an article entitled *"Beautiful and Threatened Canaan Valley."*

When Saturday April 14 dawned sunny I met with about 24 other interested people in the parking lot of the Canaan Valley Lodge and listened to U. S. Fish and Wildlife Service representative Chris Clower present information about the proposed refuge, the status of the "health" of the valley, and the continuing presence and aspirations of Monongahela Power Company.

Clower explained how the proposed Monongahela Power Company power project would work and flood some 7,000 acres of the valley, 4,000 of them wetlands. I was surprised to hear that for 8 to 10 years after a power company lake was constructed, it would have severe quality problems because of all the peat that would float to the surface from the valley floor.

When I wrote my article 12 years ago the threat to Canaan of inundation was the only one of which I was aware. Because of Monongahela Power Company's continued wait-it-out stance this remains a most serious threat. But, Clower explained, there are others now.

Canaan Valley looks different than it did 12 years ago, because of the presence of so many vacation homes, such as the ones at Timberline and Black Bear Woods. I humbly wondered, if in the efforts of so many of us to become a part of this lovely valley, we weren't, at the same point, going to love it to death.

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Gauley River and The Trust For Public Land

For over 17 years the Trust For Public Land (TPL) has been acquiring critical land resources. TPL is a national, non-profit land conservation organization. Many lands acquired by TPL, such as those along the Gauley River, were threatened with development. Although the National Park Service wants to add additional land along the Gauley to the National Recreation Area, it is hamstrung by the slow appropriation process. TPL is able to step in by either buying or having the property donated to provide temporary protection for the land until it can be sold to the government. Once sold, TPL has cash to continue buying additional land.

With a keen interest in West Virginia, TPL has been involved in protecting lands in Shavers Fork, Greenbrier River Trail, Spruce Knob-Seneca Rocks, Blackwater Canyon, Cranberry Back Country, and the Gauley River.

Congressional hearings are now underway to decide the fate of the Gauley River and other areas of the country. The preservation projects Congress approves will be purchased at the end of this year through the Land and Water Conservation Fund, which directs a portion of government receipts from offshore oil drilling and other resource depletion into land

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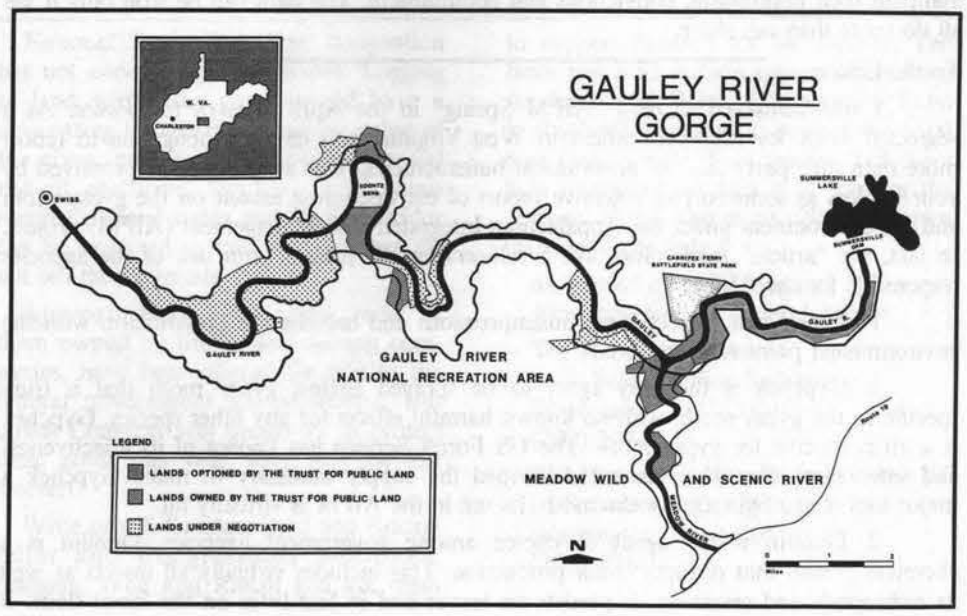

— FROM THE HEART OF THE MOUNTAINS —

by Cindy Rank

EARTH DAY REVISITED

I remember that first Earth Day 20 years ago.

I was in Pennsylvania working in the campus ministry at a University at the edge of downtown Pittsburgh.

The Vietnam War was still raging, still haunting the conscience of the country as well as the lives of the male students who frequented our activities and counselling sessions. The demonstrations of those days were full of anger, confusion, a never ending flow of information and a deep sense of sorrow. They were always an education in themselves.

"Civil Rights" and the fight to recognize the existence and equality of the Black population of America was fast evolving into "Black Power" and the struggle to achieve an equal partnership in corporate America. The marches were still tense but not as openly brutal as those at Selma and Montgomery.

On April 22, 1969, I wandered on downtown to Point State Park where the Earth Day Rally was to take place. Although I know there were talks of a serious nature and warnings of doom and gloom, what I remember most are the colors: the green expanse of grass at the park dotted with the bright multitude of balloons and signs and clothes. Even the music was bright.

I think I envied the crowd the relatively lighthearted atmosphere so unlike the typical demonstrations I was familiar with. And I think I resented the fact that here were a couple hundred people who could be adding their voices to the more important life-and-death issues of war and poverty and civil unrest.

Little did I know then that I would move from the city in an attempt to simplify my life, to make more sense of a world engorged with gadgets and trinkets and consumerism. Little did I know then that my own personal attempt to make peace with myself and the earth around me would lead to actively defending the very air and water and ground that I so cherish in my own life.

In these past 20 years I've begun to realize the full meaning of that first Earth Day. War and poverty and civil unrest have not been vanquished from this or any other land we humans inhabit. But the message of that Day was the underlying awareness that what we are doing to the earth often has as profound an effect on our existence and future as some of the more blatent acts of violence and aggression we foist upon our fellow man and woman.

The strong visual impact of naplaming the jungles and people of Southeast Asia or the burning of Detroit or Newark had a bit more immediate media appeal than cutting down remote tropical rainforests or tracking a rather hazy hole in the ozone layer. But the day has come when our waste products that we so confidently flush out of our sight have begun to fill their final resting places to a point where even the oceans are beginning to spew them out.

Some people may believe in a Dune future where the only water available is that which is recycled in and out of our own bodies with the help of a technically advanced self-contained body suit that everyone will wear, or in a future where life is only possible in a plastic bubble and nourishment is taken in pill form. I for one am intrigued by such stories, but am not at all enchanted with the prospects as actual scenarios for the future.

The belief that we can control everything including nature, that we can indeed be the masters of all creation, that we can continue in our present destructive and wasteful ways without eventually destroying ourselves is pure folly. A sustainable future is only possible if the earth as we know it continues to be the underlying force that supports and surrounds us. For this to happen we must stop and, in many ways, reverse our actions that now foul the earth, the air and the water.

Our new actions may include participating in activities to protect the oceans or the rainforests or the ozone layer or other treasures of worldwide significance. They may include more localized activities like protecting special places like Canaan Valley before it's developed to destruction. They may include protecting special aspects of every day life like our waters which are now threatened by incrementally permitted pollution.

It is an uphilll battle to reverse some of our current practices, to resensitize societies and individuals to new and/or renewed ways of doing things. The struggle can be advanced only if the thousands of people who participated in Earth Day 1990 maintain their enthusiasm, convictions and commitment. The fight can be won only if we all do more than our share.

To the Editor:

I was dismayed to read "AIPM Spring" in the April issue of the ***Voice.*** As a respected voice for the environment in West Virginia, you have an obligation to report more than the "party line" of government bureaucracies. This article may be perceived by your readers as some sort of objective report of the upcoming assault on the gypsy moth and the environment under the Appalachian Integrated Pest Management (AIPM) project. In fact, the "article" reads more like a self-serving PR release from one of the agencies responsible for the AIPM.

Perhaps I can correct some misimpressions and balance the presentation with the environmental point of view.

1. Gypchek is the only agent to be sprayed against gypsy moth that is truly specific to the gypsy moth, with no known harmful effects for any other species. Gypchek is a virus specific for gypsy moth. The US Forest Service has known of its effectiveness and safety for years, but has not developed the supply necessary to make Gypchek a major tool in the fight against the moth. Its use in the AIPM is virtually nil.

2. Dimilin is the agent of choice among government agencies. Dimilin is a chemical poison that disrupts chitin production. This includes virtually all insects as well as arthropods and crustacea. It persists on leaves and in leaf litter on the forest floor. It may concentrate in streams, ponds, etc. It is harmful to all the creatures that are chitinous, but to many others, too, through its impact on the food chain.

3. Bt (Bacillus thuringiensis), according to your article "is a naturally occuring bacteria that affects only caterpillars." This makes this stuff sound downright benign. "Naturally occuring" does not mean good; Bt kills. And who cares, as long as it "affects" (that is, kills) "only caterpillars." Aren't caterpillars hairy and crawly and nasty? But let's use our heads. What this means is that Bt kills virtually all lepidoptera—that is, butterflies and moths—around at the time. There is already evidence that Bt may be wiping out rare or endangered species.

Our group has worked with the Forest Service and the West Virginia Department of Agriculture to encourage responsible responses to the gypsy moth threat. We believe we are seeing some progress.

Yours truly,
Jim Sconyers, Chapter Chair, Sierra Club, WV Chapter

(continued from page 1) *FIELD TRIP*

With the construction of so many new homes comes the challenge of effectively treating the additional sewage that makes its way into the Blackwater River. Clower explained that the Blackwater River reached its maximum sewage treatment capacity two years ago. Since that time even more houses have been built in Canaan Valley and new vacation projects are on the drawing board.

I had heard about the June motorcycle races in Davis. I had even seen pictures of them and thought that they looked like fun for all. Clower explained that the wetlands which many off-road-vehicles (ORV) go over are fragile. He explained that the water-saturated valley has a very short growing season, 85-90 days. At this rate, the deep ruts from these vehicles take a long time for nature to repair. The ORV user does not need to gain permission from the Monongahela Power Company to use their land for recreational purposes. Signs attached to trees all over the area seem to declare recreation as a right.

But hearing about the damage ORV's can cause in a wetland and seeing it are two different things. In many places deep ruts were torn through the soft moist moss and deeply into the wet black soil. I am uncertain of the appeal the wetlands have to ORV users and have difficulty understanding that they do not fully recognize the harm their vehicles do in these fragile areas.

We entered the northern Valley where the large expanse of wetlands lay by way of the road to Camp 70, the site of one of many turn-of-the-century logging camp in the area. Today its 7 mile length is accessible only by 4-wheel drive vehicles or ORVs. As we slowly bumped along this road it became apparent that as well as ourselves and ORV users, the Blackwater River was being appreciated by about 30 different trout fishing parties which were still there even at noon.

The most amazing part of this talk/tour was the walk in the valley itself. Because of my experience with the rest of the valley, my thoughts were of lovely grassy farm meadows bordered by forests. From my readings I truly could not envision what the valley's wetlands, with their remnant ice-age vegetation like none other found in the Eastern United States, would be like. This was my opportunity to find out and to experience them for myself.

The wet trudge of about a mile into the interior of valley yielded many delights. I viewed thickets of alder which I was told were perfect woodcock habitat. I mentally made a note and promised myself to search out that bird at a Spring sunset and watch the spiraling courtship display of the males. I saw beaver slides leading from their watery passages down into the streams. To a land where winter comes easy and Spring comes hard, I saw spring beauties and bluets beginning to bloom.

Walking through a mossy sphagnum bog area is a sensation not to be forgotten. Clower warned us it would be wet. Actually it wasn't as wet as it was spongy. Our feet sunk in about 8 inches on each step. In the midst of the bogs, we found teaberries, a pleasant tasting bright red berry which I was told is the flavoring for Beechnut gum.

I felt a whole new world of possibilities had opened up for me. I listened as several of my more knowledgeable companions talked excitedly about canoe trips through the valley and early June forays to an area called Low Gap where the Scottish heather blooms.

Canaan Valley is resilient. Although its primary spruce vegetation was eliminated by logging operations at the turn of the century, Clower said in another 500 years those spruce could grow back. I obviously will never live to see the day, but I now feel a thrill when I see a young spruce growing in the valley.

As a federal wildlife refuge which would protect some 28,000 of its acres, Canaan Valley would have a chance. And, I learned, so would Tucker County with the ten million dollar ($10,000,000) annual revenues that conservative estimates indicate it would bring.

After experiencing the northern valley, I can see why conservation organizations, state and national, have vowed to never let it be flooded. I hope soon the power company will encourage both protection of the wetlands and the economic development the federal refuge would bring to the area. But as it stands now it appears they care little about the uses and abuses of the wetlands or the local economy and both are suffering.

When I wrote my 1978 article the process for Canaan becoming a federal refuge was only at the beginning. That is exactly where it still is. Interested persons can help to provide refuge status for Canaan Valley by contacting Governor Gaston Caperton, and Senators Robert C. Byrd and John D. Rockefeller.

*Nancy was editor of **Audubon Naturalist** News for the Audubon Naturalist Society of the Central Atlantic States in 1978 and 1979. She currently teaches 5th grade in Fairfax County, Virginia.*

What On Earth To Do This Summer

Now that summer is almost here and the greatest celebration of Earth Day ever is long over a void has become so glaring that two issues have been joined. They require your immediate attention. Due to the auspicious conjunction of these events, combined solutions may be explored as a valid alternative.

First, what to do this summer; and, second, finding those against the Earth now that everyone has declared in Earth's favor.

Let's begin with the more traditional problem. In bald numeric terms, three months or 14 weeks or 93 days is probably an insignificant percentage of a life span. For the average American life-span, .00306% of life is at stake (see Days of Our lives table). Not enough to take seriously? Be careful in concluding prematurely. Most religious authorities will verify that this is your one and only life. Those that take a somewhat broader view are not free of restrictions on the quality effort that must be expended in any one of a number of lives.

For some, maybe one summer missed may be mitigated by a winter cruise or extra skiing trip. Others may be facing a summer that is a transitional period marking a crucial transformation in that life. For these, comprising a statistically significant group, mitigation is not possible.

Now that the problem is clarified, a review of the traditional solutions is in order. Go to camp. Go to a relative's. Like some traditions, these options lack vitality and originality. Also, any decision now may create an unteneable position when solutions for the other problem are developed.

The other problem differs from the first in being a voluntary issue. While everyone is confronted with the .00306% of life to manage this summer, not everyone is consumed with the quest for the anti-environmentalists. Given this more than significant realization, some preliminary exploration may be required.

Maybe a folk song, "Where have all the anti-environmentalists gone" could be written to the tune of industrialization and played on radio stations. Even without funds to offer a monetary reward, perhaps something of value could be pledged as a finders' fee. Any traditional approach such as this does lack spontanaeity and requires administrative expertise. Also, just like the summer problem, if addressed separately, it may reduce opportunities to combine prescriptions; or, at the least, inhibit flexibility.

In the interests of economy, that is, getting very much for very little, erase all concepts of these individual issues as separate. This summer, go look for anti-environmentalists. If any forward thinking reader is wondering what to do in the event an anti-environmentalist is located, well, really, identifying the problem is half the work and the finders' commitment has to be understood . . . chances for positive identification are slight.

It appears to me quite tenable that the function of literature as a generated prize-worthy force is precisely that it does incite humanity to continue living; that it eases the mind of strain, and feeds it, I mean definitely as ***nutrition of impulse.*** *This idea may worry lovers of order. Just as good literature does often worry them. They regard it as dangerous, chaotic, subversive. They try every idiotic and degrading wheeze to tame it down. They try to make a bog, a marasmus, a great putridity in place of a sane and active ebullience. And they do this from sheer simian and pig-like stupidity, and from their failure to understand the function of letters . . . It is as important for the purpose of thought to keep language efficient as it is in surgery to keep tetanus bacilli out of one's bandages.*

EZRA POUND

DAYS OF OUR LIVES

Life Span In Years	% of Life In One Summer
83	.00306
82	.00310
81	.00314
80	.00318
79	.00322
78	.00326
77	.00330
76	.00335
75	.00339
74	.00344
73	.00349
72	.00353
71	.00358
70	.00363
69	.00369
68	.00384
67	.00380
66	.00386
65	.00391
25	.01
10	.02

(continued from page 1) *TRUST*

preservation. Congress needs to set aside $1.0 million of this fund for the Gauley River, allowing the National Park Service to add these threatened private lands to the protected federal ownership of the Gauley River National Recreation Area.

Right now, key subcommittees of the U.S. Senate and House of Representatives are working to decide which lands should be purchased and permanently protected by the National Park Service, Forest Service and other federal agencies this year. Included on the list for possible protection in West Virginia are critical lands in the Gauley River National Recreation Area.

The lower Gauley River, stretching for 26 miles below the Summersville Dam in central West Virginia, offers some of the most technically demanding and challenging whitewater in the nation. Coursing through its steep and beautiful gorge, the river and its Class III to V rapids afford everything from clear, calm water to awe-inspiring whitewater. Fishermen are also drawn to the Gauley by the trophy sized trout in the cold tailwaters of the Summersville Dam. The area is ecologically important, sheltering several rare plant and animal species. Two rare plants, Virginia Spiraea and Barbara's Buttons, occur in greater abundance in the Gauley River corridor than any other known location in the world. In recognition of the extraordinary recreational potential of the Gauley, Congress in 1988 designated this stretch of the river as Wild and Scenic and created the Gauley River National Recreational Area.

National Recreation Area designation has not ended logging pressures. Logging of land within the gorge would have a devastating impact on the scenic value of the river, and would create substantial run-off problems. Similarly, individuals owning mineral rights within the corridor can be expected to mine soon if they do not sell their interests.

Approximately 1700 acres, most of them owned by timber and mining companies, have been offered for sale to the federal government for protection. But unless Congress acts decisively to protect these lands this year, they may be lost forever!

Write or call Senators Byrd and Rockefeller and Congressmen Mollohan, Staggers, Wise and Rahall and ask them to support funding for the Gauley. Tell them that a $1 million appropriation from the Land and Water Conservation Fund is absolutely essential to protect this vital area from private development. Tell them how important the area is to you, for the reasons listed above or for your own reasons. Write today!

Submitted by Skip Deegans,
Vice President for Federal Affairs

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GOVERNOR'S ADDRESS

Governor Caperton's speech was full of numbers and came across more like a computer program written in Basic than a thoughtful analysis. Repeatedly punctuated by the phrase "better life equals better jobs," it was not clear what the administration perceived as the problem that inhibits their formula from being a present reality. The latest numbers on the amount of trash West Virginians generate, the number of arrests under litter laws, the number of investigations of violations, the number of open dumps closed, the number of highways cleaned, did require some punctuation as an in-depth evaluation was not presented. The familiar phrases of educating for preservation and protecting natural resources sounded cliche in this numeric context.

Understandable pride with success in several dramatic projects was enough to give the administration a self-satisfied appearance. Only actions will determine the depth of the Governor's commitment to leave a clean environment for future generations. Strong and effective leadershp on the issues might consider a specific list of the macro and micro activities that must change to achieve a beautiful West Virginia that uses resources wisely. That is, identify the problem then work for solutions.

STATE STATUS REPORTS

State officials had more than one insight to offer and each presentation was a different contribution. Not too surprising given the fact of separate, independent duties but partially attributable to thoughtful programming.

Again, even more numbers. Presentation by the overseeing officials did strengthen the impact and most were available for questions. The Adopt-A-Highway program, now in 35 states, is operated by volunteer organizations who collect highway litter. Director Ann Shehan's musings on the amounts that continue to be collected was saddening and thought provoking.

A panel on litter law enforcement testified to new enforcement efforts from the perspective of the administrative agency (DNR), magistrates and law enforcement officers. Action by law enforcement is always a dramatic step, results in southern West Virginia have been particularly stunning. After an initial year-long effort to inform and warn residents of the penalties for illegal dumping, tangible results have been achieved. One hauler reported so many new customers to service that an additional truck was required to meet increased demand.

Impediments to enforcement to litter laws are similar to other environmental laws in WV. Lack of trained inspectors and a limited number of inspectors for large territories are frequently cited as reasons for failure and inadequacy. Penalties imposed by magistrates differ widely in every county. Tucker County Magistrate Linda Hockman described work release penalties that include highway litter clean-up. She believes that awareness of the problem will develop from individual values and be reflected in broader community attitudes. A civil penalty system will be developed by DNR.

PPOD, Pollution Prevention and Open Dump Program, has achieved visible success. (See Charleston Gazette 4-8-90). Slaty Mountain in Monroe County was cleared of garbage and an abandoned industrial site in Clarksburg was cleared of tires. Both clean-ups inhanced the beauty and sanitary conditions of the areas. Scheduled clean-ups include open dumps along Kanawha Turnpike and the New River. The cost is met with DNR funds.

The "Trends in State Solid Waste Legislation: Issues for the 90's" session presented an explanation of the latest changes to state laws now in place. Determing whether or not the fascination with lost causes will prevail in future legislation remains guesswork. Solid Waste Management Board Executive Director George Chappell stated only that the super high technology represented in source separator facilities like one researched by Gary Roark, G. W. Roark & Associates, were viewed favorably.

Ground water protection legislation status reported by DNR Deputy Director Larry George was very brief. George stated that while no consensus had been reached he felt groups had become closer. DNR remains satisfied with their strategy of constructing legislation in a puzzle-like manner. Not coincidentally a reflection of the administration satisfaction with the status quo. Devotion to focusing on the realities of the situation may contribute to a rupture of those dreams the Governor mentioned so fondly in his address.

Max Robertson, Acting Chief, Waste Management Section, DNR, has no comparable dilemmas in his split universe. The hazardous waste world will continue to be addressed with support from EPA. The hazardous waste world is up and spinning. Guidelines have been established, timetables are set, EPA approval is secure. The axioms driving DNR programs include: (a) allow for a planning process; (b) integrated solutions that combine source reduction, recycling, resource recovery should be coherent and coordinated; (c) each section must appreciate their role in the cycle: facility siting, program implementation, market responses, (d) do not over regulate any section. Communication of these principles have been effectively delivered to state and industry officials. Recycling regulations to be released this summer by DNR may reach a wider audience.

Clarification of EPA priorities was given by Kim Pritchard, Assistant Chief, Waste Management Section, DNR. The order of priorities in constructing an integrated management approach saves the most environmentally controversial topic for last. To appreciate the scheme let's follow the intended order. First, source reduction; this is everyone's responsibility. Industry and the consumer both in their roles as purchaser and disposer. Second, recycle. This means "closing the loop." Collecting is not enough. Once is not enough. Third, landfills must be safe to the environment. Regulations require liners and ground water monitoring. And finally, the little talked about waste to energy option. While incinerators do not consume the quantity of fossil fuel more traditional technologies require they fall short as an ideal representative of clean, safe and renewable energy.

INDUSTRY PRESENTATIONS

Given these implicit pressures from government, industry response has been to study hard and apply the 3 R's in reduce, reuse and recycle. Emphasis upon a history of efficient use of resources drew a picture of industry as an experienced recycler. On the one hand, it is great to acknowledge positive gains, especially for the steel, aluminum and glass manufacturers. On the other hand, potential dangers are increased when distorted self-images become reenforced.

A growing momentum has produced many creative contributions in design and technology applications that address landfill construction, recycling and other aspects of solid waste. Technical journals are full of research on these new issues. Hundreds of patents are being sought. Evaluations of the business applications reveal familiar tensions in the public versus private options for management solutions to solid waste. Public waste facilities often face high employee turnover, lack of financing, and lack of staff. None of these factors are a variable when reviewing reputable private waste management firms.

AVAILABLE OPTIONS

In contrast to the super high-tech, super efficient, super costly source separation and resource reduction facility being studied by DNR, the National Recycling Coalition, Inc. presented several case studies. All are now working models in rural Minnesota. Most operations combined private and public facilities. Motivated by rapidly filling landfills, communities achieved a measurable reduction in material that went to landfills. A karst geology similar to West Virginia is also a ready point of comparison. One landfill has been closed because of ground water contamination.

Successful programs began on a small scale following public education and information campaigns. Incentives included economic rewards for recycling either indirectly by volume based fees or by payment for traditional recyclables (glass, paper, aluminum, metal, plastics). Various orgaizational structures include government partnerships, private collectors and non-profit organizations. Regardless of structure, each organization had a clearly defined role in the recycling process.

Some programs are mandatory, others voluntary. Some accept commingled material, others separated waste. Collection occurs at the curbside, at drop-off centers or are processed at a central facility. Most programs met costs and maintained rates considerably less than fees required for traditional disposal methods. Leadership was a key element for every project. A committed individual can be significant in the overall success of the operation.

WEST VIRGINIA SUCCESSESS

Verifying the experiences of the Minnesota projects, Frederick Clark, Vice Chairman of Pride Against Litter, encouraged consolidation of difficult trash, especially white goods (refrigerators, kitchen appliances). Many additional markets for the unwanted goods become available when a certain amount is collected. The WV REAP crusher is now being employed to prepare goods for sale as scrap material.

GOVERNMENT PLANS FOR TRASH

As landfills continue to fill and close, a curious parallel exists as the number of government professionals charged with solid waste management expands in DNR and closes in DOH. Signals from the federal government are equally confusing. Lack of historic data on crucial aspects

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Defining Municipal Solid Waste

MSW is defined by OTA as post-consumer solid wastes generated at residences (e.g. single-family-units and apartment buildings), commerical establishments (e.g. offices, retail shops, restaurants), and institutions (e.g. hospitals, schools, government offices). These wastes may be catagorized as either materials or products.

MATERIALS

paper, yard waste, food waste, glass, ferrous and non-ferrous metals, plastics, textiles, rubber, wood, management residues (e.g. incinerator ash, some recycling residues)

PRODUCTS

durable goods (e.g. appliances, furniture, tires)

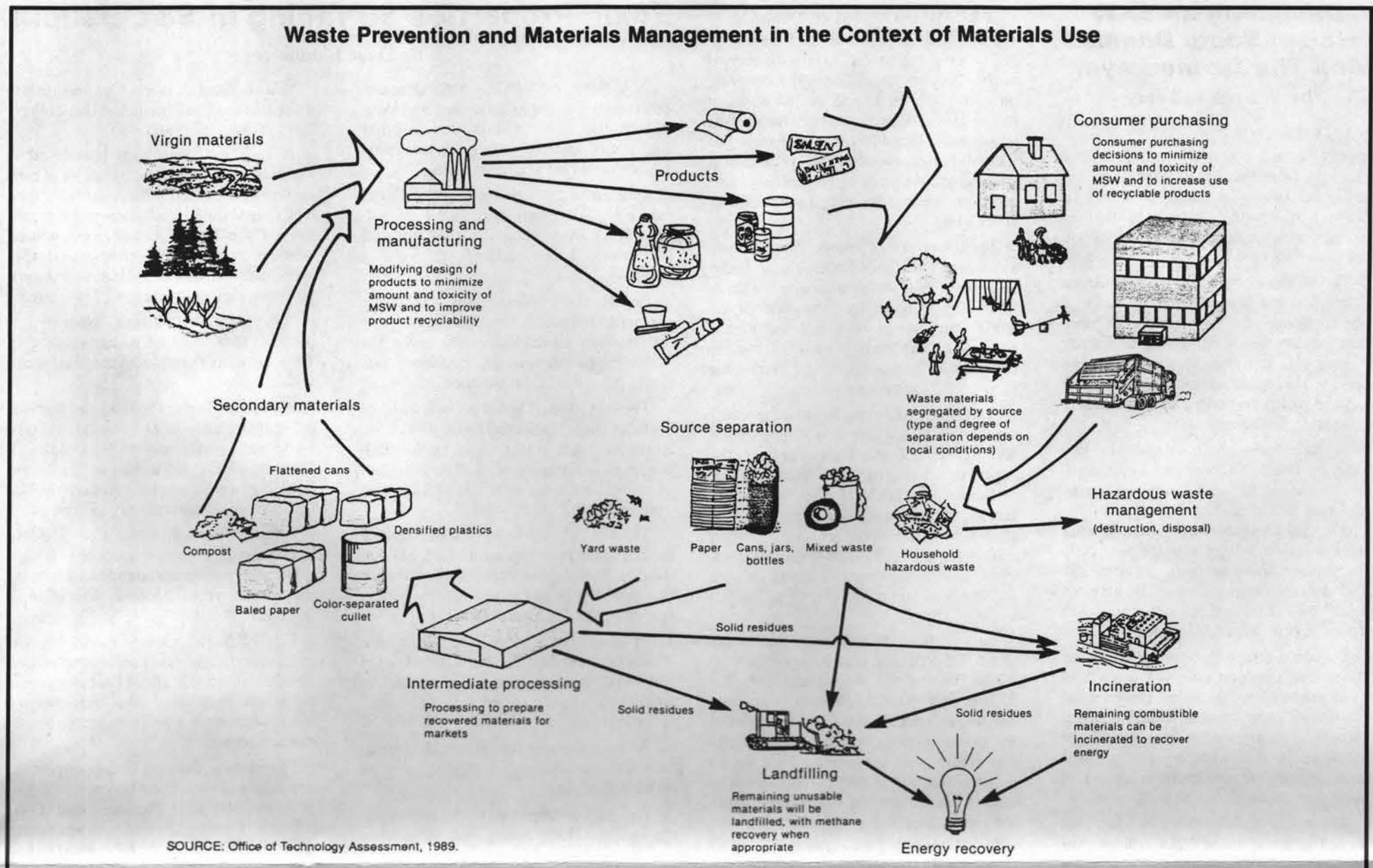
nondurable goods (e.g. magazines, tissue paper, clothing, motor oil, small plaster products, batteries, household cleansers)

containers (e.g. cans, bottles, boxes) and

packaging/wrapping (e.g. made of paper, paperboard, plastic, glass, metals, ceramics, wood)

Defining MSW is not always straightforward, as different people will often include different materials and products. These 'gray areas' can add confusion to MSW debates. As defined here, for example, MSW does not include automobile bodies, demolition and construction debris, municipal wastewater or drinking water sludges, and ash from industrial boilers. Some municipalities are responsible for managing these items, and some of the materials are discarded into MSW landfills. As a result, some observers may consider the first two items in particular (i.e. auto bodies and construction debris) to be components of MSW. These differences must be recognized when data from different reports are compared, especially with respect to waste generation and recycling rates.

"Facing America's Trash What Next for Municipal Solid Waste"
Office of Technogoly Assessment



such as ground water monitoring is as troublesome as the lack of uniform standards and definitions.

While the federal government continues to emphasize local solutions for distinct local problems, state governments look to meet guidelines established by the federal government. The paritally implemented regulations of DNR are purported to fit together like a puzzle—once all the pieces are made available.

As things now stand public involvement has been selective and most publicized industry commentary has been in support of those programs now in place.

Not viewed as an inadequacy by state officials, the delays and gaps are explained as a necessary step in the process toward a completely integrated approach. The role of the individual citizen is believed to be adequately addressed by spotty public hearings.

The extent of potential failures that may face the government plan for solid waste has been hinted at by some objective observers. Market stimulation for some recycables could negatively impact other recycable materials; refusal to comply with landfill standards could result in massive closings—closings that do not include continued, responsible monitoring; incentives to recycle could overwhelm energies designed to reduce at the source.

Community awareness and community solutions should be an important part of the solid waste solution. Indentifying and changing the fundamental drivers of a non-sustainable life style will take more than individual efforts. The government approach: source reduction, recycling, landfilling, incineration, appears to present a blueprint that could build a wall.

Hazardous Treatment

EPA guidelines for technologies that can be used to treat wastes are divided by method of treatment. The five categories listed below are definitions taken from an EPA guide entitled ***"Treatment Technologies for Hazardous Wastes of Superfund Sites."***

BIOLOGICAL TREAMENT

A treatment process in which bacteria, fungi, and/or microorganisms are used to alter or destroy hazardous waste. Liquid and solid wastes that can be treated by this method may include toxic chlorinated and aromatic organic compounds. The process is highly sensitive to environmental conditions, including fluctuations in pH and temperature, and to changes in the concentrations of heavy metals and salts in the waste stream.

CHEMICAL TREATMENT

A treatment process in which the hazardous waste is altered by a chemical reaction in order to destroy the hazardous component. Wastes that can be treated by this method include both organic and inorganic compounds without heavy metals. Drawbacks to this method include the impurities in the waste and the potential generation of hazardous byproducts.

PHYSICAL TREATMENT

A treatment process in which the hazardous waste is separated from its carrier by various physical methods such as absorption, distillation, filtration, etc. Physical treatment is applicable to a wide variety of wastes but further treatment is usually required.

STABILIZATION, SOLIDIFICATION, AND ENCAPSULATION TREATMENT

A treatment process which isolates hazardous wastes from the surrounding environment without destroying the hazardous constituents. The treatment objective is normally achieved by mixing the waste with an inorganic compound such as fly ash, lime, clay, etc., to form a chemically and mechanically stable solid. The treated waste generally has higher strength, lower permeability and lower leachability than the untreated waste. Stabilization, solidification and encapsulation treatment is applicable primarily to inorganic wastes containing heavy metals. Organic compounds often interfere with the setting action of the solidifying agent. There is no guarantee of the effectiveness of this method over time due to lack of data on long-term leachability studies. This type of treatment may be feasible for use at sites with limited space or in emergency actons to alter the form of the waste to a more easily transportable form.

THERMAL TREATMENT

A treatment process involving the decomposition of hazardous waste by thermal means into less hazardous or nonhazardous components. When subject to high temperatures (2500°-3000°F), organic wastes decompose to similar, less toxic forms. Complete combustion yields carbon dioxide and water plus small amounts of carbon monoxide, nitrous oxides, and chlorine and bromine acid gases. Some thermal processes produce off-gases and ash that require further treatment or landfill disposal. Thermal treatment is most suitable for organic wastes and is less effective when attempting to detoxify heavy metals and inorganic compounds. One drawback of thermal treatment is the high cost invovled.

Designing an SST: Noise, Sonic Booms And The Ozone Layer

by Warren E. Leary

WASHINGTON—As the United States quietly pursues a new effort to develop a plane to carry passengers over long distances at twice the speed of sound or faster, it is focusing unusual attention on environmental problems that could ground the plane before it takes off.

The National Aeronautics and Space Administration says preliminary studies it commissioned on a high-speed civil transport indicate that building such an aircraft is possible. But the effort will depend upon technological advances to make such a plane environmentally and economically acceptable, the agency says.

Parallel studies done in the past two years by Boeing Commerical Airplanes in Seattle and the Douglas Aircraft Company of Long Beach, Calif., a division of the McDonnell Douglas Corporation, indicate there will be a market after the year 2000 for a plane that can carry between 250 and 300 passengers at speeds between 1,350 and 2,000 miles per hour over distances of at least 6,000 miles.

The last attempt to build an American supersonic transport, or SST, ended in 1971 when Congress killed the program because of environmental concerns about excessive noise, possible damage to the ozone layer and whether such a plane could operate economically in an era of rising fuel prices.

Attempting to learn from the past, the agency plans to spend $284 million over the next five years to find out whether a high-speed transport is feasible. The program will center initially on technology related to environmental issues.

The chief concerns are sonic boom, airport noise and engine emissions that could help reduce the atmosphere's protective ozone layer.

CONFRONTING THE BOTTOM LINE

"We don't want the country to invest money in another round of supersonic transport development until these environmental questions are answered," said Howard L. Wesoky, NASA's program manager for highspeed transport research.

"We are looking at environmental issues ahead of hardware issues, which is unusual for a technology project," Mr. Wesoky said. "The bottom line is that if we can't solve the environmental questions, the plane will not be built."

To underscore these concerns, NASA has established an advisory committee on environmental problems that includes representatives of technical agencies concerned with aircraft, people from the Environmental Protection Agency and the National Oceanic and Atmospheric Administration, and representatives of environmental groups, such as Dr. Michael Oppenheimer, senior scientist for the Environmental Defense Fund.

"We're starting a process that may go on to become a model for Government, industry, environmental groups and others getting together before a technology is developed to see about doing it right," Dr. Oppenheimer said. "This wasn't done for the first SST, nuclear power or some other technology that hasn't worked out."

The preliminary studies by Boeing and Douglas are cautiously optimistic that technology can be found to overcome enviromental difficulties.

PROMISING ENGINE DESIGN

The only supersonic airliner in service is the 100-seat Anglo-French Concorde; only 16 were built, and all but about a half dozen have been retired. The aircraft, which sees limited service between the United States and Europe, proved too small and short-range to be profitable and has been the source of many complaints about noise.

The resurgence of interest in supersonic airliners in the United States is in response to surveys that show passengers want a faster way to reach far-flung areas of the world, particularly Asia and the Pacific Rim, and that there would be intense international competition for a market for at least 650 such planes.

Aerospatiale, the French aircraft company, is studying a next-generation SST to replace the Concorde and the Japanese government has begun serious research. The Soviet Union has begun studies on a transport plane that could fly at five times the speed of sound, and is exploring the possibility of jointly developing a smaller, supersonic business jet with an American company.

To withstand the stresses of supersonic speed, the proposed planes would have to fly in the thinner atmosphere between 55,000 and 60,000 feet (the Concorde flies at just over 50,000 feet). The heat of the planes' engines would produce nitrogen oxides, which would drift up to higher levels and destroy ozone, a form of oxygen that screens the Earth from potentially damaging solar ultraviolet rays.

Dr. Harold S. Johnson, a professor of chemistry at the University of California at Berkeley whose research on this reaction in the early 1970's helped scuttle the American SST, said a fleet of 500 supersonic airliners using existing engine technology would seriously deplete the ozone layer, which many researchers say is already being damaged by man-made chloroflubrocarbons.

According to a recent computer model study by Dr. Johnson with Douglas E. Kinnison and Donald J. Wuebbles of Lawrence Livermore National Laboratory, this fleet would reduce ozone by 15 to 20 percent, almost three times the damage predicted from chlorofluorocarbons.

Dr. Johnson said this worst-case prediction would probably not come true because engineers believe they can make jet engines that produce only one-tenth to one-hundredth as much nitrogen oxide as existing ones.

"I'm not the one to say this is impossible to do, but someone has to show that this is safe and practical," Dr. Johnson said, "You can't start building planes on the promise that these problems may be solved."

Flying faster than sound creates pressure waves in the air that cause a plane to leave a conical shock wave in its wake. The pressure waves that reach ground are heard as jolting sonic booms, which critics say disturb humans and animals, and produce vibrations that can damage property.

Mr. Graf of Douglas Aircraft said the sonic boom problem is important because his company's analysis indicates a supersonic airliner might not be economic if it were restricted to overwater flights.

Since sonic boom is affected by a plane's shape, size and mass, the aircraft makers say they are looking to new materials and manufacturing techniques to cut weight without sacrificing seating capacity. In addition, they are looking at different nose configurations and plane contours to reduce sonic boom.

'IT LOOKS VERY GOOD'

To deal with noise around airports, there is much research on cutting engine noise and improving the proposed plane's lift so that it rises quickly to leave the area sooner.

Jet engines powerful enough to push a big plane to supersonic speeds are inherently noisy, but engineers are looking at new types of engines that change their configuration so that they act and sound more like subsonic engines at takeoff and landing. Work is also progressing on new types of sound suppressors.

"I think it looks very good for producing a plane like this after the year 2000," said Mr. Wesoky of NASA.

Dr. Oppenheimer of the Environmental Defense Fund said he was not as optimistic that the problems could be solved and was particularly concerned about the effects a supersonic fleet could have on the atmosphere. *NYT 4/10/90*

Toxic Properties Surfacing In S&L Bailout

by Dave Skidmore

WASHINGTON (AP)—Federal regulators cleaning up bankrupt savings and loans are finding they've inherited another unexpected and expensive mess: real estate contaminated by hazardous waste.

Officials at the Resolution Trust Corp., which has taken over more than 400 insolvent S&Ls, say some of the failed financial institutions had foreclosed on polluted property.

Recent court rulings have found that financial institutions are potentially liable for cleaning up such property under the 1980 Superfund law. By extension, that could put the RTC on the hook.

The RTC doesn't know yet how many of its more than 30,000 real estate parcels are contaminated, but agency spokesman Stephen J. Katsanos says, "I'm confident there are sites in our inventory that . . . need some cleanup."

The RTC, already faced with an estimated $325 billion price tag for its S&L bailout, thinks the Environmental Protection Agency's Superfund should foot the bill on any failed S&L property cleanups.

"The taxpayer is going to be paying for it one way or another . . . but if it comes out of the RTC then it reduces the amount of money available to protect deposits," Katsanos said.

A bigger problem than the actual cleanup cost is the cloud of uncertainty cast over the RTC's portfolio.

Pollution problems aside, the agency has had great difficulty selling S&L assets when it turns over a failed institution to a new owner, and the potential for an environmental expense is just one more risk discouraging the purchase of assets in large blocks.

Not only do buyers have to worry about evaluating real estate owned by an S&L, they have to worry about environmental problems at properties pledged as collateral for loans that may later turn sour.

Other agencies, including the Small Business Administration and the Farmers Home Administration, also are wrestling with polluted properties.

Sally Narey, SBA general counsel, estimated the agency has wound up with about 150 cases of contamination—and there could be more.

Not only does the SBA face a possible problem when it forecloses on a delinquent loan it has guaranteed, it could face liability from other programs in which it provides operating advice to businesses.

"We just don't know what's out there that we haven't uncovered yet," she said.

A bank or S&L, as private enterprises, can simply steer clear of making loans to high-risk businesses, but the SBA, as a government agency, is caught in the middle.

"It's a difficult situation. Our mission is to make loans to small businesses that can't get loans elsewhere," Narey said.

A variety of legislation introduced in Congress aims to address the problem both for the agencies and for financial institutions. Sen. Jake Garn, R-Utah, the senior Republican on the Senate Banking Committee, would provide immunity to federal banking agencies as well as lenders for environmental problems they only inherited, not created.

"My sense is this is a much bigger problem than a lot of people think it is. There are more examples all the time," Garn said.

Rep. Silvio Conte, R-Mass., has offered a bill applying only to government agencies, while earlier this month Rep. John J. LaFalce, D-N.Y., chairman of the House Small Business Committee, introduced legislation that would exempt only lenders.

Another proposal by Rep. Curt Weldon, R-Pa., would exempt lenders only if they paid for an environmental audit to determine if a property is contaminated before taking it over.

The EPA and private environmental groups are opposing the bills as unnecessary. The Superfund law already provides some protection to lenders who only have a security interest in a property and no role in its management.

The problem, from the banks' perspective, is that they often in effect become managers of a property after they foreclose. Even before foreclosure, a lender will sometimes participate in management in an effort to steer a borrower out of trouble.

EPA enforcement attorney Glenn Unterberger said cases of potential lender liability vary so widely that is is better to let the courts judge each on the facts rather than trying to write a blanket rule to cover all situations.

Attorney Donald Strait of the Natural Resources Defense Council said he fears providing greater protection for lenders could result in windfall profits at the taxpayers' expense.

"All of a sudden, a bank which took over a site which was worth very little would have a much more valuable site because it was cleaned up with taxpayers' money. I don't think banks should get that windfall," Strait said.

Sponsors of the bills say they are willing to write them to prevent such profit. And they argue that without the legislation businesses face a credit crunch, particularly high-risk businesses such as gasoline stations and dry cleaners.

Forcing banks to pay for environmental studies before they accept property as collateral is no solution either, said Thomas Greco of the American Bankers Association.

Sunday Gazette-Mail 4/29/90

Spaceship Earth: Is It In Trouble?

An Interview with R. Buckminster Fuller

In your book, *Approaching the Benign Environment,* you emphasize that not only is man altering his environment, but the environment is altering man too. Do you believe we are being altered for the worse by this process?

I don't believe anything. The word "believe" means to me accepting explanations of physical phenomena without any experimental evidence.

I am a hard realist. I am a ship's captain. I was a regular United States Naval Officer. I was an air pilot. I'm a navigator. I'm a mechanic, an engineer. I will not tell people I'm going to get across the ocean if I didn't know how to do it, and so I talk always in terms of evidence. The fact that we have options—and I'm often able to make clear to humanity that we have options they didn't know we have—should not make us optimistic. When I'm making them understand that humanity has a chance to make it on this planet, when they've become so dismayed and assume things are really going to pieces, I don't ask them to believe a thing, I explain exactly how I arrived at those results, and they feel better and say "your optimism brushed off on me," but I'm anything but optimistic. To know that we have the option doesn't tell me that we're going to make it at all. I know all the reasons why we may not make it.

It seems very touch-and-go whether we're going to make it on this planet. So, I'm anything but an optimist.

Do you see any hopeful signs at all?

Human beings are born deliberately by design. A universe that can design 92 chemical elements is utterly unique, a universe that can design the eternal principles such as mass interaction of celestial bodies, such principles as leverage, optical refraction, such a universe deliberately designs human beings with incredible equipment. Our eyes could not be more incredible, our brain could not be, but humans are also designed to be born naked, absolutely helpless for months—with no experience, absolutely ignorant, but hungry, thirsty, and curious, and we are designed to learn only by trial and error. Humanity after millions of years of finally developing words to communicate with one another, is able to compound experiences by written words, where the dead can speak to the livng, so we have made enormous advances.

Nature put humans on this planet but let people make some very bad mistakes such as environmental pollution. People are now becoming very excited by pollution, and probably nature gave them enough margin to really get things under control. But we don't make moves until things get absolutely horrendously bad. Humanity doesn't move unless it can see things moving. And when you don't see something moving, you don't know you're going to be run over. So it's only when they push us that we begin to really holler. Humanity is going through that right now, so I'm delighted. The worse news I get about environment and so forth, the better I feel because I knew those things were going on all the time 50 years ago. I said then, how can we get humanity to move? Now we're getting to the point where everybody is terribly excited, and the kids are getting even more excited, which is the most important thing.

In your book, *Operating Manual for Spaceship Earth,* you mention that there was a big safety factor designed into this planet when man came on the Earth that gave him time to learn how to operate this spaceship and adjust to his environment.

Nature gave him an enormous cushion—a life support system with time to learn by trial and error.

Are we running out of time on this now, as far as this cushion is concerned?

As I've said, it's absolutely touch and go, whether we're going to make it. I do know we have the option to make it.

You write and speak a great deal about problems in the cities—particularly their pollution problems. What remedies would you suggest that we do that we're not doing now?

I'd like to review the city and pollution problem. Of course a very famous one was the London fog. That was because people had been burning coal in their grates and mixing it up with the fog. But today there's no London fog anymore. All those chimneys are there, but no smoke is coming out of any of the chimneys in London anymore.

Then we come to Los Angeles, which has had this very famous smog problem.

On the Pacific Coast along the mountain coast range, mists are made by the temperature differential of the sea and the mountains. When industry began to come in, particularly the oil refineries of Los Angeles, the fume got impounded in that mist and made it heavy as it came down. So, it made more and more of a curtain impounding that industrial fume.

The people of Los Angeles before World War II complained a great deal about this to their city government. The government said they were going to do something about it. The city management was pretty sure that this fume from the industry was causing the trouble so they said the corporations were going to have to stop this pollution.

The industries replied there are ways of precipitating all right, but it costs a lot of money, and if we put it in, we couldn't compete with the companies that are not operating under controlled conditions. We are going to have to move out of Los Angeles. The city said, don't go, we need you very much for the taxes, so people it's your fault, all of your backyards are incinerating and making smoke. So, they passed a law against it and Los Angeles had no more incineration. But just about the time that was working well, an enormous influx of new people came in after World War II. The city began to look at that and said, "People, it's your fault, it's the fumes from your cars."

Now, what I'll simply say, and this holds true for every city in one way or another, industry won't pay any attention to this industrial fume. The air doesn't stay local to any place, the wind just simply moves around the country, the air belongs to everybody, and the only way we're going to lick this is the following. I have observed, for instance, that the amount of sulfur coming out of all the chimneys around the world annually matches the amount of sulfur we take out of the ground to keep industry going.

So government may have to say to every corporation, you are going to have to put in fume precipitation.

All this waste is recoverable. I was asked to give the annual dinner talk to the Edison Electric Generating Management. They have precipitation for all the fumes coming out of the electrical generating plants, and the company engineers said it would cost the generating companies only 25 percent more to precipitate. But the industry would not cooperate. From now on government is going to have to say to every corporation, "Well, here's equipment, you must put it in and precipitate. No matter what it costs you, we'll rebate that as taxes at the end of the year—your income tax.

"But you must turn over all the metals and all the valuable chemical products to us which are recovered this way and we in government, then, will see that the sulphur gets where the sulphur is needed."

You first coined the metaphor that the Earth is a spaceship, did you not?

Yes. I'm the one who gave you the name "Spaceship Earth."

The late anthropologist, Margaret Mead, once questioned this phrase. She thought of the Earth as kind of a living organism, not a spaceship. She felt that if it were a spaceship you could just push a button and solve things, but instead she liked to think of it as a living, breathing, organism that has to be nurtured. Would you quarrel with that?

If she wanted to, she could call it an organism. But it is an entity, going around the sun at 60,000 miles an hour and I think a very good name for it is Spaceship Earth.

Margaret and I were very dear friends. I knew her very, very well and she liked to get up little arguments with me.

You have warned often about over-specialization both in man's activities and in nature where very often when an organism gets over-specialized, it becomes extinct. Do you think over-specialization by man is part of our environmental problem today?

Definitely, yes. I find every child is born an inherent comprehensivist. He asks the most beautiful questions about microcosms, and macrocosms—and the parents say, "No I can't answer, wait till you go to school, they'll answer you." The child gets to school and they say "Never mind, we're going to give you one, two and three. You handle that and we'll give you four, five and six, and give you the ABC's." Childen are put into what's called elementary school where they're given the parts instead of the whole.

I find that the only difference between humans and other organisms is that every other living organism has some built-in special equipment that gives it special advantage in some special environment.

Whether it's a little dog that's cut very close to the ground so he can follow a trail or whether it's the special vine that only grows in the Amazon because it does it beautifully there, or a bird in the sky using wings, but then, when it's not flying, it cannot disembarrass itself of its wings and it finds that its walking is very greatly hampered.

Humans have, however, phenomenal brains and they are able to discover a relationship existing between special cases. We have eternal principles which only human minds have the capability to discover.

What is different is we understand principles and are able to be objective to the principle rather than having built-in special equipment. If Nature wanted humans to be specialists, she'd have them born with a microscope on their eyes as she does with many other creatures.

Here in Philadelphia about 25 years ago, the American Association of Advancement of Sciences had its annual congress and there were two reports turned in, one in anthropology, the other in biology. There had been a team of biologists for years that had been studying all the known cases of the biological species that became extinct.

The anthropologists had been reviewing all the case histories of human tribes that have become extinct. Both teams found completely independently that extinction was a consequence of overspecialization. For instance we can inbreed by marrying two fast running horses. With the concentration of these fast running genes, you're liable to get a fast running horse as an offspring, but as you do, you outbreed adaptability. You have to look out for that horse more and more. You find inbreeding and specialization always have their price: the loss of general adaptability.

You have today all of humanity so over-specialized that no one in the end will know what to do about anything. Man knows he's in trouble, so he leaves it to a politican and the politician can't do a thing about it. It turns out the politician as an individual is absolutely stymied by this.

So, we're at a point where we're that close to becoming extinct by virtue of overspecialization rather than the general capability of humanity.

(continued on page 8)

(continued from page 7)

You have made a great contribution to architecture in the use of lightweight materials in your geodesic dome and other structures. When you were creating these buildings, using your philosophy of "doing more with less," did you consider yourself an environmentalist in the sense that you were using fewer resources?

I set out deliberately in 1927 to pay attention to ecology, to see the complete interrelatedness of everything. That is, instead of being a specialist, to look at the total planet Earth, never look at a local country. I wanted to look at the total resources, the total tools of know how, and to use them for the total success of the generation of life on our planet.

I saw something going on in our technology that society did not appreciate or understand. When I was born, reality was everything to see, smell, touch and hear which is the same reality the newspapers deal with today. But we had come into a new era of electronics where you couldn't see things. We came into the era of chemistry and metallurgy, where no one could see the difference between two pieces of metal weighing exactly the same but this one was exactly twice as strong as that one.

World War I had been a war of alloys, doing more with less. Suddenly there's a ship coming, same tonnage as yours, same number of guns, same size guns, but what you don't know is he has a kind of steel in his guns so that his guns will fire accurately one mile further than yours. And your ship goes to the bottom.

Nobody tells it. So, the most guarded secret of World War I was this "doing more with less." When I hear architects talk aesthetically that "less is more," I'm not interested. I am talking about physically doing greater performance with less volume of material and ergs of energy for each function.

I saw that it was only going into the military. We were putting it in the airplane, into ships, we had all this priority in light weight metals and alloys going to the military.

In 1927 I found that the building of the home, what I call "livingry," was many years behind the arts of designing military equipment for the sea or control for the sky. In 1927 there was an article about a single family dwelling published by the American Institute of Architects in their Journal—a house in Illinois which they considered optimum for that year.

I took the total floor area and volume, the number of windows, all the plumbing it had, and so on, and I found its total weight including the pipes was 150 tons. I took the problem then of producing equal environment controls to a new floor area, same cubage, same number of functions, equally performed and using the most advanced aircraft technology. I came up with three tons against 150. I saw then, by immediately applying the most advanced science and technology to the home front, there was a good possibility we might do so much with so little and it might be able to take care of everybody.

Russia and the United States for the last 30 years have been spending over $200 billion a year focusing on how to destroy humanity most expertly. But I knew when I came to my studies of environment control, I could take care of the living.

Between 1948 and 1950 I was giving a general lecture series at MIT. They had a department of architecture and it was considered by the other departments there as sort of a department of liasion with idiots.

Now, what are you going to do with technology? I said I think right now we ought to change the name of the architectural department to Department of Environmental Design. Bill Wurster was head of the MIT architectural school at that time and later moved out to the University of California at Berkeley.

I got a letter from Bill about five years after that. He said, "Bucky, I'm changing the name of our department here to Department of Environmental Design." That's how the word "environmental" got going so much in architecture, really out of my suggestion, because I've been at it 52 years.

Many years ago you wrote an article in Fortune about the world energy resources.

Yes, in their tenth anniversary issue, in February 1940.

Did you anticipate at that time the mess we would be in now in energy?

Excuse me, but I can show you that in 1927 it was absolutely clear to me that we were in trouble. Automobiles were just getting to be popular. The cars were proliferating, and quite clearly, you were using up a savings account in energy and obviously your savings account was going to run out some day.

But over the years I have found that neither big government nor big business was interested in anything for you to get energy directly from nature; only what comes through a pipe and a wire, so they put a meter on it and tax you for it and make a profit out of it. So, there's no earnest attention being paid, really, to wind power—to cleaner water power, tidal power. Big business is so powerful today, and it keeps saying, "We're not interested."

At the time of World War II, the grand strategy against Hitler was to cut off his energy. We succeeded in cutting off all his petroleum. Meanwhile, the German scientists went to work and found they were able then to develop four kinds of alcohols. They made a high octane gas from the alcohol.

Germany was not licked on energy because alcohol saved them. I was in economic warfare in World War II and I had over at the Bureau of Standards a Plymouth and a Ford and a Chevy engine which we ran for two years on alcohol and ran better than on gasoline. So now I know we can do this.

You've traveled a great deal, Mr. Fuller. Which country would you say has the most advanced environmental ethic, the most sensitivity to environment?

Well, I have been around the world 45 times. I was in China this year. I felt more at home in China. There was more sensitivity to what we're talking about than any place I've ever been.

In what way?

There was an honesty and a clarity. In Russia, I've been there many times and met their top people, and they can't talk about things. They can talk about technology, but they can't talk about how you run things. I found in China, anybody can talk about anything, government or anything. Everybody is interested in the truth. I've never, never seen anything like the progress positively in China. Japan is very imrpessive; every corner is growing something, but in China it's overwhelming.

We know they're planting a lot of trees in China for reforestation.

They're planting everything. Every inch of ground is used. It's very well done.

Kruschev once said that he wanted "Mr. Buckingham Fuller" to come to Russia to teach his engineers. Did you ever accept that invitation?

That same year was the year of the protocol exchange between the United States and Russia. The Russians built a great exhibit in New York. The United States had an exhibit over there. My dome was being used for that. I had already been asked by the United States government to represent United States engineering in the protocol exchange, so I was going over there anyway. And I did speak to his engineers. I did find that they did like the geodesic dome, they agreed that was one of the things that had not been done in Russia. But Khrushchev was talking about my dome when he was speaking to the New York reporters. He said some American inventors are good, and this one of them. So they recognized it as being mine and not Russian, and have built many geodesic domes since then.

R. Buckminster ("Bucky") Fuller, 2-12-1895/7-1-1983, was best known as the inventor of the geodesic dome, a lightweight structure of honeycombed triangles. Author of numerous books on environment, energy, education, mathematics, and world planning. This interview appeared in the November/December, 1979 ***EPA Journal.***

Reasons To Join WVHC

The West Virginia Highlands Conservancy is a private, non-profit environmental organization started in 1967. Its objectives are "to promote, encourage, and work for the conservation—including both preservation and wise use—and appreciation of the scenic, historic, open space, wilderness, and outdoor recreation resources of and related to West Virginia, and especially the Highlands Region . . ."

Members include people and organizations diverse in their personal interests diverse in their personal interests and professions but united by a common interest. Most WVHC members are West Virginians but many live outside the state.

The Highlands Voice, a monthly 8-page newspaper, is sent to all Conservancy members. It is filled with environmental news on topics of interest and concern to members as well as articles about trips and outings.

The Conservancy sponsors two special weekends each year. These are usually at some scenic spot in the highlands and feature speakers, outings and board meetings.

Your contribution to WVHC is tax deductible and joining is as simple as filling out this form and returning it to the office in Charleston.

Join today and become part of an active organization dedicated to preserving West Virginia's natural resources.

WVHC Membership Categories (Circle One)

Category	Individual	Family	Organization
	$	$	$
Senior/Student	12	—	—
Regular	15	25	50
Associate	30	50	100
Sustaiing	50	100	200
Patron	100	200	400
Mountaineer	200	300	600

Name _____ Phone: _____

Address: _____

City/State/Zip _____

Make checks payable to: West Virginia Highlands Conservancy
Mail to: P. O. Box 306, Charleston, WV 25321

Membership Benefits

- 1-year subscription to **The Highlands Voice**
- Special meetings with workshops and speakers
- Representation through WVHC's efforts to monitor legislative activity.

The West Virginia Highlands Conservancy is a non-profit organization. Your contribution is tax-deductible. Please keep this for your records.

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Amount _____

Check number _____