Vermont Environmental Report

November/December 1981 A Bimonthly Newsletter Published by the Vermont Natural Resources Council Vol. 2 No. 6

Lowell Says No to Landfill

Belvidere Mountain in Lowell, Vermont, home of the largest open-face asbestos mine in the United States.

Mary S. Hooper

Some people call Lowell, Vermont, a company town. This northern Vermont community is home to the largest open-face asbestos mine in the United States. Two of the town's three selectmen work for the Vermont Asbestos Group (VAG) and many of the mine's 175 employees live in Lowell.

More than a few people were surprised, then, when local citizens organized to oppose VAG's plan to dispose of phenol-contaminated asbestos wastes in Lowell. Nearly 250 people turned out for a public hearing on the proposal in August, and in October, "Concerned Citizens Against the Dump" secured a municipal ordinance banning the disposal or storage of hazardous wastes in Lowell.

The Lowell group is concerned that burying an estimated six truckloads of waste per week on Belvidere Mountain could contaminate local wells or pollute nearby Burgess Brook. They're also worried that the landfill will trigger a decline in property values, and

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Danger: High Voltage
The Health Effects of EHV Lines

Per Krogh Hansen

The public debate over extra high voltage power lines in Vermont has focused on the need for new large-scale sources of power versus the potential of conservation and small-scale renewable energy. But at the heart of the debate lay concerns about the effects of the lines on humans, animals and vegetation. Unfortunately, predicting the health effects of EHV transmission lines is at least as difficult as projecting Vermont's long-term energy requirements.

The United States has relatively little experience with extra high voltage (EHV) transmission, particularly direct current (DC) EHV transmission. America's first EHV/DC line was constructed in California and Oregon in 1970. The line proposed for Vermont would be the fourth of its type and would carry the highest voltage and electrical load.

Much of the research into the biological effects of exposure to high electric and magnetic fields is preliminary and inconclusive. Most research has involved AC rather than DC current, and has been conducted in laboratories rather than in the natural environment. Field strength, duration of exposure and types of biological responses measured have varied widely, making comparisons difficult.

Why EHV lines? Over long distances, high voltage power lines transmit power more economically than smaller lines. A single large power line can carry as much power as several small lines, but it requires less land and costs much less to build and maintain. Also, energy losses decrease as voltage increases.

For very long distances (400 miles or more), DC transmission is the most efficient. AC lines have two conductors carrying alternating current at a frequency of 60 cycles per second (60 Hertz). DC lines have two constant voltage conductors. Because DC lines have only two conductors, they require a narrower right-of-way and smaller towers, but the power must be converted from AC to DC at the source and from DC to AC at the point of distribution.

Electric and magnetic fields: Both AC and DC lines produce electric and magnetic fields. The voltage creates an electric field, while the current produces a magnetic field. Maximum electric and magnetic field strengths occur at ground level directly beneath the conductors and decline sharply as distance from the conductors increases.

Two 345 kV (kilovolt) AC lines and one 115 kV/AC line together will generate a maximum electric field at ground level of 6 - 7 kV per meter. A typical 450 kV/DC line will have an electric field strength at ground level of 16 kV per meter. The earth's natural static (DC) electric field is .12 kV per meter, and the highest 60 Hz electric field in most homes is .25 kV from an electric blanket.

The "space charge" can add 50% or more

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NEPOOL, VELCO AND EHV IN VT

The New England Power Pool (NEPOOL) is a consortium of regional utility companies. NEPOOL is negotiating with Hydro Quebec to buy surplus hydroelectric power and is looking for an extra high voltage (EHV) power line corridor in both New Hampshire and Vermont.

In New Hampshire, NEPOOL is negotiating with the New England Power Company, and in Vermont, it is working with the Vermont Electric Power Company (VELCO), a statewide association of Vermont utilities originally established to help distribute power purchased from the Power Authority of the State of New York (PASNY).

The 450 kV/DC line would transmit 600 megawatts (MW) of power from the Des Cantons substation in Quebec to the Comerford substation near Monroe, New Hampshire. It will carry 2000 MW once it is extended south to eastern Massachusetts.

If the power line passes through Vermont, VELCO will receive 10% of the power; if it runs through New Hampshire, Vermont will get 5%. The Vermont route is about 20 miles shorter.

Both NEPOOL and VELCO favor a Vermont power line corridor which begins at the Canadian border near Norton and runs due south to Comerford through Avery's Gore, Averill, Lewis, Bloomfield, Brunswick, Ferdinand, Granby, Lunenburg, Concord and Waterford.

The line will be built on wooden H-frame towers, 95 feet tall. The conductors will be a minimum of 36 feet above the ground at mid-span, and the right-of-way will be 200 feet wide.

VELCO must receive a certificate of public good from the Public Service Board before it can build the line, and it will probably apply for that permit in early December.

VELCO has also filed for a permit to extend a 345 kV/AC line which runs from Vermont Yankee in Vernon to Coolidge substation in Cavendish. The extension would terminate in Essex and would follow the route of two existing 115 kV/AC lines. MM

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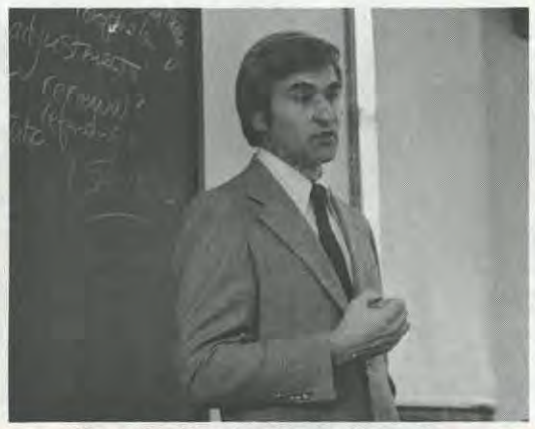

Tom Jorling in South Royalton

SMALL IS STILL BEAUTIFUL

It's been said before, but in a recent address, Tom Jorling, Head of the Environmental Studies program at Williams College, made the "do more with less" philosophy particularly relevant to 1980's environmentalism. At the 4th Annual Environmental Law Conference in South Royalton, Vermont, Jorling said that conservationists must enunciate what they are *for*, not just what they are against.

"It's not enough to plead, 'conserve! recycle! sacrifice! abate!' " said Jorling. The environmental movement must provide a vision of where it would take society.

He suggested that environmentalism is primarily concerned with freedom, independence, security, resilience and reduction of vulnerability. He described how, in the last century, we have come to rely on enormously complicated production and distribution systems, and how this dependence limits our freedom.

"In earlier days," Jorling said, "people generally knew how to produce or obtain and maintain the various requirements necessary to support life [or] knew, in a personal sense, the individuals who did know how to produce it. It is the confidence in that knowledge that enables a sense of security that is essential, and precedent, to freedom."

Jorling quoted a 1970 CIA report which estimates that in this country the average molecule of food now travels more than 1300 miles from the point of production to the point of consumption. And while it is often subordinated to the 1973 oil embargo in terms of public attention, the interstate truckers' strike which occurred at the same time revealed that the Northeast has about a ten-day food supply at any one time. "As our life support needs are made more distant, it will deprive people of any sense of independence from a megasystem on which they must depend, but over which they have no control."

We can prevent the creation -- or completion -- of a "collective homogenous megasystem" by portraying a future that "successfully appeals to a different set of imperatives and values that people support." One of these imperatives would be the "subdivision of geography and human settlements into more environmentally integrated and life support secure units." Jorling also said that technology should be developed "in scale with individuals or communities, their resources and serviceable by them."

In a discussion following Jorling's speech, Harvey Carter, VNRC's attorney in the I-93 case, compared a network of small-scale in-state hydro dams to a single large power line linking Vermont with James Bay. Jorling and Carter agreed that although the latter might be do less environmental damage to Vermont, it would leave us dependent on a life support system over which we have no control and would be inconsistent with the goals of environmentalism proposed by Jorling. MM

Announcements

WATER RESOURCES BOARD REVIEWS VERMONT'S WATER QUALITY STANDARDS

As part of its review of the State's efforts to protect water quality, the Water Resources Board has declared that it will consider "changes to any aspect" of Vermont's current water quality standards.

In November and December, the Board will meet with representatives of local government, environmental organizations, the business community and academia to discuss the underlying assumptions of the current standards (see "calendar," this page). In January, the Board will circulate proposed revisions for public review and comment. If you would like to comment on the standards, or if you need more information about the meetings, call or write the Water Resources Board, State Office Building, Montpelier, VT 05602, 828-2871.

STATE SEEKS INFORMATION ON GROUND WATER CONTAMINATION INCIDENTS

The Vermont Department of Water Resources is conducting a statewide survey of ground water contamination and is looking for information on incidents of contamination from oil spills, landfill leaching, fertilizer or pesticide application, industrial waste storage or disposal, road salt storage, or animal manure and whey storage and spreading. This information will help the Department determine the major causes of ground water contamination in Vermont as well as the best methods for protecting our underground water supply. If you know of a ground water contamination incident or if you'd like additional information about the survey, write or call Marshfield Engineering Services, Depot Hill Road, Marshfield, VT 05658, 426-3585.

EXTENSION SERVICE SPONSORS REGIONAL FARMLAND CONFERENCES

The Extension Service is sponsoring a series of five all-day regional conferences on farmland protection in February and early March, featuring panelists from the Department of Agriculture, VNRC and Vermont's regional planning commissions. The meetings will stress citizen participation and will include discussions of farmland protection devices particularly applicable to Vermont.

Date	*Location*	*For more information, call:*
February 1	Lyndonville area	Ernie Saunders, 748-8177
February 8	Burlington area	Noah Thompson, 656-4420
February 15	Rutland area	William Bingham, 773-3349
February 22	Bellows Falls area	Bob Townshend, 457-2664
March 8	VTC, Randolph	Barry Stryker, 223-2389

Calendar

Monday, December 14th
The Water Resources Board will discuss revision of Vermont's water quality standards at an informal public meeting from 1:00 - 4:00 p.m. at the South Burlington Municipal Building (575 Dorset Street). See "announcements," this page.

Tuesday, December 15th
Organizational meeting of a statewide recycling association, beginning at 10:00 a.m. at Rutland County Solid Waste District offices at the Opera House in Rutland. For more information, call Connie Leach at 775-6482.

Monday, December 21st
The Department of Water Resources will hold a public hearing on **the priority list for municipal sewage treatment plant construction** at the Pavilion Auditorium in Montpelier, beginning at 1:00 p.m. For more information, call Bill Brierley at 828-3345.

Tuesday, January 12th
First meeting of a **statewide recycling association,** in Montpelier. For details, call Connie Leach, 775-6482.

Saturday, January 16th
Insulated window cover workshop, sponsored by the Vermont Institute of Natural Science in Woodstock, from 10:00 to noon. Kathy Weaver will demonstrate how to make insulated window covers and will discuss different materials, techniques and payback periods. Pre-register before January 12th by calling VINS at 457-2779. Bad weather date: January 17th.

Tuesday, January 26th through Thursday, January 28th
Vermont Farm Show, at the Barre Auditorium, an off-the-farm get-together and exhibition for farmers and their suppliers. The times for the show are:

Tuesday	9:00 -- 6:00
Wednesday	9:00 -- 9:00
Thursday	9:00 -- 4:00

VERMONT ENVIRONMENTAL REPORT

Editor	Marion MacDonald
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Lowell

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that once the site is established, more dangerous wastes will be disposed of there.

VAG representatives say the landfill will be very profitable for Lowell's principal industry. One of VAG's best customers is the Bendix Corporation of Troy, New York. Bendix manufactures brake shoes from asbestos bound with phenolic resins. The shoes are ground into shape, leaving a residue of asbestos and phenol. This dust, encapsulated in cement for safety and ease of handling, will be disposed of in the Lowell landfill.

The mine owners maintain that the landfill designed by consulting engineer Don Marsh is completely safe. They say their research shows that the amount of phenol in the leachate from the Lowell asbestos dump will not contaminate ground or surface water and that given the decreasing presence of the mine, the landfill will not affect local property values.

But many local people do not trust the Vermont Asbestos Group. They feel that VAG has been less than candid about the type of wastes to be buried in the Lowell landfill. When the Belvidere site was first proposed in the spring of 1981, it was billed as a landfill for asbestos wastes only. Most Lowell residents did not learn that the wastes would contain phenol until shortly before a permit hearing on August 11th.

Phenol is deadly in large quantities, and harmful to aquatic life in small quantities. But the Agency of Environmental Conservation (AEC) has declared that the phenol disposed of in Lowell will not be considered a hazardous waste. Vermont's hazardous waste regulations provide that some wastes can be de-listed if they are proven harmless in certain quantities or under certain conditions. Aquatech, Inc., a testing laboratory in South Burlington, estimates that leachate from the Lowell landfill would contain only about 35 milligrams of phenol per liter, well below the AEC's acceptable limit of 350 milligrams per liter.

Several independent experts have substantiated Aquatech's conclusions, but to the people of Lowell, it seemed that VAG and the AEC withheld information and short circuited Vermont's hazardous waste regulations. By the time of the hearing on VAG's application for a landfill permit, local sentiment had changed from tacit approval to outright hostility.

VAG responded to criticism of their proposal by re-designing the landfill, adding liners and drains to control water on the site. Current plans call for constructing the landfill on part of an overburden which was scraped away 15-20 years ago. The piles of soil and bedrock are more than 80 feet tall. A 3.5 acre section of the overburden will be covered with ten feet of glacial till, a foot of sand, a PVC (polyvinyl chloride) liner, and another foot of sand. Cells for the waste will be built on this base. As each cell is filled, it will be covered with another foot of compacted till, six inches of sand, another sheet of PVC lining, six more inches of sand, one foot of till, and topsoil.

The area will be planted to reduce erosion. A drainage system on top of the first PVC liner will catch any water that leaches through all of the barriers, and water from nearby wells and from Burgess Brook, the nearest stream, will be monitored for leakage from the fill.

Concerned Citizens Against the Dump hired Shawn Donovan of DuBois and King to conduct an independent investigation. Donovan suggested that the overburden may be unstable and perhaps too permeable to prevent phenol from leaching into the ground water, and that runoff from the landfill will increase erosion at the site. He also raised questions about the ability of the PVC liners (rated to 20 degrees below zero) to withstand frigid Vermont winters without cracking.

Despite these criticisms, VAG received a permit from the State to build the landfill. The company must overcome several more hurdles before construction can begin. Lowell's new hazardous waste ordinance prohibits disposal or storage of all types of solid waste except household trash, animal manure, wood wastes and locally-generated mining wastes in the town. VAG will have to obtain a variance or have the ordinance invalidated before it can build the landfill. A variance is unlikely, and some attorneys say that the Lowell ordinance could not withstand a court challenge.

VAG must also receive an Act 250 permit. The company initiated proceedings with the District Seven Commission, but it postponed further action in the aftermath of the AEC hearing. VAG owner Howard Manosh says the project is "on the back burner for the time being," but that the company will probably proceed with attempts to obtain the required permits.

Whether they are right or wrong about the Lowell landfill, Citizens Against the Dump have voiced legitimate concerns about the safety of hazardous waste disposal. These questions are being asked by many people in similar situations across the country who are reluctant to accept the conventional wisdom that a well-designed landfill is better than the likely alternative, i.e., illegal dumping.

Thousands of new chemicals are produced each year, and their health and environmental effects are largely unknown. We know very little about how chemicals move through soil, air and water and even less about how they react with other chemicals. No landfill is completely safe, and without careful monitoring and adequate safeguards, today's landfill could become a dangerous legacy for tomorrow's children.

As long as we continue to generate hazardous wastes, we must provide for their disposal. Incineration is often the safest method, but when landfilling is the only option, every effort should be made to minimize leachate production and to guarantee long-term monitoring and maintenance. Above all, local residents must be informed of the potential health, environmental and economic risks associated with hazardous waste disposal facilities before they are asked to allow the construction of such a facility in their community.

Mary Shattuck Hooper is the former Director of VNRC's Sewage Management Project.

Farmink

A new, perhaps regular column covering the latest developments in the fertile field of farmland preservation by Don Hooper, VNRC's Assistant Director and Vermont's second most successful goat farmer (the first being his wife Alice).

What's in store at the State House in '82: Although there is a raft of agriculture-related bills left over from the 1981 legislative session, including agricultural districting, purchase of development rights, and a Vermont Agricultural Development Authority, few are likely to see much action this year. They will probably be pre-empted by debate on the following:

•State Aid to Education. Almost all of the alternatives to the Miller Formula will have adverse effects on farming. Farm and forest land taxes, which presently benefit from a relatively low assessment in many towns, will almost surely go up if there are sweeping changes in the way the State appropriates funds for local education.

•Use Value Assessment. Its $1.5 million appropriation now expended, Current Use is up for re-funding. There may be several minor amendments to tighten the law, but the hot and heavy debate will involve a realistic funding level. Because farmland property tax pressures will probably increase, we anticipate that more farmers will turn to Current Use for relief. Stay tuned on this one.

•Act 250 "Ten Acre Loophole." Vermont's principal land use and development law may actually encourage the subdivision of economically-viable tracts of farmland by exempting 10-plus acre parcels from Act 250 scrutiny. There is a new bill to plug the "ten acre loophole," but foes of land use planning and development control may use the opening to stage an uprising against other aspects of Act 250. Get ready to call your representative.

Legislative package on hold: The legislative package that the Department of Agriculture had intended to prepare for the 1982 General Assembly will be one more year in the works. The Aglands Task Force and a technical back-up team appointed by Agriculture Commissioner George Dunsmore will work toward a 1983 deadline. For the upcoming session, it will probably submit only an "apple pie" Conservation of Farmland Resolution, intended to give legislative blessing and direction to the study of the farmland preservation issue.

Meanwhile: The UVM Extension Service is gearing up for a series of five regional farmland preservation conferences in February and March of 1982. Check "Announcements" on page 2 of this VER for details. The recommendations which emerge from these sessions may be very important in setting the public context and tone of the 1983 legislative debate of this issue.

Current Use survey summary: The Fair Tax and Equal Education Coalition has just completed a survey of landowners, foresters and town officials on their reaction to the Use Value Assessment Program. VNRC is tabulating the results and preparing a brief report. Survey respondents suggested some slight modifications of the program, but were generally very supportive of its aims and execution. Write or call VNRC for a copy of the summary report.

NALS Study available at last: The final, 284-page report of the National Agricultural Lands Study documents the loss of agricultural land, identifies the causes of the problem, describes the legal and constitutional issues involved in farmland protection and recommends an integrated arsenal of strategies. If you are seriously interested in this issue and what you can do about it, this is a great new reference for you. *The Protection of Farmland: A Reference Guidebook for State and Local Governments* is being sold by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, for around $10.00.

Just another state: According to fifth grader Erik Levin, "without farms, Vermont would be just another state."

What a way to sum it up. It might make a great bumper sticker. Erik's conclusion was a line in his entry in Lt. Governor Kunin's essay contest on the importance of farming to Vermont.

Flotsam and jetsam at the Morristown landfill.

Bill Ricker, John Malter, Reginald Cram and Charles Nichols at the opening of Montpelier's waste oil recycling center.

SLICK SOLUTION TO USED CRANKCASE OIL PROBLEM

What do you do with the crankcase oil you drain out of your car or truck every 5000 miles or so? Do you pour it into an old cider jug and give it to the garbage collector? Do you dig a hole in the backyard and bury it? Do you (God forbid!) dump it down the drain? All of these disposal methods can contaminate ground or surface water, but what are the options?

A year ago, John Malter, Chief of Hazardous Materials Management, couldn't answer that question, but today he can. Malter and the Montpelier Rotary have set up a waste oil recycling project in the Capital City. Malter says, "All it took was a couple of folks getting together and committing a little time."

The City of Montpelier donated the site (behind the City garage on Prospect Street), New England Marine of Burlington provided a 275-gallon tank, and the Barre Vo-Tech made a sign for the project. The Rotary's only expenses were for materials for the sign and a brochure.

The facility will be open 24 hours a day, seven days a week. As often as necessary, a tank truck from New England Marine (which also picks up waste oil from area filling stations) will drain the tank and carry the contents to an oil recycling plant in New Haven, Connecticut. There it will be filtered and blended and sold as industrial heating oil.

The Montpelier Rotary will be paid 15¢ a gallon for the oil, and the proceeds will be "recycled" and used for other environmental projects.

Malter estimates that Montpelier motorists who change their own oil generate about 5000 gallons of waste crankcase oil per year. He hopes that the Montpelier project will succeed and be duplicated elsewhere in the state, reducing one of Vermont's more troublesome waste disposal problems. "Prevention is the answer," says Malter.

John Malter views waste (or "used") crankcase oil as a misplaced resource. The "highest and best" use of this resource is lubrication, since only about two quarts out of every 42-gallon barrel of petroleum is suitable for this purpose. But crankcase oil must be "re-refined" before it can be reused as lubricating oil, and there are no re-refineries in New England.

In the meantime, reusing the oil for industrial heating is not only a good second choice, but evidence that a little individual initiative and creativity can make a difference.

For more information about the waste oil recycling project, call or write John Malter, Department of Water Resources and Environmental Engineering, State Office Building, Montpelier, Vermont 05602 (802) 828-3395.

re:cycling

Al Gledhill says that "if the towns of Vermont and New Hampshire really got into recycling, they could do a lot more to help us help them get rid of their wastes." Gledhill represents the Glass Container Corporation of Dayville, Connecticut, one of New England's major glass recyclers. Gledhill and several other recycling industry spokesmen addressed the October 24th Vermont Recycling Rally in Rutland, sponsored by the Rutland County Solid Waste District and the Agency of Environmental Conservation.

It's not hard to be one of New England's major glass recyclers these days. Gledhill lamented the fact that many glass recyclers have gone out of business in the last few years. The reason? They couldn't get enough glass to make the business profitable.

Yet one of the principal barriers to successful recycling in New England is the lack of reliable markets for newspaper, glass and metal. One small-time recycler said that although his group was still collecting glass, it had stopped collecting cans altogether because it could not find a market.

It's a matter of economics, according to Peter Karter, President of Resource Recovery Systems, Inc. Karter explained that the market for glass is very good as long as the glass is sorted according to color and free of all metal, ceramics, caps, rings and wrappers. The same goes for tin cans. Karter says you can "sell as many tin cans as you can get" as long as they are separated, cleaned and flattened.

Many small recycling centers have neither the equipment nor the labor force to clean, sort and separate their glass and metal containers. If they cannot guarantee a consistent product of sufficient volume, they cannot command the maximum price for their recycleables. In some cases, they cannot even cover their transportation costs.

Karter's firm caters to these hometown recyclers, buying up their cans and bottles, processing them and re-selling them to re-manufacturers. But he confessed that a major part of his business is crushing "bottle bill" glass. "Almost all 'bottle bill' glass is being crushed and recycled rather than refilled," Karter said, "because there's no way a bottle filled in Milwaukee is going to be returned to Milwaukee."

Gledhill said the bottle bill has actually hurt the glass recycling industry, because recyclers cannot get enough of the glass they can sell most easily (i.e., beer and soda bottles).

Ron Perkins, a self-described "consultant and garbage man," offered another view. "We're caught between the people who want us to throw away more (recycling industries) and the people who want us to throw away less," he said, "but if our objective is to reduce solid waste, a bottle bill is one of the most efficient methods." He said there was an immediate 20% drop in residential solid waste tonnage in New Haven, Connecticut, after the introduction of a bottle bill.

Listening to the recycling industry spokesmen, it was difficult to shake off the suspicion that our commitment to recycling has actually declined in recent years. Albert Rosetti of Burlington, "speaking as a beer distributor and as a recycler," complained that although beer in returnable (bar) bottles sells for $1.00 less per case, "people won't buy it." Most of his customers prefer the throwaway bottles which, although certified as refillable, are actually being crushed and recycled.*

There were some rays of hope. Henry Frankel of Lintech, Inc., spoke briefly about new technology which is making it possible to profitably recycle high-grade plastic. And representatives from several recycling center described how, against all odds, they are staying in business and even turning a small profit in some cases.

Connie Leach, Recycling Coordinator for the Rutland County Solid Waste District, estimates that there are about 15 recycling centers in Vermont. Some take only cardboard and newspaper, some take all types of recycleable materials, some sort and crush their own glass and metal while others sell unsorted recycleables to intermediaries. Some have paid staffs, but most rely entirely on volunteers. All reported problems with volume and quality control and "burnout" among volunteer laborers.

Clearly, if we want to continue to leave recycling entirely to the private sector, we'll have to guarantee sufficient volume to make the recycling centers profitable and self-supporting. And as consumers, we must make marketplace decisions which will encourage manufacturers to use more recycleable materials.

The Rutland County Solid Waste District is helping to organize a statewide association to promote the benefits of, and the reasons for, recycling. There will be an organizational meeting at RCSWD offices in Rutland beginning at 10:00 on December 15th, and the first regular meeting is scheduled for January 12th in Montpelier. For more information, call Connie Leach at 775-6482. MM

**A returnable bottle consumes about one-third as much energy as a one-way glass bottle.*

Report From: *Sterling Institute*

By the Sterling Institute Staff

A small rural community in Vermont's Northeast Kingdom provides a unique setting for intensive college-level study in the fields of agriculture, forestry and wildlife management. For eight months of every year, the forests, fields and waterways surrounding Craftsbury Common serve as classrooms for 90 young men and women who wish to pursue outdoor careers.

Sterling Institute, founded in 1958, conducts two programs for college students. The Grassroots Project is a one-year program which introduces students to the rigorous academic and outdoor challenges of agriculture, forestry and wildlife management. The Rural Resource Management Program is a second year of studies which builds on the Grassroots experience while introducing students to the special challenges of resource management.

All courses use the outdoors in some fashion. Although a topic may be introduced indoors, students can usually count on finding themselves far from the warmth and shelter of any building before class is over.

A student's day may begin at 6:30 with feeding livestock and mucking out stalls. After breakfast the morning may bring a lecture in animal science, or a discussion of the role of public lands in society, or a session on using a chainsaw or other logging equipment. Academic and applied knowledge play equal, supportive roles in the curriculum. The afternoon brings more classes both indoors and out. A guest speaker may be featured in an after-dinner seminar.

In the highly-structured Grassroots Project, students are constantly challenged and pushed. All take a core curriculum of seven courses to which they add at least four more courses in Livestock Farming or Wild Area Services. Classes are intense learning sessions up to four hours long. Class size varies to meet the demands of the courses, ranging from lectures for the entire Project, to groups as small as three or four in skills sessions.

By graduation in late May, students have laid down a strong foundation of work skills fortified by courses in ecology, forest management, soil science and other disciplines. They have also learned what is perhaps the most important lesson the land can teach: that hard work combined with awareness and respect can lead to a deeply satisfying and productive life.

Many graduates of the Grassroots Project will go on to work in natural resource professions after further education. Others will enroll in liberal arts programs at other colleges or pursue professions where the focus of work may be different but the important lessons about work and high personal standards remain valuable.

Approximately 15 graduates of the Grassroots Project or transfer students with comparable backgrounds enroll in the Rural Resource Management Program, Sterling's second major program. The RRMP is basically academic in nature and focuses on resource management. The curriculum stresses both technical understanding of resource issues as well as effective communications skills and awareness of the social impacts of resource decisions. An internship with a resource-related organization is an integral part of the program. Here students have the chance to use both the practical and academic skills developed in the Grassroots Project and the first term of the RRMP. Sterling is seeking associates degree-granting status for the two-year course of study in these two programs.

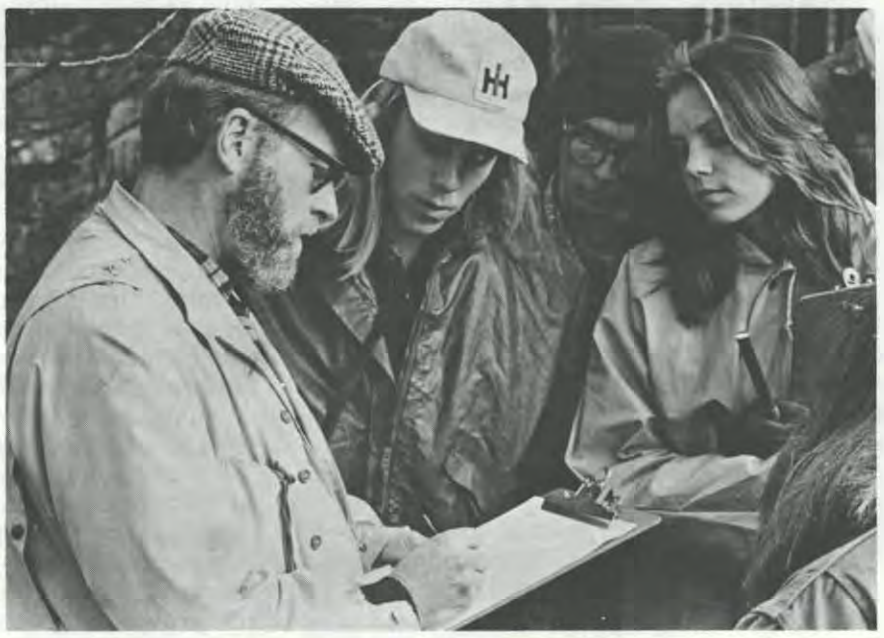
This intense, demanding blend of academic and practical pursuits inspires and challenges young people. It also creates obvious and immediate obstacles for the careless, inattentive or lazy individual. Poorly-designed and constructed snowshoes snap and sag, leaving their maker floundering in waist-deep snow; faulty paddles warp or de-laminate in whitewater canoeing classes; a poorly-fenced pasture forces one to chase half-ton cattle over frigid, snow-drifted farmland. Because of the dangers inherent in activities such as felling trees, skidding logs behind 1800-pound draft horses, running whitewater in a loaded canoe miles from civilization, or keeping warm and dry on a midwinter backpacking trip, students learn quickly the importance of good judgement and attention to detail.

The rural, outdoor environment is central to this teaching. Lessons learned in the classroom are complemented by the experience of working directly with land resources. Through such work and through daily contact with Vermonters who earn their livelihood on the land, students gain valuable insights into the important place resources and the rural environment play in the larger society. Vermont's rural heritage plays a vital role in their education.

The need to recognize the importance of this aspect of education led Sterling to establish the Office of Rural Affairs (ORA) in addition to its two college programs. An outreach agency, ORA sponsors research and projects to promote awareness of the impact of the rural heritage on contemporary society. A recent effort is *The Inheritor: The Pastoral Dilemma in Vermont*, a 30-minute film which concerns changing land use patterns in our state. The film won an Honorable Mention at the 1981 American Film Festival. ORA is also pioneering ways in which computer-based education can be of service to rural inhabitants.

Sterling has turned to the land as a primary resource in the education of young people, perhaps the most important resource of all. The special quality of life in rural Vermont plays a formative role in developing sensitivity to resources, appreciation of the complexity of resource issues, and the will to take part in the resolution of natural resource problems.

For more information, write:
Sterling Institute
Craftsbury Common
Vermont 05827



Dr. Maxwell McCormack, internationally-known silviculturalist, with Sterling Institute students on a forestry field trip.

Sterling students participate in a woodlot harvesting operation. (Photos courtesy of Sterling Institute).

A GUIDE TO LAKE CHAMPLAIN AND ITS HIGHLANDS

The Lake Champlain Committee has published a 224-page guide which the Vanguard Press recently described as "the most comprehensive and colorful survey ever" of the Champlain Valley. *Exploring Lake Champlain and its Highlands* covers everything from the discovery of acid rain (by an English chemist, in 1872) to the name of Champ's public relations firm (Skayles, Wheyles and McEntrails), and is packed with "enough information . . . to make it a permanent addition to your library, bike bag or fishing tackle box."

The guide sells for $5.25 at local bookstores, and proceeds go to the Lake Champlain Committee. For more information, write or call The Lake Champlain Committee, 14 South Williams Street, Burlington, Vermont 05401, (802) 658-1414.

CONCERNED CITIZENS OF LOWELL

A Lowell citizen's group needs help in its struggle to prevent the construction of a phenol-contaminated asbestos waste disposal site in their community. "Concerned Citizens of Lowell" is $400.00 in debt for legal and consulting fees. If you can help, write: Concerned Citizens of Lowell, c/o Martha van Tubergen, Box 72, Lowell, Vermont 05847.

Commentary:
"R" and "K" Strategists and the Environment

David Jillson

There is a body of ecological theory which examines the evolution of plants and animals in changing environments. Living organisms are arranged along a continuum according to attributes such as body size, lifespan, mode of reproduction and competitive ability. The organisms found at the two extremes of this life history continuum are known as "r-strategists" and "k-strategists," respectively.

The r-strategist species has evolved the ability to increase in number as quickly as possible. The growth rate of a population is denoted by "r," hence organisms which have adopted the strategy of increasing growth rates are "r-strategists." These organisms tend to be small in size, have short lifespans, often reproduce asexually, and typically have enormous numbers of offsrping. Plants such as weeds and animals like insects are r-strategists.

At the other extreme are the k-strategists, named for carrying capacity, "k," the approximate number of individuals of a species which an environment can sustain over time. K-strategist species maximize the number of organisms capable of living in the environment over long time spans. These organisms are characterized by large body size and lifespans lasting many years. They produce few offspring at a time, but parental care is commonly provided to protect their investment. Trees and the larger vertebrates are k-strategists.

R-strategists are most common in ecosystems where resources such as food and space are variable, whereas k-strategists tend to dominate in ecosystems where resources are relatively constant or predictable.

In unpredictable environments, the r-strategist succeeds by allocating considerable energy to reproduction when resources are abundant and becoming dormant when they are scarce. The phytoplankton in aquatic environments are r-strategists. Their populations multiply rapidly when nutrient levels, light and temperatures are favorable, and may enter resting stages when conditions are not favorable for growth. Resources are used as rapidly as possible when available, and populations tend to go through boom and bust cycles.

K-strategists prevail in ecosystems such as rainforests where resource availability is relatively constant. The dominant organisms, trees, allocate a considerable proportion of their energy to maintenance rather than reproduction; if they live several years, they can produce seed or fruit each year. Rather than adopting a one-shot, all-or-nothing strategy, they have evolved the ability to use resources efficiently over time.

It occurs to me that historically, the economic behavior of Americans has been like that of the r-strategist. During the infancy of the United States, the country was huge relative to the number of inhabitants, so that individuals and families were limited principally by their ability to obtain resources. Pioneers who found the eastern United States crowded moved west in search of more land and opportunities. There was little concern for air or water quality because there were many rivers and few factories.

We now find ourselves in an environment where resources are no longer functionally infinite. Our population is much larger, and we have increased our per capita consumption of practically everything. The air, land and water all show the detrimental effects of human habitation. We can no longer go west in search of greener pastures.

Given that we now inhabit an environment of finite resources, one might expect that Americans would begin to behave more like k-strategists. But the goal of the Reagan Administration seems to be maximizing economic growth rather than using resources efficiently. Some of our most important environmental laws are on the chopping block, and Interior Secretary James Watt is encouraging the exploitation of previously untouched wilderness areas. In short, the Reagan Administration appears ready to trade our childrens' heritage for a few more years of conspicuous consumption. Indeed, this consumption is to be fueled by a supply-side economic program designed to stimulate production.

The r-strategist philosophy has worked well throughout much of the history of the United States, and it has made us one of the most powerful nations in the world. However, it is successful only so long as there are sufficient resources to sustain growth. It seems abundantly clear that we have a limited supply of resources such as wilderness, agricultural land, clean air and clean water. Yet we continue to behave as if we had an unlimited capacity for growth. Let us not forget that we, too, are animals, biologically dependent upon our environment. Let us begin to behave in a manner which recognizes the value of our life-sustaining natural resources.

David Jillson is a biostatistician with the Public Health Statistics Division of the Vermont Health Department. He is also an active VNRC member with a special interest in growth management.

FROM THE EXECUTIVE DIRECTOR

Seward Weber

The Vermont Natural Resources Council must prepare for a very difficult political and financial climate in the 1980's. The new administration has dealt us a double blow: on the one hand, Federal support for environmental protection and enhancement will be cut by more than 50% in the next two years; at the same time, tax law changes will drastically reduce financial resources for private non-profit organizations.

In the future, a strong and active VNRC will be more important than ever because many issues will be decided in Montpelier instead of Washington, but it will be difficult to stay strong enough to do battle on this field.

The situation is full of ironies. The Reagan Administration professes to support volunteerism and local determination, but it has engineered a radical new tax law which will reduce the incentive for upper middle income and wealthy taxpayers to contribute to charitable and non-profit organizations -- the backbone of the volunteer movement. The decline in charitable giving could occur just when Federal funds for non-profit research, education and other projects disappear.

These changes have already affected VNRC. We had to abandon our clean water program this summer because of the loss of funding from the National Demonstration Water Project (which was supported, in turn, by the Federal Economic Development Administration). We will probably have fewer contracts with the Vermont Agency of Environmental Conservation in the future because Federal monies make up a substantial portion of the AEC budget. Private grants will also be harder to come by because foundations are under tremendous pressure now that they are the major source of grants to private non-profit organizations.

VNRC will have to fend for itself through increased membership and local fundraising. The Council's Board of Directors is working on a long-range development program which will emphasize annual giving and corporate gifts. We also hope that in the long run, the new tax law will not affect the giving habits of our members.

We were cheered by the sentiment expressed by Nicolas Finck, who sent us this note with a recent contribution:

Friends--

Keep up the good fight, and don't be discouraged that, as the Red Queen said to Alice, "Around here, you have to run as fast as you can just to stay in the same place." It's a pretty good place, and you are the stewards of reasonable change.

VNRC Bookshelf

Did you know that you can obtain, free of charge or for a very minimal fee, several dozen books and pamphlets on a wide range of environmental topics from the Vermont Natural Resources Council? Here are just a few of the selections from VNRC's bookshelf:

Wildlife and Our National Forests: A Citizen's Guide to Commenting on National Forest Plans (National Wildlife Federation, 1981), 9 pg., free.

Farm and Forest Property Tax Stabilization and State Aid to Education: A Guide for Vermont Cities and Towns, Benjamin L. Huffman (Extension Service and Environmental Program, University of Vermont, 1977), 38 pg., free.

A Primer on Radiation (Vermont State Nuclear Advisory Panel, 1979), 16 pg., free.

Don't Leave it all to the Experts: the Citizen's Role in Environmental Decision-Making (Environmental Protection Agency, 1972), 20 pg., free.

A Landowner's Guide to Wildlife Habitat Management for Vermont Woodlands (Vermont Fish and Game Department, 1979), 39 pg., free.

Disappearing Farmlands: A Citizen's Guide to Agricultural Land Preservation (National Association of Counties Research Foundation, 1980), 18 pg., free.

If you'd like a copy of any of these publications, stop by our offices at the Old Depot in Montpelier, or send your name and address and $1.00 for postage and handling to VNRC, 7 Main Street, Montpelier, VT 05602.

The Council

NOTES FROM THE FALL BOARD MEETING

VNRC's Board of Directors recently adopted an energy policy statement, underscoring the growing importance of energy as an environmental issue. At a meeting in Whiting on November 12th, the Directors approved a policy calling for the development of a statewide energy policy which would coordinate existing energy projects and programs. The policy should be designed to achieve a stable energy future with as little economic and environmental disruption as possible, and should be based on conservation and a heavy reliance on renewable sources of energy.

In other action, the Board rejected a proposal for an annual fundraising campaign on the grounds that it is too ambitious for VNRC's present pool of volunteer fundraisers. The Board discussed adding a professional fundraiser to the staff during the next fiscal year, but it is unclear whether or not such a position could be created without displacing an existing staff member. For the time being, the Council staff was instructed to prepare a balanced budget for 1982, minus the usual built-in deficit.

Board members spent most of the afternoon discussing the Planning Committee's draft plan for the future of the Council, including a statement of VNRC's mission and a definition of specific objectives.

The following officers were elected for 1982: Chairman, Carl Reidel; Vice-chairman, Mollie Beattie; Treasurer, Bob Klein; Secretary, Seward Weber.

A calico cat named "Q" discusses solar heating principles over lunch.

VNRC ENERGY POLICY STATEMENT EMPHASIZES CONSERVATION, RENEWABLES

At a November 12th meeting, VNRC's Board of Directors adopted a resolution calling for a comprehensive State energy policy which will serve as "a blueprint for orderly transition to a stable energy future . . . based on conservation and renewable energy resources."

This policy should be based on "appropriate legislative action" to encourage conservation "at all levels of production and distribution" and should provide for "long-term transition from conventional fossil and nuclear fuels to reliable renewable energy resources."

The Board labeled as "inadequate and inefficient" the present policy of evaluating energy projects on a "piece-meal and ad hoc" basis. "Discussion of specific locations for electrical generating facilities or power lines based solely on electricity requirements, without a comprehensive energy policy . . . is divisive and ineffective," they said.

According to the VNRC directors, "sound energy planning" must address such vital issues as agricultural land protection, residential, commercial and industrial development, transportation planning and governmental investment policy. The Board acknowledged that this "integrated approach" to energy planning will require "a fundamental assessment of basic environmental and development laws, governmental reorganization and tax reform."

For a copy of the full text of the VNRC Energy Policy Statement, write VNRC, 7 Main Street, Montpelier, Vermont 05602.

NEWMEMBERSNEWMEMBERSNEW

VNRC welcomes the new members who joined us in September and October: F. Sheldon and Barbara Prentice; Hilary Frost; S.B. Bromley; Martha Nowlan; John M. Lynch; Eric D. Sakai; Lewis N. Snell; Sylvia Ewerts; Heidi and Nick Nikolaidis; Mrs. H.T. Swain; Linda Mullestein; Joseph Robert Kasvinsky; Kenneth Batten; Richard Dunham; L. Samuel Miller Family; Malcolm and Janet Whatley; Thom J. McEvoy; Allis Beaumont Reid; Christopher Recchia; Robert S. Babcock; Hermon F. Robb; Billi Gosh; Mr. and Mrs. Alan Walker; Missy Bongartz; Rod Vallee; Brian Joyce and Barbara Gaudet; Mary S. Pierce; Ralph and Anne Flanders; Mrs. Eleanor Rogers; Mary Jane Grace; Carol Hillman Van Dyke; Union Mutual Fire Insurance; Charles and Cecilia Sweet; Lewis C. Smith, Jr.; Willard G. Martin; Mr. and Mrs. Charles Griswold; David N. Little; Theodore Draper; Ann Hunsicker; Miles L. Finch; Chris Granstrom; James Aitken; Z. Thomas Zabski; Linda Filippi; Mrs. Janet K. Blood; Margaret Stone; F. Clayton Adams; Mrs. John Kennedy, Jr.; Brenton A. Niles; Robert Sabloff; Mrs. Helen Jepson; Mr. and Mrs. John Clark; Mr. and Mrs. Nikolaus E. Wolff; Nanine Hutchinson; Dorothy J. Gjessing; Margaret Skinner; Betty Gilson; Joy Green; Eleanor Sherberg; William Edward Brown; Mrs. Vincent Bennett; Elisabeth Roberts; Dennis Kauppila; Dr. and Mrs. William A. Woodruff; Jane M. Cress; Jeanne Savage-Hayes; Titia Vander-Noordaa; Stephen and Judy Dardeck; Dr. Rhoda Metraux; Shirley Griggs; Phillip Hobbie; Anne Wainwright; Winston Churchill; Nancy Ressler; Gary Leach; Robert Pasotti; Mr. and Mrs. Wlater P. Colteryahn; Ames Poirer; Mrs. Byron Fleming; Chris and Barry deSousa; Mr. and Mrs. Willcox B. Adsit; Donald Fairbairn; Judith Gellert; James F. Bozzelli; Walter and Christine Griffin; Ms. Cynthia Coy; Mrs. Louis Ladd; Robert L, Kinney; Mr. and Mrs. Floyd Richardson; Susan Localio; Dr. and Mrs. David Babbott; Kate and Bill Piper; Rob Thomson and Lydia McIntire; Leo Bisson; Sherry Ryther; Mrs. J.D. Simson; Marc Des Meules; Federation of Lake Associations of the Northeast Kingdom; Thomas and Wistar Rawls; Paul Dannenberg; Franklyn Estes, Jr.; Marilyn Jackson; Steve Boutcher; Cynthia Martin; Anne Baird; Mary Ann Carlson; Thomas Mansfield; Kenneth Ricketson; Edwin Sturges; Edna Puls; Elliot Burch; George and Annette Ross; Ted Siegler; L.L. Jankowski; Jeffrey J. Gratton; Gustave E. Wiedenmayer; Francis Lobdell; Mr. and Mrs. Shepard Stone; Anne Hathaway; Mr. and Mrs. Robert A. Collins; Mrs. Sarah W. Drew; Thomas J. Soucy; Erwin Stunkel; Emerson and Mary Johnstone; Dorothy Simson; Victoria M. LeMay; Mr. and Mrs. Richard Knowlton; Powerline Action of Vermont, Inc.; Mr. and Mrs. Charles W. Fisher; Mrs. Alfred Coons; Mrs. Charles Ewing; Joseph K. Hurley; R.D. Bullard Family; Mr. and Mrs. Thomas Nelson; Mrs. Winthrop A. Smith; Mrs. R.J. McKay; Mr. and Mrs. Paul Z. Nowicki; Franklin E. Witzmann; Jim and Leslie Hutchinson; Mrs. P.G. Wyckoff; Mrs. Nancy Egan Sternback; Bonnie and Richard Katzman.

IF YOU REALLY L♥VERMONT

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VERMONT NATURAL RESOURCES COUNCIL

The Vermont Natural Resources Council is working hard to preserve this small, green and special place. If you're not a member of VNRC, please join us. If you're already a member, please give this coupon to a friend.

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POWER LINES

(Continued from Page 1)

to the total electric field beneath DC conductors. High voltage electric fields break down air molecules, creating positive and negative ions (electrically-charged particles). When this happens, the line is said to be "in corona." For AC lines, the ionic environment is confined to the region around the conductors, but the constant voltage in DC conductors allows the space charge to build up and drift downwind. There have been very few studies of ion concentrations in the vicinity of EHV/DC transmission lines.

A typical EHV/AC line generates a magnetic field of about .3 Gauss (the unit of measurement for magnetic field strength). The highest known 60 Hz magnetic field in most homes is 10 - 25 Gauss for a hairdryer. A typical EHV/DC line has a static magnetic field of .5 Gauss, which is the same as the earth's natural static magnetic field.

Health effects: Until recently, scientists believed that electric and magnetic fields had no effects on life except for heating effects from very high doses. There is no longer any doubt that such fields produce biological effects; the question is whether or not they represent health hazards.

Nearly all experts agree that electric fields affect, to some degree, rates of growth, biological stress levels, functioning of the central nervous and cardiovascular systems and psychological behavior.

There is less concern about exposure to magnetic fields generated by EHV transmission lines, but there have been no studies of the combined effects of prolonged exposure to high electric field strengths and magnetic fields.

Positive and negative ions: Recent research indicates that the ionic environment associated with EHV/DC transmission lines could have significant biological effects. Normally, molecules of oxygen, nitrogen and other elements in the air carry their full complement of electrons and are therefore electrically neutral. But a high electric field can shear an electron from one of these molecules, leaving it with a positive charge. It is then a positive ion. The liberated ion may then attach itself to a molecule which already has a full complement of electrons, creating a negative ion.

Dr. Albert Krueger of the University of California and other researchers have found a correlation between ion concentration and the production of serotonin, a powerful neurohormone (like adrenalin) which plays an important role in basic life processes such as sleep, sexual activity and mood changes. Positive ions release serotonin from tissue stores, and negative ions accelerate its oxidation. The "serotonin irritation syndrome" includes symptoms such as migraine, nausea, vomiting, amblyopia (dim vision), irritability, hyperstasis, rhinitis (inflamed runny nose), tremors, congestion of the upper respiratory tract and frequent urination.

Dr. Felix Sulman of the University of Jerusalem experimented with several hundred subjects and found that ions had significant effects on about 25% of the population, considerable effects on another 50%, and no effects on the remaining 25%.

These symptoms and percentages parallel the results of a study of the health effects of an EHV/DC transmission line in Minnesota. The Minnesota Environmental Quality Board surveyed 800 landowners who lived along the route of a 400 kV/DC line in west central Minnesota. Of the 454 who responded to the survey, 35% reported health problems associated with proximity to the power line. The principal complaints were headaches (29%), respiratory problems (17%), fatigue (16%), tingling (12%), dizziness (11%), nosebleeds (11%), eye problems (8%), and nausea (6%). The Minnesota study has been criticized because it involves a self-selecting sample and no control group, but it suggests the need for further research into the health effects of ion concentrations.

Electric shock: Electric shock results when electric current passes through the body because of a difference in voltage between two points of contact (a hand and a foot, for instance). It is relatively common for people in the vicinity of EHV transmission lines to receive small shocks from large conducting objects, such as farm equipment. Another concern is the potential for combustible vapor ignition from shock discharge. For this reason, school busses in New York State are not allowed to discharge passengers in the immediate vicinity of EHV transmission lines.

The health of power line workers: In evaluating the biological effects of EHV lines, an obvious area of study is the health of people who build and maintain the lines. There have been several such studies, but they are contradictory and inconclusive. Studies in the Soviet Union, Spain and Sweden found that transmission line workers suffered from dizziness, nausea, headaches, impaired memory, respiratory problems, lack of restful sleep, decreased libido, chromosome damage and were more likely to father stillborn children. Similar studies in the United States, Canada and Sweden found no ill effects.

Other research: The study of the biological effects of EHV transmission lines is just now coming of age. Battelle Institute's Pacific Northwest Laboratory and the Southwest Research Institute are studying effects on human and animal health, the Tennessee Valley Authority is evaluating the effects of a 500 kV/AC line on the growth and development of farm and forest crops, and in Pittsfield, Massachusetts, General Electric is measuring electric and magnetic field strengths and ion concentrations under EHV/DC transmission lines. Studies of the effects of ions are underway at the University of California, the University of Jerusalem and Rockefeller University, and Minnesota's Environmental Quality Board and New York's Health Department have both hired several nationally-known scientists to investigate the effects of high voltage transmission lines in their states.

Most of these studies will not be completed for several years. Leading scientists predict that we will have conclusive information about the health effects of EHV/AC lines by 1986; DC research will take somewhat longer.

There are many unanswered questions about the health effects of extra high voltage power lines -- particularly EHV/DC power lines. More conclusive information should be available in a few years. Perhaps we should postpone construction of an EHV/DC line in Vermont until we know the full costs of the line, including the health risks. In the meantime, we should continue to study the effects of EHV transmission and make maximum use of conservation and small-scale renewable energy.

Per Krogh Hansen is a private engineering consultant who lives in Burlington.

A 115 kV/AC line near Irasburg, Vermont

Vermont Environmental Report

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