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50-271

[redacted]

April 4, 1981

Charles Haughney
Division of Fuel Cycle and Materials
Safety
NRC
Washington, D.C. 20555

Dear Mr. Haughney,

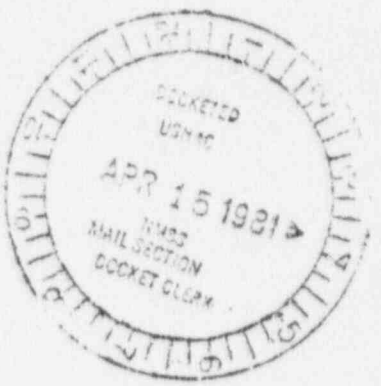
Over a month ago I wrote you regarding the 100' by 200' sandy strata recently identified by the New York State Department of Environmental Conservation as located at the state-licensed burial grounds, a strata extending from approximately trench #13 in a northwesterly direction. Since this direction is towards the NRC-licensed burial ground we are concerned regarding the possibility that this sandy strata could intersect with the NRC-burial ground and constitute a route for lateral migration of radioactive materials. Since this matter is of significant concern to residents in the region, we would appreciate knowing 1)whether you feel that this sandy strata does or does not intersect with NRC burial ground and 2) what drillings this assessment is based upon?

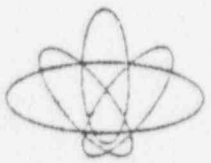
Thank you for your attention to this matter.

Sincerely yours,

Mike Hamilton
Co-Director
Sierra Club Radioactive Waste Campaign

cc: Congressman Jack Kemp, Hank Nowak, John LaFalce





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Insecure Landfills:

The West Valley Experience

A "low-level" burial ground sounds relatively harmless. The nuclear industry regularly promotes the concept of "low-level" as nothing to worry about. But is the term accurate? The Maxey Flats "low-level" burial ground, near Morehead, Kentucky contains almost 2 million curies* of radioactivity, including about 200 lbs. of Plutonium 239. And, the State-licensed portion of the West Valley dump, 35 miles south of Buffalo, New York has 12 lbs. of Plutonium, 15,000 curies of Strontium, and 40,000 curies of Cobalt 60, among other materials.

These large amounts of extremely hazardous, long-lived radioactive materials belie the term "low-level." To avoid the implication of harmlessness, we suggest the use of the term solid radioactive waste as a substitute for "low-level." It is important to note, however, that most solid radioactive waste burial grounds rapidly are liquified as water infiltrates into the dumping area.

the origin of solid radioactive waste

The popular image of solid radioactive waste material is of "slightly" contaminated booties, paper trash, animal carcasses and a few discarded work clothes. Actually, only about 1% of the curie content of waste generated by commercial reactors comes from contaminated clothing. And, slightly less than 1% comes from contaminated piping and concrete that must be periodically removed. (In understanding burial ground problems, it is important to make a distinction between waste by amount of volume, by curie content and by the half-life** of the radioactive materials involved. It is these last two factors which are most important.)

Ninety-eight percent of the curies generated by reactors come from byproducts left over after reactor coolant water has been cleaned.[1] The reactor coolant which circulates around the highly radioactive fuel rods must be regularly purified. The water is filtered through resins and dissolved contaminants are concentrated in evaporators. These contaminated resins and evaporator sludges contain significant quantities of Cobalt 60 and Cesium 137. Since Cobalt and Cesium have a half-life, respectively, of 5 years and 30 years, the materials must be carefully isolated from the environment for hundreds of years.

In one year of operation, a boiling water reactor produces a total of 4,100 curies of solid radioactive waste, and a pressurized reactor produces 1,900 curies.[2]

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* Curies are a measure of radioactivity the way miles-per-hour represent speed. One-millionth of a curie of Plutonium can cause lung cancer if it is inhaled.

** A half-life is the time during which one-half of the radioactivity of a radioactive material decays. The industry rule-of-thumb is after ten half-lives a material will be safe.

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Thus, during the 30 year lifetime of one reactor, about 57,000 to 123,000 curies of so called "low-level" waste are produced.

medical treatment blackmail

The nuclear utilities have recently been using the need for dump sites for medical wastes as a cover to promote siting of radioactive waste dumps for commercial reactor waste. The medical-treatment-blackmail argument basically states if citizens do not agree to opening a burial ground, parents and loved ones will not be able to receive radiation treatment for cancer. Statistics belie this argument.

Medical wastes represent 25% of the volume of solid radioactive waste, but contain less than 1% of the total radioactivity disposed of annually. In other words, the toxicity of medical waste is minor compared to commercial nuclear power plant waste. Furthermore, according to a Nuclear Regulatory Commission survey, 97.8% of this waste has half-lives of 60 days or less.[3] This means that if this material is sorted at the source and stored temporarily for a matter of months, the waste can be disposed of as normal trash. Twenty-five percent of the solid radioactive waste problem can be solved through better planning and administrative procedures at hospitals and medical centers.

status of burial sites

There are currently three commercial burial sites that are shut-down and three operating. The three shut-down plants are Maxey Flats, Kentucky (1963-1977), West Valley, New York (1963-1975) and Sheffield, Illinois (1967-1979). These dumps are now closed because of off-site migration of radioactivity and poor burial practices. The remaining burial sites have also been plagued with problems. In 1979, both the Beatty, Nevada and Hanford, Washington sites were temporarily closed due to receipt of improperly packaged materials. The Barnwell, South Carolina dump will, by October, 1981, decrease by 50% the amount of out-of-state waste received. Since Barnwell has been receiving about 85% of the solid radioactive waste generated in the U.S., this restriction will have a major impact on other states and increase pressure for siting additional dump sites. Further, due to a referendum, the Hanford, Washington dump site will only accept medical wastes after July, 1981.

To meet the need for new dump sites, a bill passed the U.S. Congress in December, 1980, to allow states to form regional compacts to look for burial sites. Many individual states such as Massachusetts, North Carolina and New Jersey are actively developing dump site criteria and searching for locations. The assumption behind this search is that radioactive material can be safely dumped in the ground. This assumption needs to be re-examined.

does a "secure" landfill exist?

Advocates of burial grounds argue that a "secure" landfill can be "engineered" to prevent off-site migrations of radioactive materials and to adequately protect the public health and safety. The experience with toxic chemical "secure" landfills is similar to radioactive waste dumps and not re-assuring. Most "secure" landfills are, in fact, very insecure. At Love Canal, in Niagara Falls, New York

chemicals were dumped into the ground in the 1940s. Thirty years later, the chemicals had migrated underground into peoples' basements, water supply and lives. Love Canal is not an exception.

The performance record of chemical landfill sites has been extremely poor. A recent study[4] of landfills in New York run by SCA Chemical Waste Services and Cecos International, shows chronic problems of slumping, erosion and water infiltration. SCA, in 1980, was pumping 300,000 gallons per month of liquid from landfills built only 3 to 8 years earlier and Cecos was pumping, in 1980, 4,000 gallons per day from landfills closed in 1978 and 1979. The insecure landfill experience applies equally to radioactive waste dumps such as the West Valley facility.

The West Valley experience is important for citizens monitoring radioactive burial plans elsewhere in the country. The argument by industry is that West Valley was, indeed, plagued by problems, but industry has now learned from those problems and the next burial site will be correspondingly better. We see no evidence, however, that the industry has learned the lessons of West Valley. The West Valley lesson, as we shall see below, shows that radioactive materials should not be dumped into the ground where it is impossible to control or monitor the movement of these hazardous materials for the necessary number of years. The Sierra Club Radioactive Waste Campaign advocates above-ground storage in concrete or steel bunkers.

West Valley: a brief history

The West Valley State-licensed burial ground* operated between 1963 and 1975. During that time, 550,000 curies of material were dumped into dirt trenches approximately 30 feet deep and about twice as long as a football field--600 feet (see Map #1). The trenches were not lined with concrete, plastic or any other medium. Radioactive garbage was dumped directly into the ground in a "pussy-cat" approach: A little earth was scratched away, material dumped in and then, re-covered by scratching back the original earth.

There are two sets of trenches at the 7-acre West Valley facility. North trenches, #1-7, were dug and filled between 1963 and 1969, and south trenches, #8-14, between 1969 and 1975 (see Map #2). Within a few years of filling, water started to infiltrate into and accumulate in the north trenches. By March, 1975, the radioactive water broke through the cover of trench #4 and spilled radioactivity into nearby streams. Unfortunately, trench #4 contained 15,000 curies of Strontium 90, a very large quantity. During 1975, the average Sr-90 levels at a monitoring station adjacent to trench #4 were 14,102 pCi/l with a maximum reading of 270,000 pCi/l.[5]** Because of this spill, the burial ground was closed in 1975.

Ever since the 1975 spill, there have been semi-annual pumpouts at the north trenches. Over 2 million gallons of radioactive water have been pumped as of Spring 1981. The contaminated liquid is treated on site with left-over sludges being dumped into the Nuclear Regulatory Commission licensed burial ground, and the treated but still radioactively contaminated liquid released to nearby Franks Creek.

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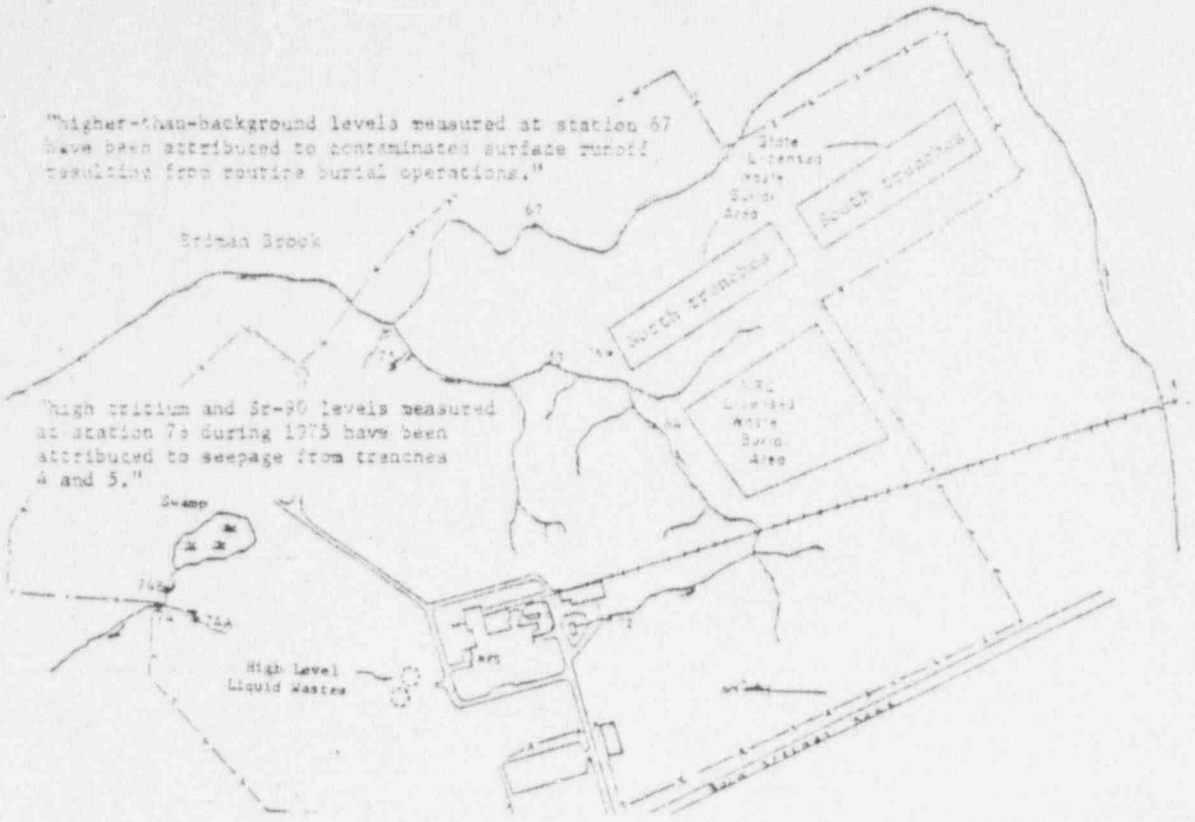
* There is also a Nuclear Regulatory Commission (NRC) licensed burial ground at West Valley. The NRC burial ground is not covered in this fact sheet.

** This is about 900 times the so-called "safe" off-site levels set by the NRC.



Map #1. Nuclear Fuel Services plant and burial grounds at West Valley. Note several streams that cut through the site. Superimposed quotations are from a 1978 U.S. Department of Energy study. Map adapted from "Annual Report of Environmental Radiation in New York State, 1975," New York State Department of Environmental Conservation.

Originally, it was thought that the water infiltration problem was due to inadequate trench cover. The original north trenches that were accumulating water had only 4 feet of cover. In 1969, the trench design was "improved" and cover at the south trenches increased to 8 feet. In 1978, the U.S. Department of Energy (DOE) was optimistic that water infiltration into the trenches would cease. But, in 1979, the New York State Department of Environmental Conservation announced that a pumpout of the "improved" south trenches was now necessary. By 1980, over 900,000 gallons of liquid needed to be pumped from these trenches. With both the north and the south trenches, the route of infiltration--through trench covers or through underground sandy strata--was not known.

In late 1980, the New York State Energy Research and Development Authority (NYSERDA), went to court to prevent the operator of the site, Nuclear Fuel Services (NFS) from abandoning the burial ground, as the company had intended to do. NFS, a subsidiary of Getty Oil, had a 17 year lease with the State which terminated on December 31, 1980. NYSERDA in asking for an injunction against NFS claimed that the burial ground was in default, and without continual maintenance would be a hazard to public health and safety. Furthermore, in an attempt to assure adequate funds for remedial action and perpetual maintenance, NYSERDA also asked that Getty Oil not be allowed to withdraw $16 million in loans it had made to NFS. A court hearing on the case is due in Spring 1981.

What are some of the lessons or warnings of the West Valley experience?

Warning 1

A handful of geologic borings cannot adequately characterize a radioactive waste burial site. West Valley has been described by the nuclear industry, the U.S. DOE, and the New York State government as being located in an almost ideal, "impermeable" clay-like till. This characterization was based on four original drillings in a 22-acre burial site.[9] Obviously, this small number of drillings--one for every five acres--was insufficient evidence. Furthermore, samples were taken at 5 foot intervals, which would not detect permeable strata of significant widths. More detailed geologic studies of the site have since been made, but after large quantities of radioactive materials were already dumped into the ground. Thus, there has been a strong bias in all subsequent studies to prove the safety of the burial ground.

The inadequacy of the site characterization at West Valley is reflected in the fact that the burial ground was located in an area of swamps and sand lenses (see Warning #2). A sand lens is a sandy strata along which radioactive materials can migrate laterally, underground. A sand lens is permeable. In 1981, the dimension and depth of these sand lenses at West Valley have still not yet been accurately delineated. In 1977, the U.S. Environmental Protection Agency requested that the locationand extent of sand lenses be surveyed. Three years later, this request has not yet been acted upon.

Warning 2

State agencies and commercial operators which are deriving income from a dumping operation cannot be relied upon to provide accurate information regarding radiologic hazards or geologic suitability of a site. Unfortunately, other state agencies may also not be reliable sources of information--particularly if a pro-nuclear governor is appointing agency heads. At West Valley, the State relied upon visual inspection by bulldozer operators to determine the presence or absence of sandy strata. But it took a field inspection by U.S. Environmental Protection Agency (EPA) staff to detect a large (2' by 65') sandy strata in one of the trenches, open and being filled, at the time of the EPA visit.[7] This strata had not previously been reported by the corporate operator of the site, Nuclear Fuel Services. The existence of this sandy strata was, furthermore, totally ignored in a U.S. Department of Energy report on the West Valley site in December, 1978. "Western New York Nuclear Service Center Study," TID 28905-2.

The existence of a second, even larger, sandy strata was uncovered by the Sierra Club Radioactive Waste Campaign in the Fall of 1980. Until this time, the New York Department of Health, and New York Department of Environmental Conservation had kept the existence of this strata--100' by 200'--secret. The agencies had known about the strata for six years—since 1974. It is not yet known whether there is a connection between the EPA-discovered sandy strata and this larger one. It is not known whether there is a connection between this strata and a swampy area that is close by (see Map #3). These are major uncertainties that should have been carefully investigated before a dumping operation was initiated.

warning 3

The mechanisms for migration of radioactive materials off dump sites is poorly understood. At Maxey Flats, Plutonium 239 has been found a mile from the site. It is not known whether migration was via underground strata or surface runoff. At West Valley sediment in a dam on Cattaraugus Creek, 2 miles downstream of the dump site, contains Plutonium 238 and Cesium 137 from the burial ground.[5] Thus far, Tritium has migrated a distance of 32 feet from some of the West Valley trenches, and is released in each pumpout of the trenches. It is not known why this migration is occurring. In addition, a recent discovery proved that tritiated gas is being released from the trenches as methane builds up in the trenches from decomposing carcasses and rotting packaging.

warning 4

There is no known way to control slumping, compressing and shifting of material dumped in a burial ground. One reason water penetrates a dump site such as West Valley is that materials (steel drums, wooden crates and cardboard packages) inside the trenches rust, degrade, rot and settle. As this happens, the trench cover, likewise, shifts and settles. In this process, large cracks and indentations appear in the cover. One way water accumulates in the trenches is through these openings. This shifting and settling will occur indefinitely. This problem is exacerbated in a region of high rainfall such as Western New York.

As trench cover is progressively made thicker and heavier, it becomes harder to prevent the covers from slumping down into the trench cavity. Only <u>if</u> and <u>when</u> the compressive strength of the material inside the trench has been built up to equal the weight and density of the cover, will this process cease--in hundreds of years, perhaps.

warning 5

Costly pumpout at burial trenches will be needed <u>indefinitely</u>. Since all the solid radioactive waste burial grounds contain water-soluble radioactive materials such as Cesium and Radium, it is extremely important to prevent release of these materials to near-by streams. Pumped out liquids must be treated. Unfortunately, Tritium cannot be removed by existing treatment techniques. At West Valley, 6,700 Ci of Tritium have, thus far, been released into nearby streams. Treatment and pumping costs are high. In 1980, the annual pumpout costs at the Maxey Flats dump was $500,000 per year. With rising inflation, in a few years, pumpout costs at many shut-down burial sites will exceed $1 million per year. Nuclear Fuel Services estimated in 1980, that maintenance of the West Valley burial ground would reach a whopping $3 million per year.

warning 6

After a dump site is closed, corporate owners of burial sites try to pass perpetual care costs onto the state and federal taxpayers. It has been virtually impossible to make accurate estimates of the monies needed for these perpetual care funds. At West Valley, NFS, the corporate owner, has placed $4 million into a perpetual care fund. This was the amount of money the Atomic Energy Commission thought

necessary in 1960. Seventeen years later, this estimate is a tiny percentage of expected costs. Clean up of the high level liquid wastes at West Valley have been estimated at $230 million and clean up of the burial ground may be equally high. Clearly, the $4 million fund is totally inadequate.

Warning 7

As hazards of radioactive materials are better understood, regulations regarding what can and cannot be dumped in the ground are changing radically. Prior to 1970, it was considered permissible to dump liquid wastes and Plutonium 238 and 239 into the ground. This is now forbidden. We expect regulations to continue to become more rigorous. Some current 1981 burial practices will be considered unacceptable within a few short years.

The West Valley burial ground is insecure. For decades, there will be offsite migration of long-lived, hazardous isotopes unless these materials are dug up and placed in above-ground storage bunkers of steel or concrete. These bunkers could be monitored properly and maintained until a federal repository is located. The Campaign believes the New York State Legislature should fund a study of the feasibility of digging up these materials. The Campaign urges citizens in other states to investigate the integrity of existing dump sites and to promote above-ground storage for new dump sites.

For further information: Sierra Club Radioactive Waste Campaign, Box 64, Station G, Buffalo, New York 14213. Phone: (716) 832-9100. Single copies of this fact sheet $.50, 25 or more $.10 each plus postage.

Footnotes:

[1]Report to the Governor's Task Force on Waste Management. Low Level Radioactive Waste Management in North Carolina. September, 1980, p. 10.

[2]Final Generic Environmental Statement on the Use of Recycle Plutonium in Mixed Oxide Fuel in Light Water Cooled Reactors, NUREG-0002, Vol 3, IV-H-16.

[3]"The Problem of Disposing of Nuclear Low-level Waste: Where Do We Go From Here?" EMD-80-68, p. 8, Government Accounting Office.

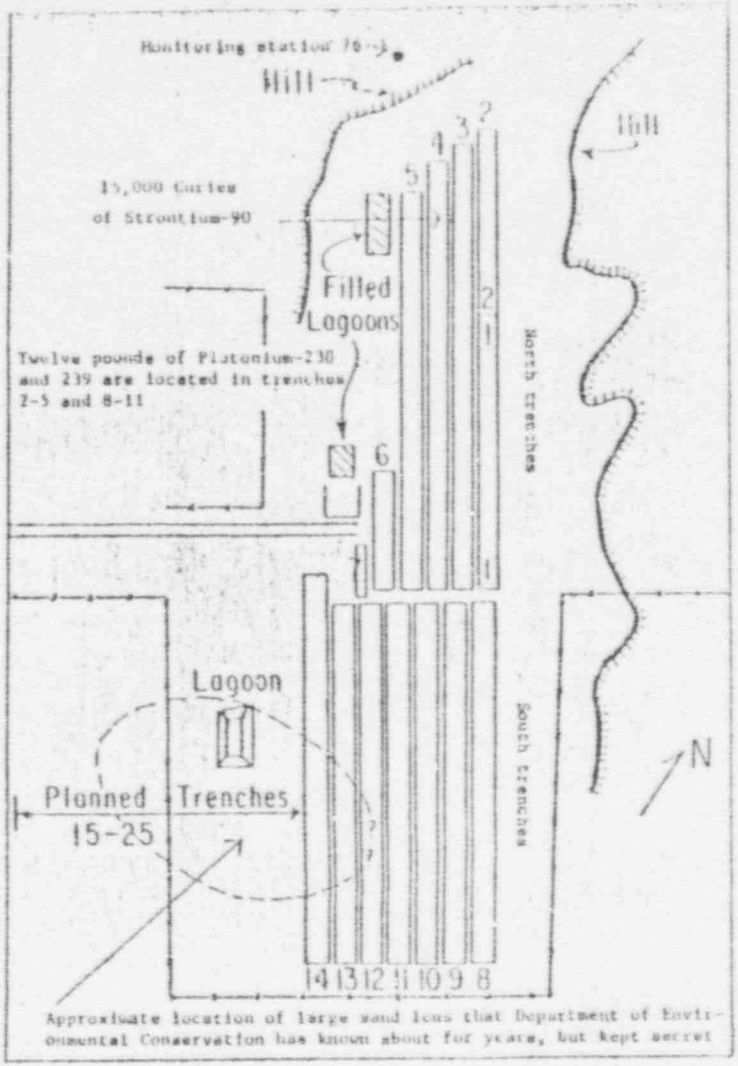
[4]"Performance Difficulties of 'Secure' Landfills for Chemical Waste and Available Mitigation Measures," paper presented by Peter Skinner before American Society of Civil Engineers, 1980. Available NYS Attorney General, Albany, New York.

[5]Annual Report of Environmental Radiation in New York State, New York State Department of Environmental Conservation, 1975.

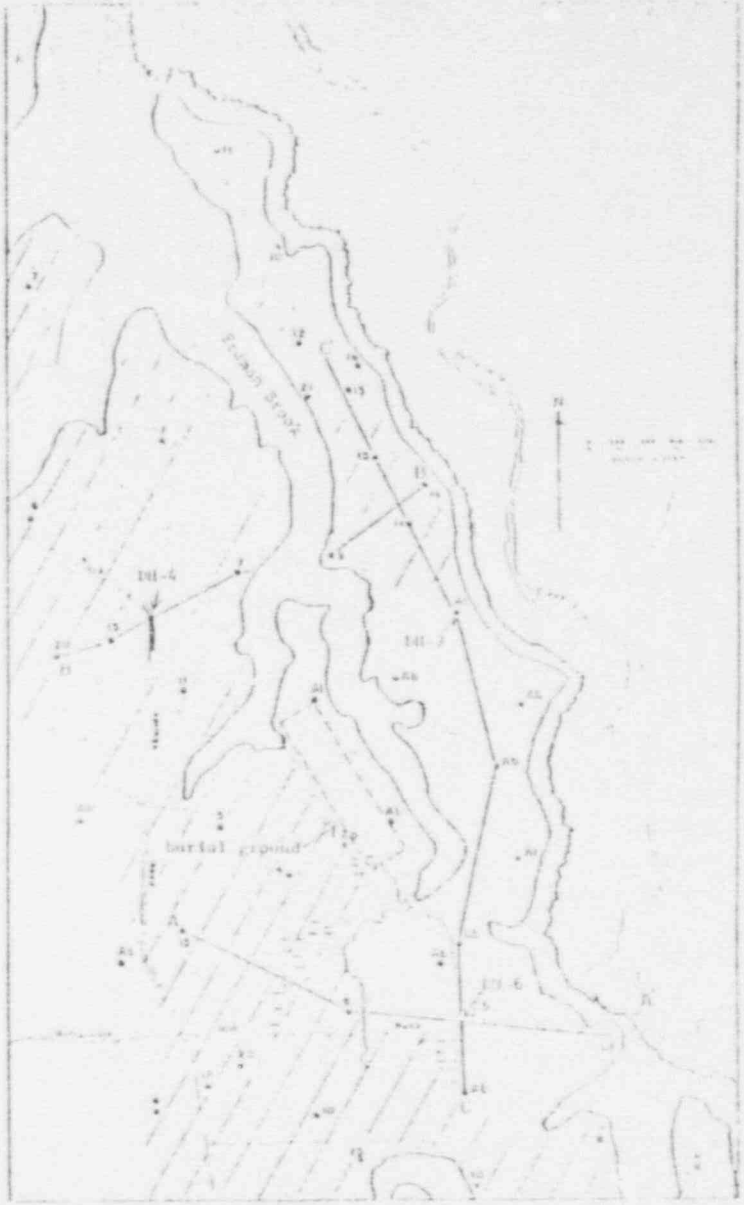
[6]Safety Analysis Report, Nuclear Fuel Services, 1962, NRC Docket 50-201.

[7]"Summary Report on the Low-level Radioactive Waste Burial Site, West Valley, New York, 1963-1975." U.S. Environmental Protection Agency, 1977, EPA/4-77-010

[8]Annual Report of Environmental Radiation in New York State, NYS Dept. of Environmental Conservation, 1977.



Map #2. Close-up of burial trenches. Trenches are built close to steep slopes leading down to Erdman Brook tributaries, Note location of Strontium 90 and Plutonium 238, Adapted from "Annual Report of Environmental Radiation in New York State," New York DEC, 1975.



Map #3. Map shows location of geologic drillings, distribution of surface deposits, and presence of swamps. Note burial ground with south end located in a swamp--see grass hatching. Ab means absence of coarse surface deposits, numbers adjacent to dots show depth of coarse deposits, where present. From Figure 2.22a, Safety Analysis Report, NFS, 1962