STEUBEN COUNTY

ENVIRONMENTAL MANAGEMENT COUNCIL

INFORMATION REPORT

Land Application of Sewage Sludge

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JANUARY 1992

AN INFORMATION REPORT ON LAND APPLICATION OF SEWAGE SLUDGE

Background:

A few years ago, local residents became concerned about the safety of the sludge disposal operation conducted by Leo Dickson and Sons, Inc. on Helmer Creek Road in the town of Cameron, and organized the Cameron Committee for a Safe Environment (CCSE). In response to these concerns, the Environmental Management Council (EMC) has investigated the major issues associated with this operation and with landspreading in general. It should be noted that this is not the only sludge landspreading operation in the county, but it is the only one regarding which the EMC has received complaints. Presentations to the EMC were made by the following individuals:

- Mr. Wayne Wells, Cameron Committee for a Safe Environment. March 22, 1990. February 28, 1991. May 16, 1991.
- Mr. Jack Martin, Cornell University, Center for Environmental Research. July 18, 1990.
- Ms. Mary Jane Peachey, Environmental Engineer, NYS Dept. of Environmental Conservation, Region 8. October 25, 1990.
- Mr. Philip Dickson, Leo Dickson & Sons, Inc. September 26, 1991. Four members of the EMC toured the operation with Mr. Dickson on January 18, 1992.

This report summarizes our findings and concerns, though we have been unable to definitively answer the complex issues that have been raised. On July 25, 1991, the Council unanimously adopted the following resolution:

> The Steuben County EMC considers sludge disposal and landspreading to be serious issues. Improper handling of sewage sludge can endanger both the environment and public health. Remediation required by unsafe practices could require significant expenditure of public funds. Allegations of unsafe sludge management should thus be taken very seriously and investigated thoroughly.

The EMC has formally moved to continue following the county situation. The Council will also benefit from the experiences in other areas through the participation of L. C. Dittrich (staff for the EMC) in the statewide Program Development Committee for the Sewage Sludge Management Education Program.

Summary:

The major questions which were raised (but not fully answered) by this investigation are:

-- Has the Dickson Corporation followed generally accepted farming practices and the terms of its permit?
-- Has the state Department of Environmental Conservation (DEC) adequately monitored the Dickson operation for compliance, and enforced the regulations?
-- Does DEC regulation (6 NYCRR Part 360) provide standards and criteria that, if properly observed in this case, would effectively protect public health and the environment in the Cameron area?

We have concluded that if done properly, landspreading of "high quality" sewage sludge can be a reasonable disposal alternative in Steuben County. However, additional steps might be warranted to insure that the sludge is free of dangerous contaminants. Landspreading on agricultural land could be prohibited for sludge containing landfill leachate, due to uncertainties regarding the degree to which pre-treatment reduces the toxicity of these complex solutions. Greater assurances of the sludge quality and proper management might be achieved if local officials assume more responsibility for insuring high-quality sludge and perhaps monitoring landspreading operations. All sewage sludge could be stabilized before it is transported to the landspreading facility, thus reducing the health hazards associated with pathogens in unstabilized sludge. (This will be accomplished when the Village of Bath waste treatment plant implements its plans to add a sludge treatment facility.) Landspreading operations on non-agricultural land might be encouraged.

Findings:

Municipal wastewater treatment plants are designed to produce liquid effluent capable of meeting strict state and federal water-quality criteria. In this treatment process, most of the contaminants removed from the wastewater are concentrated into the residual solids known as sludge. With improvements in wastewater treatment, the quantity of sludge produced has increased substantially and proper disposal techniques have become a concern, especially as landfill space has become limited and costly.

Landspreading is a relatively simple and inexpensive technique for disposing of sewage sludge. It takes advantage of the value of sludge as a fertilizer and soil conditioner, allowing sludge nutrients to be recycled through soil-plant systems. Prior to land application, the sludge should be stabilized, using a procedure which significantly reduces the pathogens (disease-causing organisms). Options available for stabilization of the sludge include: aerobic digestion, air drying, anaerobic digestion, composting, and lime stabilization. The stabilized sludge can only be applied to the land during some parts of the year, so storage facilities are necessary to hold the accumulated sludge until it can be applied.

Disadvantages of sludge landspreading include the potential for unpleasant odors, human contact with pathogens, and environmental contamination. Odor problems are most likely when sludge is stored in open lagoons, and can be reduced by proper stabilization and management techniques. More serious is the possible

contamination by heavy metals (especially cadmium), other toxic compounds (such as pesticides, PCBs, and radioactive materials), and pathogenic organisms (which can be reduced by stabilization techniques). The DEC studied the health and environmental considerations associated with sludge storage and landspreading and concluded that "with proper regulatory controls and good management, the spreading of high quality sludges on agricultural soils would have an insignificant environmental impact" (from presentation to EMC by Ms. Mary Jane Peachey, October 25, 1990). The CCSE is skeptical of this conclusion. They note that sludge can contain a multitude of chemicals and pathogenic agents which are released into sewer systems by households, industries, medical facilities, and landfill leachate collection and treatment systems. The CCSE is concerned that landspreading distributes these contaminants over wide areas of agricultural land, with successive sludge applications allowing long-term accumulation to dangerous levels, which may then contaminate water supplies or be incorporated into the food chain. The CCSE reports that problematic amounts of dioxin, furan, and PCBs have been attributed to landspreading of municipal sludge on agricultural land in Germany. They also cite a U.S. Food and Drug Administration warning of disease due to Listeria Monocytogenes associated with sludge use in Europe and Scandinavia. They are concerned about potential health affects from these and other substances for which the sludge is not currently tested. Jack Martin (Cornell University, Center for Environmental Research) reported that if the sludge is tested according to current requirements and is properly stabilized with lime, the risk of exposure to pathogens and other hazardous substances is minimal.

The DEC regulates land application and storage of sewage sludge under 6 NYCRR Part 360, which was substantially revised in 1988. DEC regulation includes review of permit applications, issuing permits, site inspection, determining compliance with permits and applicable regulations, and enforcement when appropriate. Criteria specified in regulations and permits include: the areas of land application (taking into account factors such as slope and proximity to streams), sludge incorporation rates, timing of sludge application, processing of the sludge to reduce pathogens, limiting public access to treated lands, the time delay before food crops can be planted on sludge-amended soils, and concentration limits for heavy metals and organic compounds. The permit holder is responsible for record-keeping and sampling of sludge and soil for analysis by approved labs. The CCSE has expressed concern that this regulatory system does not provide adequate accountability, relying too heavily on the integrity of the operator. They also expressed concern that the required testing of sludge is not comprehensive enough, citing a variety of potentially dangerous substances, which might find their way into the sewage system. The EMC lacks the expertise to evaluate the adequacy of DEC's permitting and sludge testing requirements.

Leo Dickson & Sons, Inc. holds a permit for land application of sewage sludge on 1,387 acres of farmland in the town of Cameron. Until June 1991, they were also permitted to operate a sludge storage lagoon on Helmer Creek Road in Cameron. This

facility began operation in 1986, when it replaced an earlier storage lagoon on Bonnie Hill Road. When the Helmer Creek lagoon was constructed, DEC fined Leo Dickson & Sons, Inc. for two violations: (1) building without a permit (Mr. Dickson states that he had received a verbal OK to begin construction.) and (2) not building according to permit (The lagoon was much larger than the submitted plans.). During operation of this facility, the DEC performed unannounced inspections of the site approximately three times per year and spot checks of the sludge before application. All results of these "snapshot" checks were in compliance with the permits. However, samples from groundwater monitoring wells showed that groundwater standards were exceeded for iron, lead, and manganese in every year since the wells were installed in 1986. It was suggested that this may have resulted from contamination of the wells by the casing, but this has not been confirmed (discussed in an April 12, 1991 letter from Jane Schmidt of DEC to Leo Dickson & Sons). Odor has been an ongoing problem at this facility, with complaints originally reported to DEC in 1987 and two tickets issued by DEC in 1988. Mr. Dickson attributes the odor to a high organic content in food waste materials which were stored in the lagoon with the sewage sludge. As the amount of food processing by-products handled at the facility was increased, the addition of lime ceased to control the odor as it had previously. Alternate sludge management practices were investigated and tried in order to eliminate the problem. In 1989, the odor problem recurred and DEC entered into a consent order with Leo Dickson & Sons, Inc. This provided for a fine and required that the storage lagoon be greatly reduced in capacity (correcting an error in the original construction). This work was completed and the odor problems improved in 1990. The permit for the sludge storage facility expired on June 30, 1991, although the permit for land application of sludge is still in place (due to expire on October 10, 1992). In September 1991, a consent order was reached with DEC providing that Leo Dickson & Sons, Inc. will: (1) pay a $10,000 fine (for allegedly storing unstabilized fine (for allegedly storing unstabilized sewage waste at the unpermitted Bonny Hill lagoon in April 1991), (2) breach the Helmer Creek lagoon so it cannot be used, and (3) submit a permit application for continued use of the stabilization tank only. The permit for the stabilization/storage tank is under review and is expected to have a public hearing before the permitting decision is made. In the mean time, Leo Dickson & Sons, Inc. continues to transport sludge to alternate disposal sites (in Hornell, Geneva, and Canandaigua). When weather conditions permit, they landspread stabilized sewage sludge (from the Dansville and Dundee sewage treatment facilities) on their permitted land. They also apply deregulated food processing sludge to additional fields. Mr. Dickson said that he plans to begin composting sewage sludge after the Bath treatment plant installs a digester to stabilize and dewater their sludge.

Cameron residents (the CCSE) have raised a number of concerns about the Dickson landspreading operation. They report serious odor problems up to 2.5 miles from the facility and claim to have documented numerous and repeated violations of DEC rules and

guidelines, including: inaccurate documentation of the proximity to streams and houses, injection during heavy rain, failure to empty the lagoon, failure to post sludge-applied fields, sludge not properly incorporated into the soil, three spills of sludge on town and county roads (unstabilized sludge is considered hazardous by the DEC), and possible failure to stabilize sludge prior to land application. The CCSE feel that the DEC response to their allegations and concerns has been inadequate.

The sludge which has been applied to fields at the Dickson site includes food processing by-products (about 60%), septage (from septic tanks), and municipal sewage sludge from three wastewater treatment plants: Village of Bath (Steuben County), Village of Dundee (Yates County), and Village of Dansville (Livingston County). These plants produce a total of 388 dry tons of sludge per year (from "Municipal Sewage Sludge Management Practices in New York State," DEC's Division of Solid Waste, April 1989). The Bath plant is the only one that does not now provide for sludge stabilization, though they plan to do so in the future. (An anaerobic digester to stabilize and dewater sludge is planned for completion by the summer of 1993.) Testing of sludge from these plants was reported by DEC as follows (from "Municipal Sewage Sludge Management Practices in New York State," DEC's Division of Solid Waste, April 1989, Appendix B, pp. 33, 37, 39):

Publicly Owned Treatment Works	Year	Parameter Exceeding Agricultural Land Limits
Dansville	1982	none
	1983	none
	1984	none
	1985	Cu (copper)
	1985	none
	1985	none
	1988	none
Bath	1983	Hg (mercury)
	1984	Ni, Cd, Pb, Cu, Zn (nickel, cadmium, lead, copper, zinc)
	1985	Cd, Cu, Zn, Hg (cadmium, copper, zinc, mercury)
	1985	none
	1988	none
Dundee	1981	none
	1982	none
	1983	none
	1984	Hg (mercury)
	1984	none
	1986	none

The reliability of these data is questionable. In Appendix A of the same DEC publication, the Bath plant is reported to have taken 5 sludge samples for analysis in 1988, with only 2 meeting agricultural limits; the Dansville plant is reported to have 6 out of 7 samples within agricultural limits for 1988 ("Municipal Sewage Sludge Management Practices in New York State," DEC's Division of Solid Waste, April 1989, Appendix A, p. A-15). However, the above data from Appendix B do not indicate any problems with the 1988 samples from either plant. Mr. Dickson supplied information suggesting that there was a technical problem with the 1985 sample reported for the Bath Wastewater Facility. A sample of the same sludge collected at the Dickson facility and analyzed at Southern Tier Analytical is reported to have been well-below agricultural limits for all tested elements. The following information was supplied by Mr. Dickson:

	Agricultural Limit	Reported by NYS DEC for Bath Wastewater Facility Test Date: 9/11/85	Reported by Leo Dickson & Sons for Dickson Facility Test Date: 9/13/85
Cadmium	25 ppm	32* mg/kg	11 mg/kg
Chromium	1000	320	60
Copper	1000	3190*	437
Lead	1000	320	92
Mercury	10	32*	4
Nickel	200	160	29.5
Zinc	2500	4700*	626

* exceeded agricultural limits
Note: mg/kg = ppm

The Bath Municipal Sewage Treatment Plant handles industrial waste, hospital sewage, and landfill leachate, leading CCSE to express apprehension that the sewage sludge may contain some long-lasting toxic, and possibly radioactive, materials which can accumulate in the environment and food chain. Leachate from the Lindley and Bath landfills is transported by truck to a county facility in Bath, where it is pre-treated using an anaerobic digestion process that reduces the toxicity of leachate considerably. Following this process it is discharged through village sewers to the Bath sewage treatment plant. Analysis of sludge from the Bath plant has not shown significant increases in heavy metal content since 1988 when the county's leachate treatment began. However, the CCSE is concerned about the adequacy of this treatment for sludge intended to be applied to agricultural land. The Lindley landfill is known to contain heavy metal sludges and other industrial wastes (reported in "Inactive Hazardous Waste Disposal Sites in New York State, Site List by Counties; Volume 8," DEC, April 1991). It is classified by DEC as class 2 (poses a "significant threat to the public health or the environment--action required"). It is likely that there will be even more landfill leachate for the county to deal with in the future, as DEC continues its remediation studies of the Prattsburg and other

class 2 landfills in the county.

Conclusions:

Sludge is a necessary by-product of current sewage treatment procedures. This sludge must be disposed of until alternative techniques for treating wastewater are developed and implemented. For small communities whose sludge is not contaminated by industry, landspreading can be a reasonable sludge management alternative. However the landspreading operation in Cameron has raised the following concerns about landspreading of sewage sludge in Steuben County:

1) Industrial and hospital wastes: The potential toxicity of sludges due to inclusion of industrial and hospital wastes in the municipal waste stream is a concern. These wastes may require pre-treatment to remove hazardous materials. However, the presence of industrial waste (pre-treated when required) in municipal sewage probably can not be avoided. If sewage sludge is to be applied to agricultural land, ongoing efforts must be made to insure that this sludge is as clean and safe as possible. Hospitals and industry must be prohibited from releasing dangerous substances into the wastewater treatment system.

2) Landfill leachate: The inclusion of landfill leachate in the municipal waste stream is a serious concern, particularly for sludges applied to agricultural land. The wide variety of chemicals which find their way into landfills makes it difficult, if not impossible, to adequately test the leachate. In order to reduce the landspreading risks associated with landfill leachate, it is important that the county continue to pre-treat and test all landfill leachate prior to discharge into municipal wastestreams. If residue from the treated leachate is considered to be an unacceptable ingredient in landspreading sludge, the county has several options:
   - Landfill leachate (pre-treated or otherwise) could be excluded from the wastewater treatment facility. This option might be quite expensive. The current cost of transporting and pre-treating leachate is $0.06/gal, or $450,000/year (for 7.5 million gallons). Previously leachate was "collected and transported to the Buffalo wastewater treatment plant at a cost of $.13/gal" (from "Report of Findings," Steuben County Ad-Hoc Committee on Solid Waste Disposal, p. 9). Or landfill leachate could be pre-treated at the existing facility and then transported to a municipal sewage system which chooses not to landspread its sludge. (Only 4 of the 9 municipal treatment plants in Steuben County currently dispose of their sludge by landspreading.)
   - Landfill leachate could be allowed to enter the wastewater treatment plant and the sludge precluded from land application. But where would the sludge be disposed? Bath and other area municipalities have few options for sludge dis-

posal. Sending all sludge from the county's sewage treatment plants to the county landfill would represent about 1.6% of its total annual load.

--- Sewage sludge containing landfill leachate could be excluded from landspreading on agricultural lands, but permitted for landspreading on non-agricultural lands (see item 6 below).

3) Accountability and regulatory oversight: Because of logistical and monetary constraints, DEC performs very few inspections of landspreading operations and relies extensively on the permittees to supply accurate operational data and collect samples for analysis. The numerous violations documented by CCSE at the Dickson facility seem to indicate that DEC regulation has not been adequate to insure consistently good management of this operation. Safer management of sludges might be achieved if more frequent on-site monitoring could be performed. Possible options include:

-- The town or county could retain (hire or contract for) environmental inspectors qualified for the task.

--- The town and/or county could work with statewide organizations to seek increased DEC funding for this purpose. It might be possible to re-allocate current DEC funding which is not currently channeled to public health and safety.

--- Local groups, such as CCSE, could be encouraged/supported to monitor and keep a clear standardized record of evident operating violations, to be sent to DEC. The possible lack of objectivity of local activists could be a problem, so this option should only be pursued if DEC or some other "objective" entity has adequate resources to verify any reported violations. Difficulties with DEC's Turn In Poachers/Polluters (TIPP) program suggest that this could be difficult to implement successfully.

4) Adequacy of sludge testing: The DEC permit requires the landspreading operator to sample incoming sludge from each sewage treatment plant for chemical analysis. The testing is performed at a laboratory acceptable to DEC and the results are reported to DEC. However, it is unclear whether this testing procedure insures that any contaminants are identified and removed before they have been applied to the soil. Modification of this sampling procedure might be worthwhile Greater accountability could be obtained if the required sample collection is performed by local officials rather than relying on the landspreading operator (see item 3 above). As an additional safeguard, it might be beneficial to require more comprehensive analysis of sludge than is currently required by DEC. Additional substances of concern include: radiation, dioxin, furan, and pathogens (such as Listeria Monocytogenes). However, any additional sample collection and/or testing should be directed by a qualified professional and such services cost money.

5) Transport of unstabilized sludge: Hazards associated with transportation of the sludge could be reduced by stabilization at the sewage treatment plant rather than at the site of landspreading. This would also eliminate concerns that the operator of a landspreading facility might cut costs by reducing the amount of lime used for stabilization. Bath currently operates the only waste treatment facility in the county which lacks a process for sludge stabilization, though stabilization methods are currently being studied. When/if that improvement is implemented, this concern would presumably be resolved.

6) Repeated application on agricultural land: When evaluating sites for landspreading of sewage sludge, DEC gives priority to surface reclamation projects and non-agricultural land. In order to minimize sludge application on agricultural soil, the county might encourage and assist enterprises which will apply sludges to state forest land or tree farms. Although there may be logistical difficulties associated with spreading in these areas, it would isolate possible sludge contaminants from the human food chain. The potential for concentration of dilute toxins in agricultural soil might also be reduced by severely limiting the frequency with which subsequent applications can be made on the same soil.

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