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Improvements in Sewage Treatment in the Fall of 1977

By: Henry Hirschland and George Berg

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THE ROCHESTER COMMITTEE FOR SCIENTIFIC INFORMATION
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Summary

In the period from May 15 through October 23, 1977, the Van Lare Sewage Treatment Plant reduced its backlog of sewage sludge and improved the control of nuisance odors. This was done at the costs of burning large amounts of fuel oil for sludge incineration and of disposing of surplus sludge at landfills.

The fuel savings gained by dewatering the sludge are computed in this report. The average level of dryness for this period was 13.6% solids in dewatered sludge. Our computations indicate saving of 32,000 gallons of fuel oil a week if the plant could produce sludge with an average 20% solids. Improvements in sewage treatment are expected beginning in November, 1977 when sawdust will be added to the sludge.

Background

Monroe County's new Van Lare Sewage Treatment Plant began full scale operation (with primary and secondary treatment) in the fall of 1975. From the start, it developed troubles in processing sewage sludge. These caused a spread of bad odors over the plant's Irondequoit neighborhood. RCSI investigated the problem, and RCSI Bulletins (2, 3) were used by neighborhood residents and the Town government in demanding better operation. The Monroe County Division of Pure Waters upgraded the treatment plant by installing afterburners in incinerators, and by installing equipment needed to send surplus sludge to landfills. This bulletin reports improved plant operation, but it notes that the improvements in air quality were made in a way that proved costly in using two limited resources: fuel oil and landfill space. The information on plant operation comes from the Frank E. Van Lare Weekly Reports, May 15 - Oct. 23 (1).*

Reduced Odors

Complaints about odors from the Van Lare Plant have decreased. We reviewed the list of complaints telephoned to the Irondequoit Odor Line at the Town of Irondequoit. The frequency of calls is shown in Table I.

We thank Pure Waters Division personnel for giving us the Van Lare Reports.

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Table I. Complaints to the Irondequoit Odor Line

Month	Total calls	Dates with More Than 10 Calls	
		Date	Number of calls
August	95	August 7	17
		August 13	11
		August 26	10
		August 31	16
September	54	Sept. 2	23
October	30	Oct. 31	11

Quality of Sludge

The key to the plant's problems was that the sludge remained excessively wet even after it was treated with a flocculating agent and filtered to remove water. The amount of fuel required for incineration increases greatly with sludge wetness, as explained in RCSI Bulletin # (2).

From May 15 to October 23, dewatered sludge at the plant averaged 13.6% dry solids and 86.4% water. The range of solids concentration was from 12% to 17%. There was a possible trend to drier sludge; if it holds, the average solids will be 15.2% in November.

Disposal in Landfills

The plant reported that sludge was trucked to landfills at a rate of approximately 81 to 105 tons of dry solids per week. If we consider that dry solids were only 13.6% of the shipped bulk, then the weekly truck shipment out of the plant were some 600 to 770 tons of sludge.

Consumption of Fuel Oil

Fuel oil consumption for the period varied from 60,000 gallons per week to 100,000 gallons per week. The average consumption was 80,000 gallons of oil per week.

To determine the relation of sludge dryness to oil consumption, we used the data for normal operation of the Van Lare Plant from May 15 to October 23. We excluded the period of abnormal operation during a strike, and the days when the plant experimented with adding sawdust to sludge. A multiple regression was run to correlate three variables:

F = fuel oil consumption, in gallons per week;

S = sludge incinerated, in tons of dry solids per week;

P = sludge dryness, as the average % of solids for that week.

We found the following equation:

$$F = 13{,}900 \times S^{0.9} \times P^{-1.3}$$

This meant that incineration became much more efficient when sludge dryness (P) increased. Under average conditions of dryness (P = 13.6), the plant burned 80,000 gallons of oil a week (F) to incinerate 303 tons of sludge dry solids (S).

If sludge dryness were improved to 20% solids, which was the level expected in the design of the plant, fuel consumption for the same measure of sludge would be cut to 48,000 gallons per week; if sludge could be dried to 25% solids, which is considered good, the equation predicted that oil use in incineration would be cut to less than half (F = 36,000 gallons per week).

Discussion

We have been unable to find, in the official reports of the Van Lare Plant, any indications of unusual operation on the days when the plant's neighbors complained of bad odors. On some days, bad odors are taken out to the Lake by southerly winds, but wind direction does not explain all the difference between odor-free days and bad days. Much of the difference must be in plant operation, but it does not appear in the official logs.

In general, odor problems have improved both from personal observation and from discussion with neighbors. This would support the idea that the Odor Line received fewer telephone complaints later in the season because there was actually less to complain about.

The Van Lare Plant is currently experimenting with sawdust as a cheap sludge additive and filter aid. A filter aid would increase the amount of solids on the filters thereby reducing the water content. In addition, sawdust has a fuel value. If the experiments in operation are successful this should result in a dryer filter cake and a reduction in total costs since the decrease in the amount of fuel used on a dollar basis should be more than the added increase in cost of the sawdust. RCSI will report on the results of these tests.

In summary, Pure Waters management appears to have been doing a progressively better job of running the Van Lare Treatment Plant. They should be encouraged to continue their efforts to curb plant odors, improve the dryness of sludge, and save on fuel.

References

(1) Frank E. Van Lare Weekly Reports; Pure Waters Divison, County of Monroe. May 15 through October 23, 1977

(2) Berg, G., Ed.; *"Bad Odors from Pure Waters: The Case of Rochester's New Sewage Treatment Plant"*. RCSI Bulletin #200, September 1976

(3) Berg, G., *"Improved Performance at the Van Lare Sewage Treatment Plant"* RCSI Bulletin #206, May 1977