Post Closure Care and Monitoring
Intermediate Closure Considerations

Session 5

US EPA Work Shop on Bioreactor Landfills

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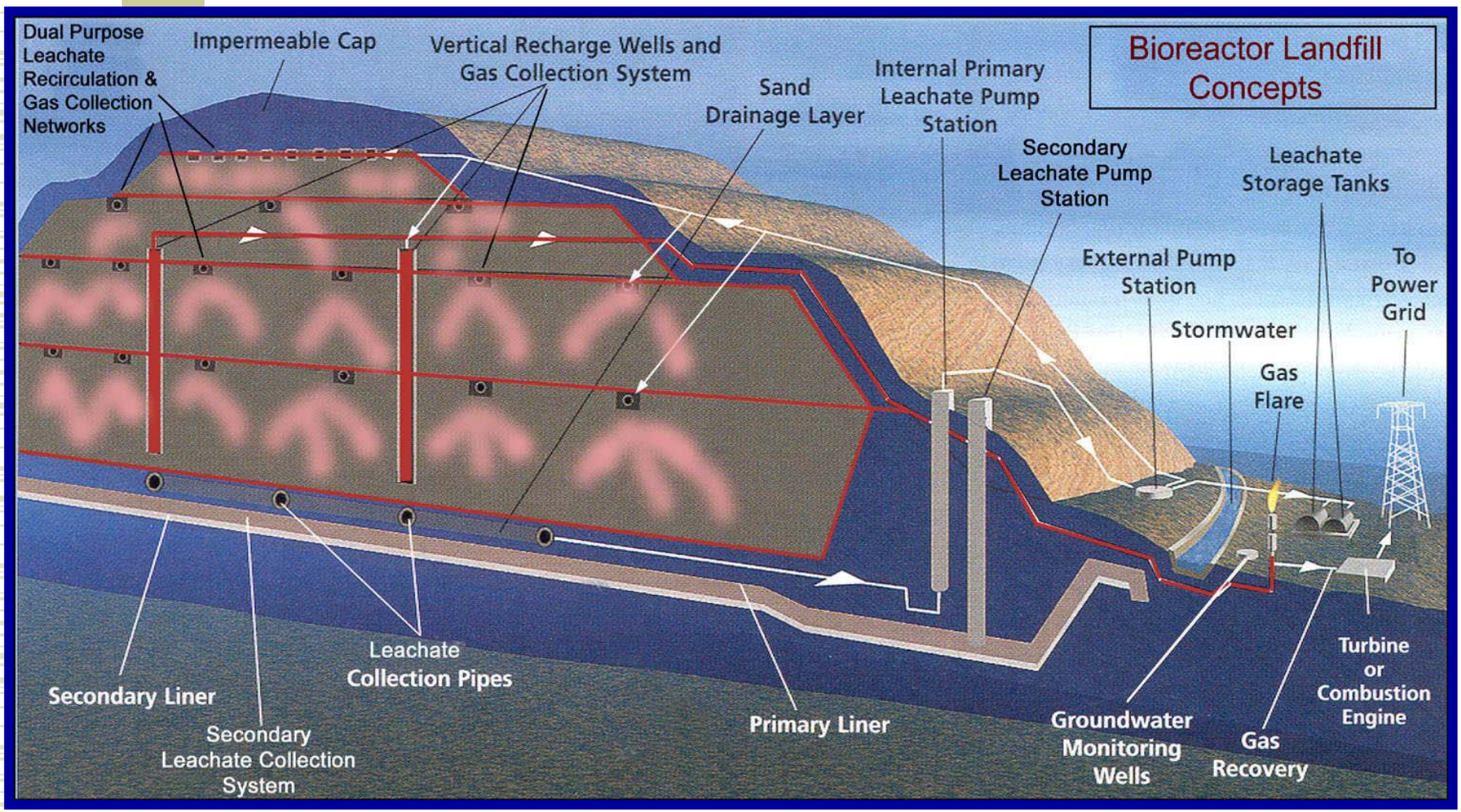
Intermediate Closure Considerations

How Do We Get To This Point ?



Intermediate Closure Considerations
Regulatory Compliance

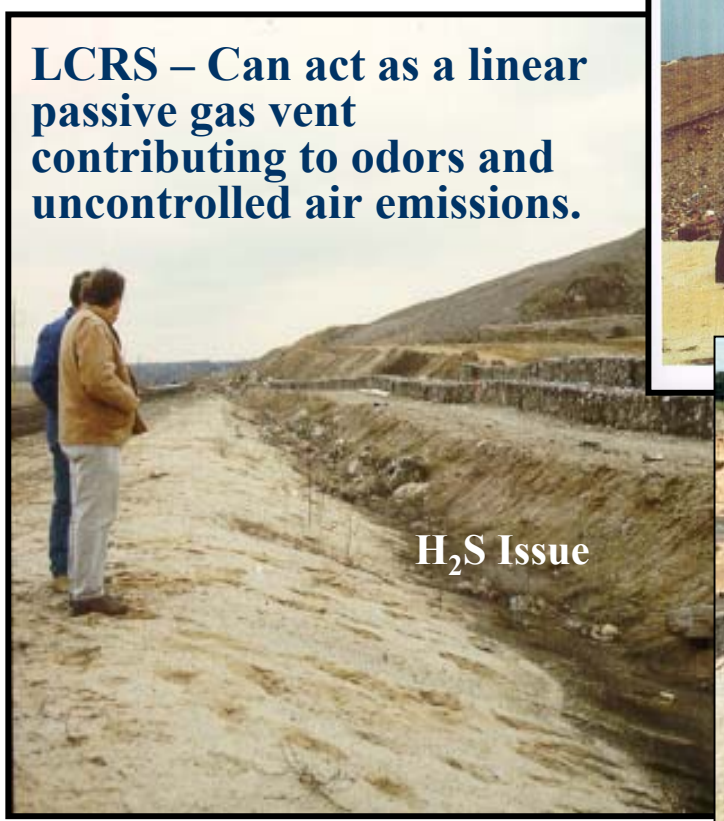
Bioreactor Landfill Operational Concepts will drive/promote the need for enhanced intermediate closure/operational concepts to ensure adequate odor, air emission and surface seep controls.

Odors can generate adverse public opinions which can directly impact/jeopardize current operations and future expansion permits.

Active gas collection and use of effective gas barriers at the surface will likely be needed to maintain regulatory compliance.

Intermediate Closure Considerations

LCRS – Can act as a linear passive gas vent contributing to odors and uncontrolled air emissions.



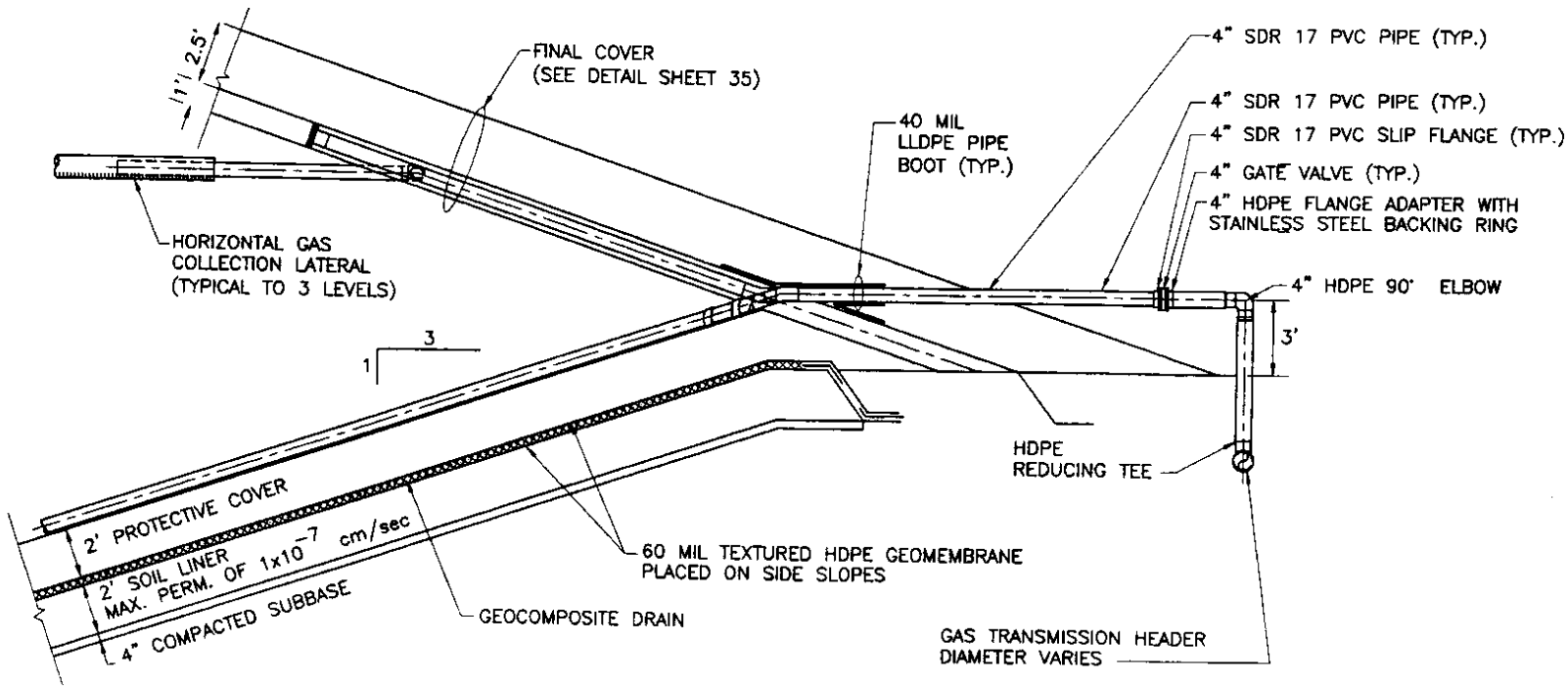
H_2S Issue

Interim slopes can be a source of odors and uncontrolled gas emissions.

Intermediate Closure Considerations

Design Details Need Ensure Intermediate Operational Compliance

Connection of Active Gas Collection System to LCRS & Horizontal Gas Collector



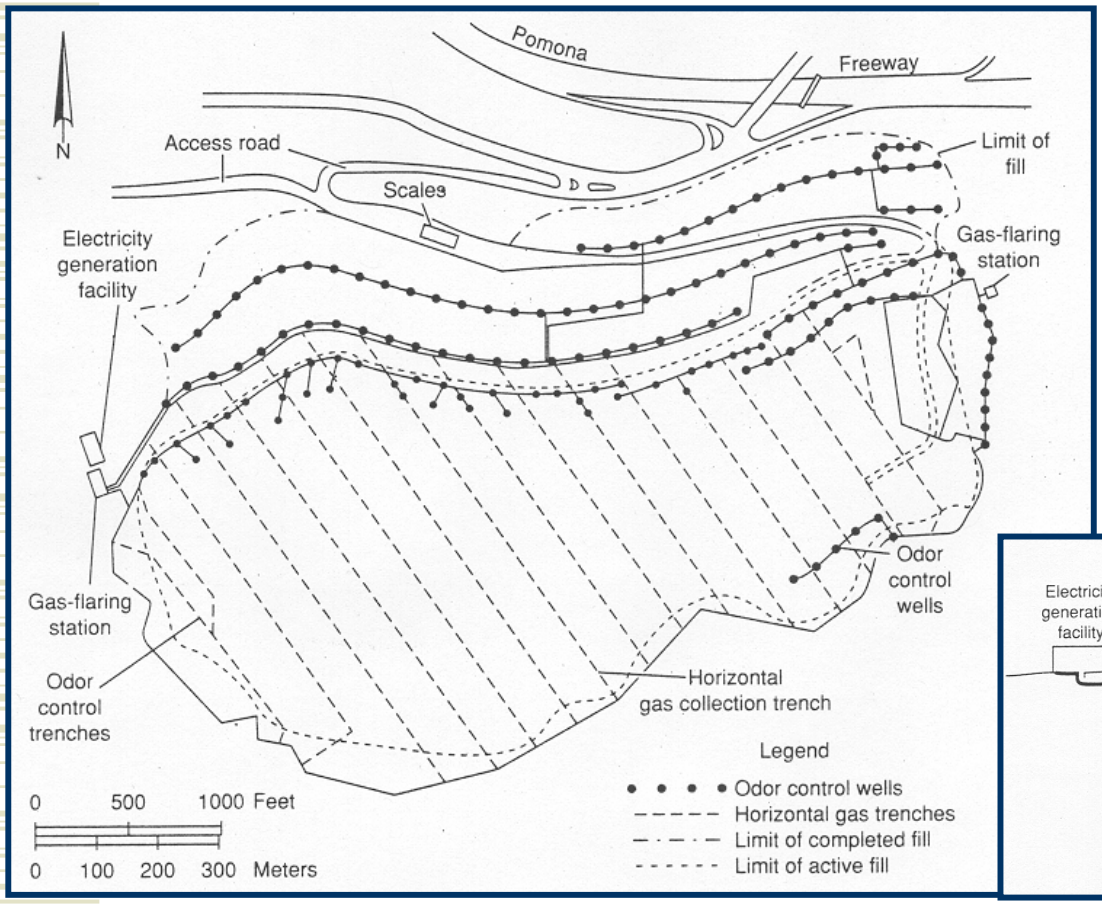
SECTION A-A

Intermediate Closure Considerations

Active Gas Collection Systems

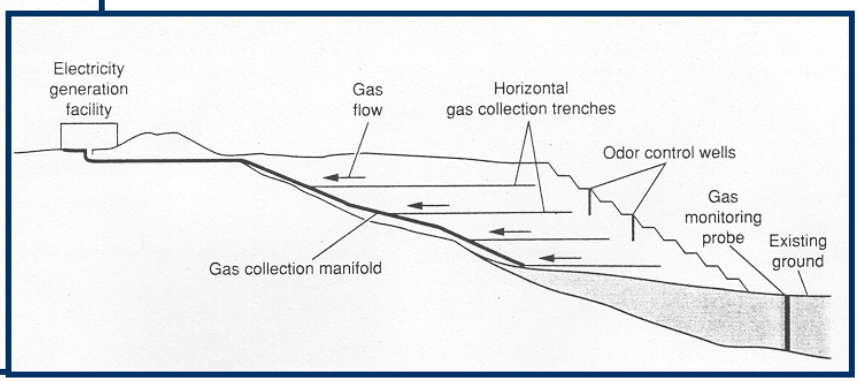
Intermediate Closure Considerations

Active Gas Collection Systems



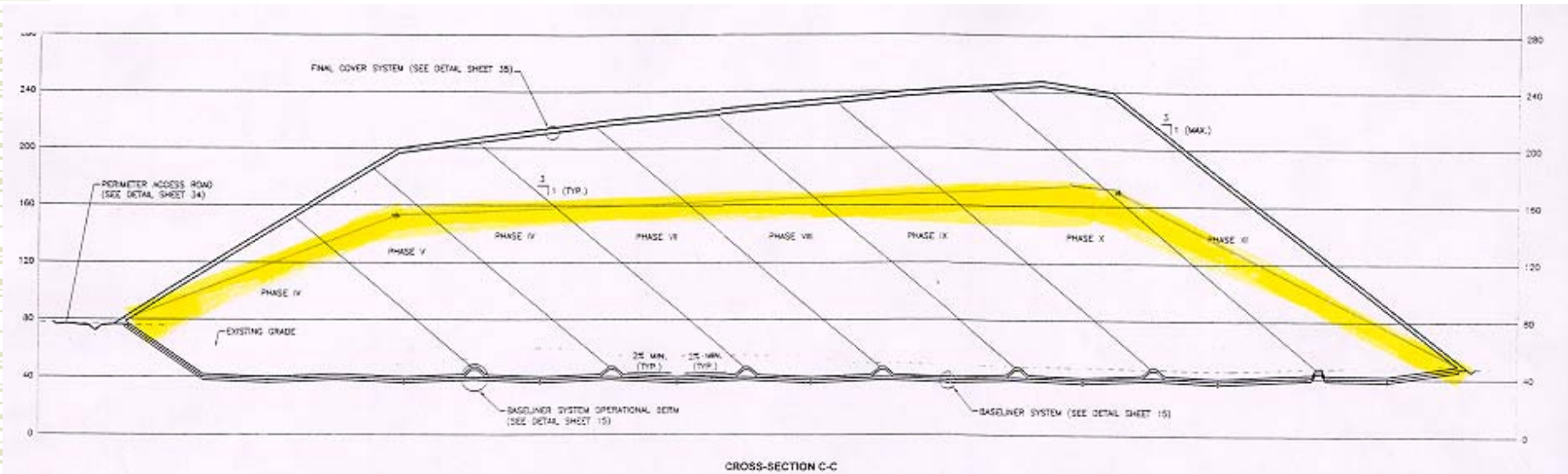
Active gas collection systems have been used to effectively control odors and emissions at conventional landfills.

Such designs at bioreactor landfills will likely need to be more robust to work effectively.



Intermediate Closure Considerations
Permitting Issues

State regulators will need to look at the way that we currently permit landfills – typically permit is issued for a fixed capacity of waste that is to be received.



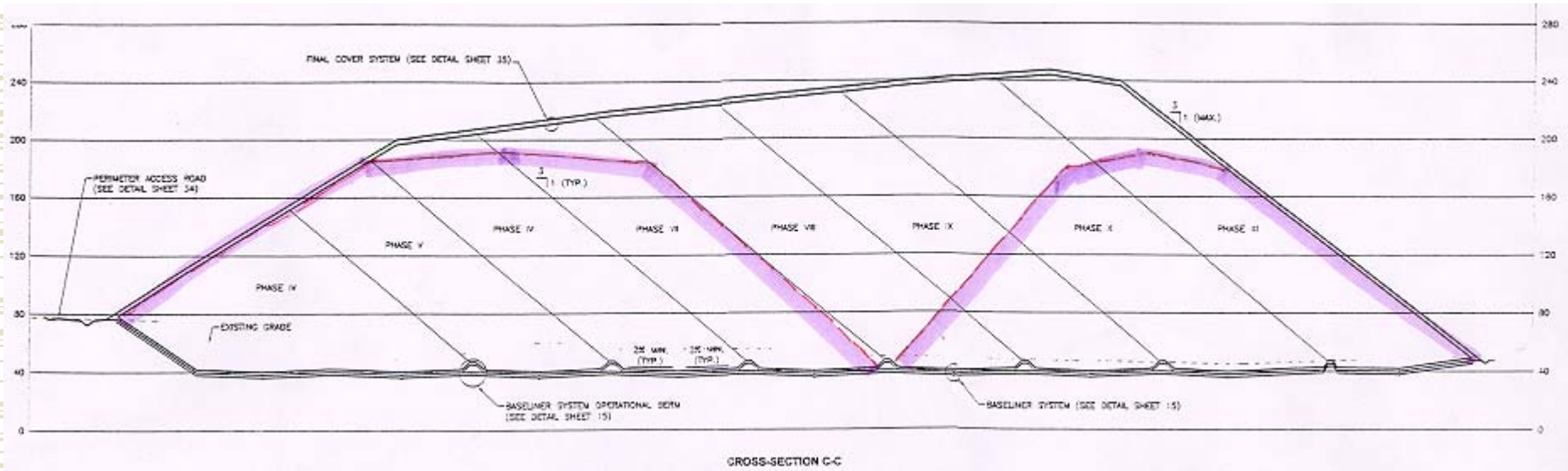
Progressive Capping Considerations?

Financial Assurance Considerations?

Intermediate Closure Considerations

Sustainable Landfill Concepts

Bioreactor Landfill Movement may end up promoting a Sustainable Landfill Operation concept.

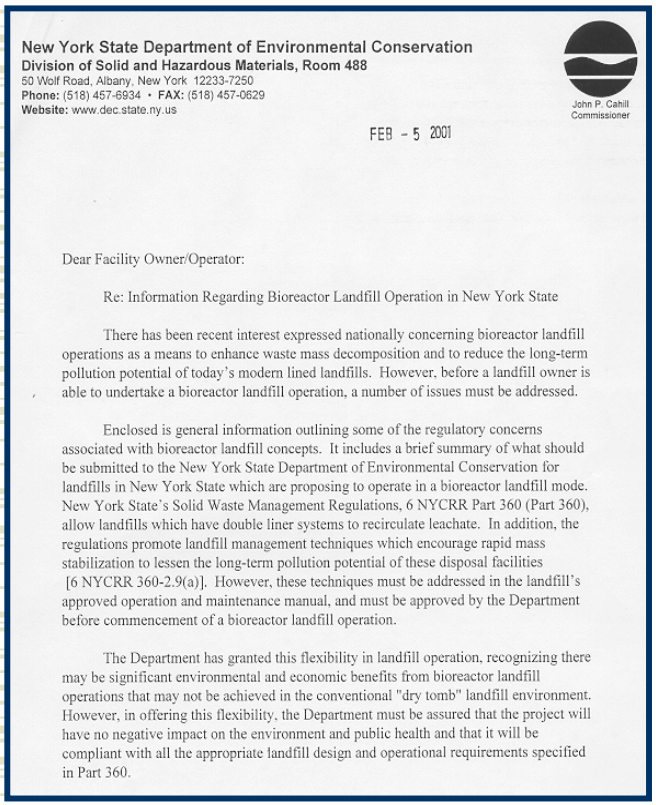


CROSS-SECTION C-C

Current trend in NYS is that most of the State's new SW disposal capacity is coming from expansions of the existing 27 active MSW landfills - all of which are double lined.

Notice to Landfill Owners/Operators:

Bioreactor Landfill Operations Need State Approval !



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John P. Cahill
Commissioner

FEB - 5 2001

Dear Facility Owner/Operator:

Re: Information Regarding Bioreactor Landfill Operation in New York State

There has been recent interest expressed nationally concerning bioreactor landfill operations as a means to enhance waste mass decomposition and to reduce the long-term pollution potential of today's modern lined landfills. However, before a landfill owner is able to undertake a bioreactor landfill operation, a number of issues must be addressed.

Enclosed is general information outlining some of the regulatory concerns associated with bioreactor landfill concepts. It includes a brief summary of what should be submitted to the New York State Department of Environmental Conservation for landfills in New York State which are proposing to operate in a bioreactor landfill mode. New York State's Solid Waste Management Regulations, 6 NYCRR Part 360 (Part 360), allow landfills which have double liner systems to recirculate leachate. In addition, the regulations promote landfill management techniques which encourage rapid mass stabilization to lessen the long-term pollution potential of these disposal facilities [6 NYCRR 360-2.9(a)]. However, these techniques must be addressed in the landfill's approved operation and maintenance manual, and must be approved by the Department before commencement of a bioreactor landfill operation.

The Department has granted this flexibility in landfill operation, recognizing there may be significant environmental and economic benefits from bioreactor landfill operations that may not be achieved in the conventional "dry tomb" landfill environment. However, in offering this flexibility, the Department must be assured that the project will have no negative impact on the environment and public health and that it will be compliant with all the appropriate landfill design and operational requirements specified in Part 360.

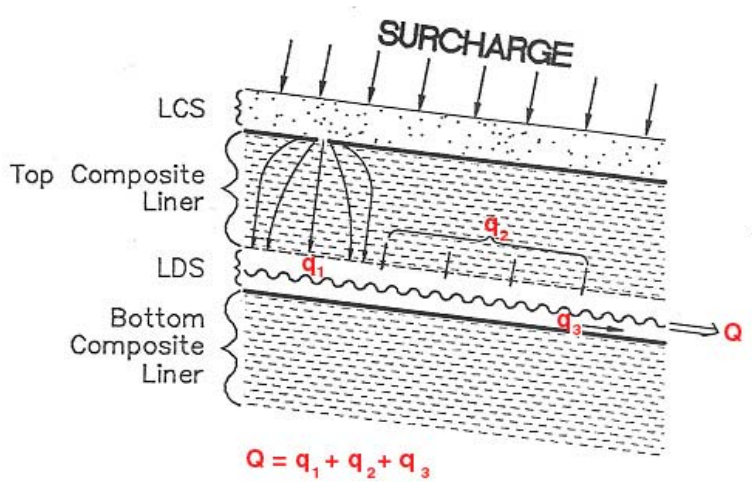
Required that all leachate recirculation or bioreactor proposals address in detail:

- Geotechnical Analysis
- Air Emission & Odor Control
- Leachate Mngt System Maintenance Plan
- Details for Leachate Induction - How & How Much & When
- Operations Plan
- Bioreactor Landfill Monitoring Plan

Sent to all 27 MSW Lfs in NYS Stressing need for Dept Approval

How Well Are NYS's Double-Lined Landfill Designs Working ?

Top Composite Liner Performance Monitoring



From 2001 Annual Reports

(data on 29 Landfills)

Primary LCRS Flows:

Max: 6909 gpad; Min: 84 gpad;
Mean: 1088 gpad

Secondary LCRS Flows:

Max: 87 gpad; Min: 0.5 gpad;

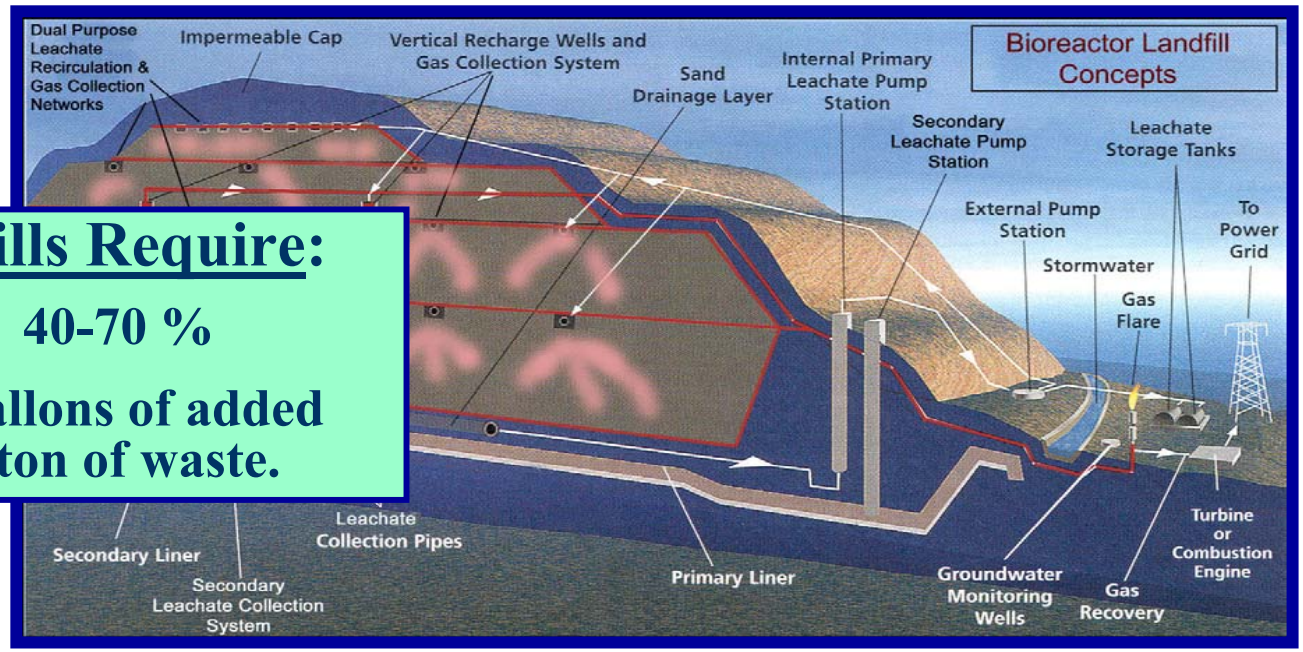
Mean: 8.3 gpad

"Upper" Liner System Efficiency:

Max: 99.97% ; Min: 94.5% ;

Mean: 98.8 %

Do we have enough leachate in NYS ?



Bioreactor Landfills Require:

Optimum Waste MC 40-70 %

Or, typically 25-50 gallons of added moisture needed per ton of waste.

In 2000 - 27 MSW landfills in NYS accepted 9.3 million tons of SW.

In general if all these landfills wanted conduct bioreactor operations we'd need between 232 million and 465 million gallons of leachate.

In 2000 - 27 MSW landfills generated just over 440 million gallons of leachate.

Individual landfill demonstration of need for additional moisture needs to be conducted.