Delaware's venture into modern landfills.

N. C. Vasuki, P.E., DEE
CEO, Delaware Solid Waste Authority
www.dswa.com

Introduction

- Landfills provide the foundation for the State's solid waste management program
- In 1980 the first geomembrane (30 mil pvc) lined landfill cell (9 acres) was constructed
- In 1982, a second cell (18 acres) was added.
- Leachate treatment became an issue.
- Dr. Fred Pohland's research at Georgia Tech appeared to provide a solution for our problem.
- Attempts were made to introduce leachate into both cells.

DELAWARE SOLID WASTE AUTHORITY

Leachate recirculation

- Absence of prescriptive regulations allowed us to experiment with various methods.
- Vertical recharge wells (perforated concrete manhole sections) appeared to work.
- More wells were added and leachate export for external treatment was reduced.
- Gas production also increased. Based on the experience gained, we started improving our design.

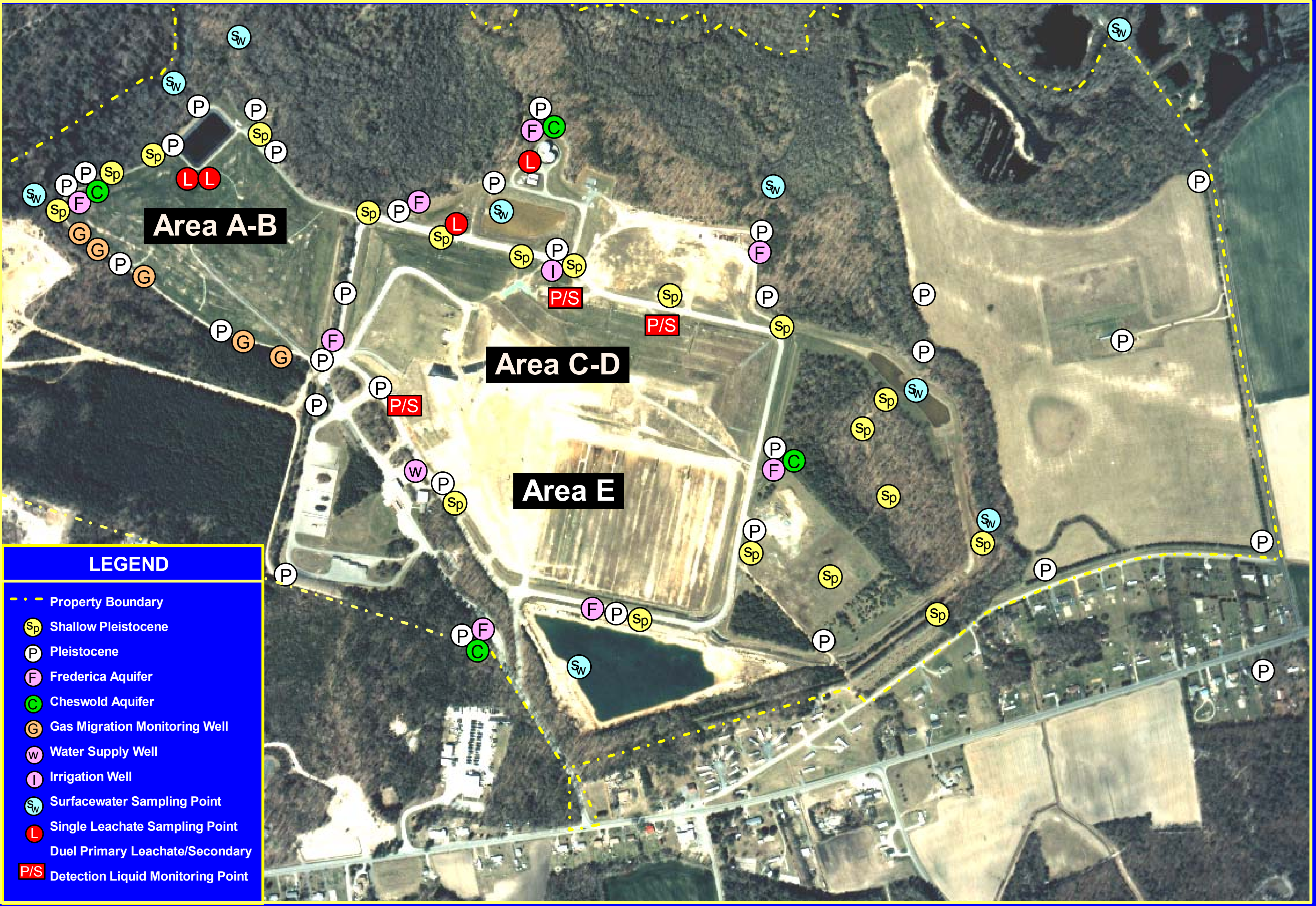


Fig. 4: Sandtown Landfill - Locations of Groundwater, Leachate, and Surfacewater Monitoring Points

Jones Crossroads Landfill

- DSWA’s southern landfill
- Four separate cells, Cells 1 through 4
- Leachate collected and pumped to tanks, hauled by truck off-site. Limited volume recirculated.
- Landfill Gas collected and flared.
- Dead chickens disposal (emergency service) created a hydrogen sulfide problem.

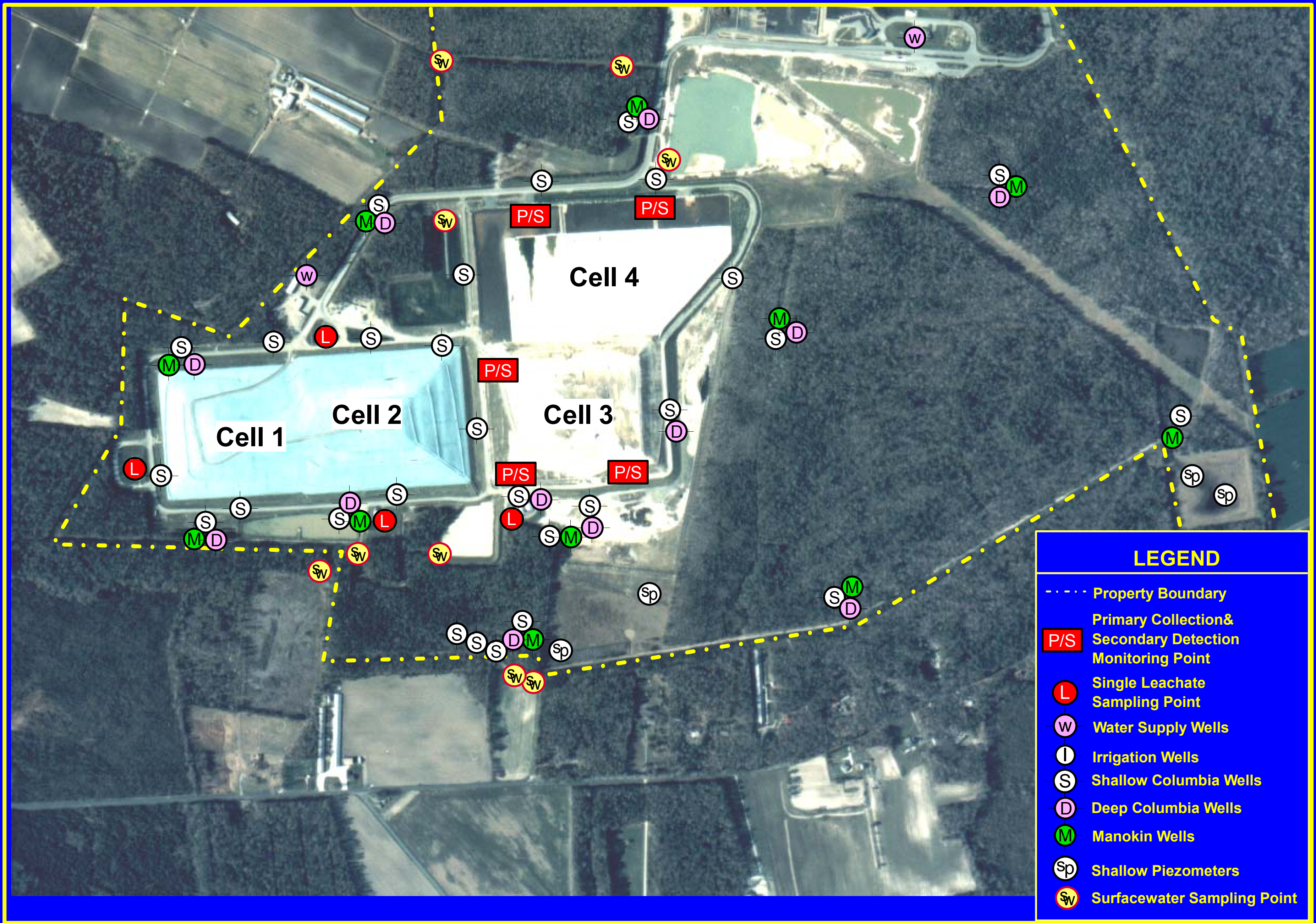


Fig.8 Jones Crossroads Landfill - Locations of Groundwater, Leachate, and Surfacewater Monitoring Points

Liner Costs

Cell	US$/sm
Cell 3	$5.70
Area E	$4.31 – HDPE
	$6.45 – fPP
Cell 4	$3.99 – HDPE
	$3.77 - fPP

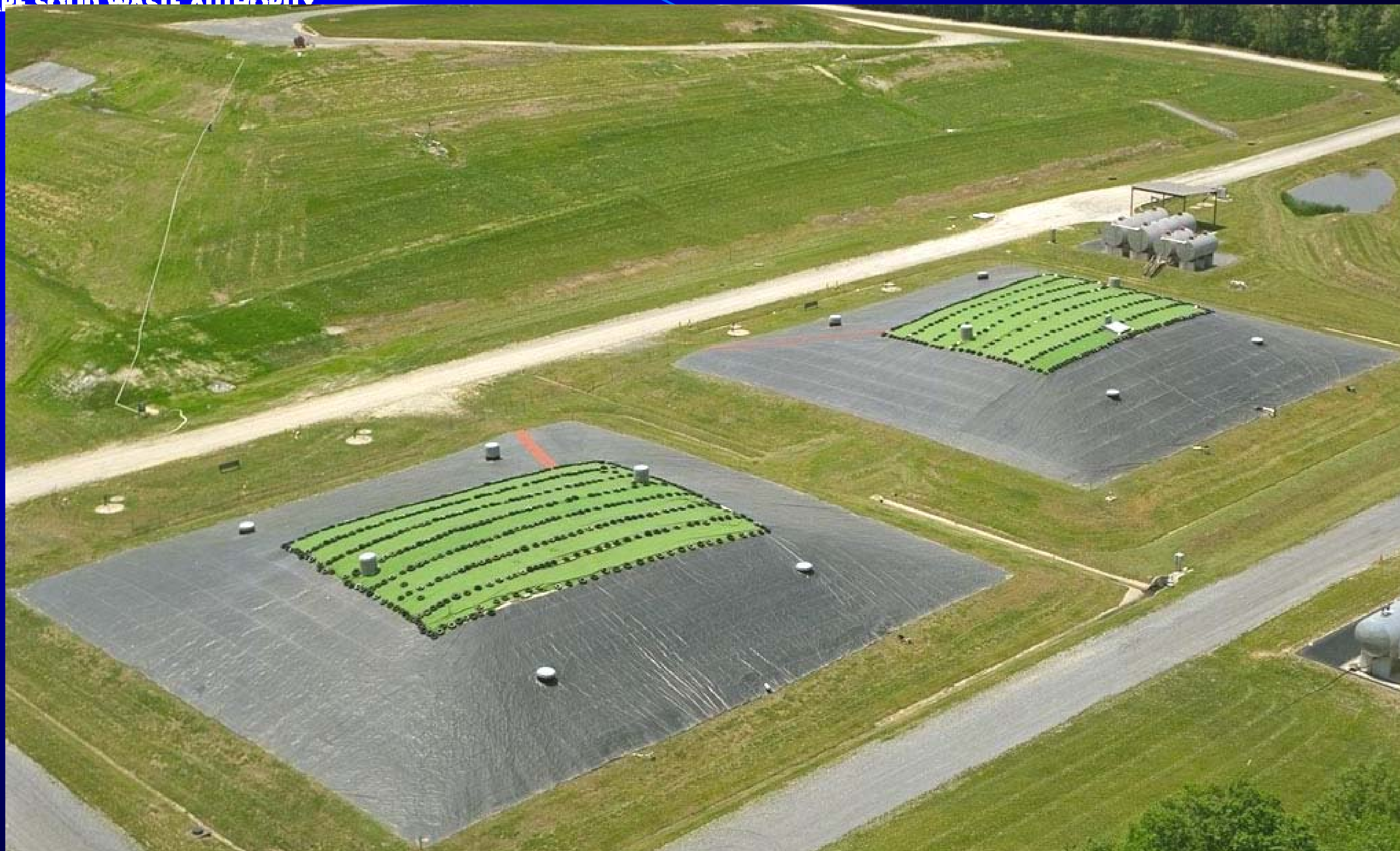
DSWA
DELAWARE SOLID WASTE AUTHORITY

Liner Leakage Rates

Cell	Type of leak detection system	Size of cell (ha)	Liters/ ha/day	Total amount of liquid collected
Area D	Sand	8.9	115.6	813,056
Cell 3	Geonet	9.7	15.9	62,429
Area E	Geonet	13.2	7.4	102,237
Cell 4	Geonet	12.1	None, to date	

DSWA

DELAWARE SOLID WASTE AUTHORITY



DSWA

DELAWARE SOLID WASTE AUTHORITY

Cap Costs & Leachate Generation

Landfill	Cap Cost $/ha	Leachate Gen Liters/ha/day BC	Leachate Gen Liters/ha/day AC
Jones cross Cell 1	324,900	2,732	650
Jones cross Cell 2	243,800	6,775	706
Pigeon pt. Soil +Phyto	80,250	NA	7,336

Cap costs & Leachate Generation

Landfill	Cap cost $/ha	Leachate Gen Liters/ha/day BC	Leachate Gen Liters/ha/dayAC
Sandtown Cells A&B	67,800	3,426	3,775
Sandtown Cell C	192,100	3,710	1,318
Sandtown Cell D	175,700	4,081	893

Current trends in leachate recirculation in Delaware

- Our new landfill cells use Horizontal pipes to introduce leachate into the solid waste mass.
- The most promising method appears to be the “Horizontal Injection Trenches” or HIT’s.
- The volume of leachate required to saturate the solid waste can be estimated using the build up of pressure as a guide.
- The trench is allowed to rest and later the same pipe can be used to extract LFG.

Data Collection

- We are attempting to add to our already large data base with specific measurements of LFG production from various cells. This may help in improving our understanding of the behavior of landfill cells over a period of time.
- One must be patient in this respect and persistent in data collection.

DSWA
DELAWARE SOLID WASTE AUTHORITY

What should USEPA do to help improve landfills?

- Modify landfill cap requirements to allow more experimentation.
- For landfill cells with double liners, phyto caps should be allowed.
- Establish uniform criteria for collection of leachate and LFG data from all landfills in the nation.

DELAWARE SOLID WASTE AUTHORITY

What else can USEPA do to help reduce emissions of LFG?

- Expedite Title V permit issuance. It is taking too long!
- Actively support research to develop criteria for determining the end of the closure period of landfills.
- Actively support upgrading the training programs for landfill operators.