Preparing a PCC Reduction/Termination Plan

Kansas
Department of Health and Environment

10:30 to 11:30 AM, May 7, 2014 in Salina

Overview of this session:

- **Part 1 - A summary of key BWM documents re to PCC reduction/termination (R&/orT).**
- **Part 2 – A review of historical leachate data for five Subtitle D landfills; three active and two closed.**
- **Part 3 - A recommended procedure for preparing a PCC reduction/termination plan.**
- **Part 4 – What are my options?**

Part 1 – A Summary of Key Documents: Nos. 1 to 3.

No. 1 - Reduction and/or Termination of Postclosure Care Activities (Policy 2014-P2) clarifies when PCC activities can be reduced and/or terminated (**R&/orT**)*. **Activities include The Big Four:**

1) Maintaining final cover.
2) Monitoring groundwater & maintaining monitoring system.
3) Conducting a gas monitoring program.
4) Maintaining & operating leachate and gas collection systems.

*__R&/orT__ must: not present risk to **PH&SorE**; have an approved plan, maintain final cover & possible gas monitoring at facility boundary.

No. 2 – Clarification of PCC Terminology Terms:

Reduction – This term has to do with the possibility of **R&/or T** of some of the requirements of State regulations concerning the various activities related to PCC. It recognizes that monitoring data and/or other evidence will serve as the basis for the **R&/orT**. However, these efforts do not reduce the 30 year PCC requirement for maintenance of **The Big Four**; but, it does allow for reduced **financial assurance (FA)** requirements because of the **R&/orT** of PCC activities.

Termination – This term has to do with the end of a PCC activity or the end of PCC with the beginning of custodial care. Custodial care will normally involve minimal monitoring and maintenance activities which are necessary to protect **PH&SorE** in perpetuity. **FA requirements** are for maintenance of these activities and to provide funds for any future remedial activities.

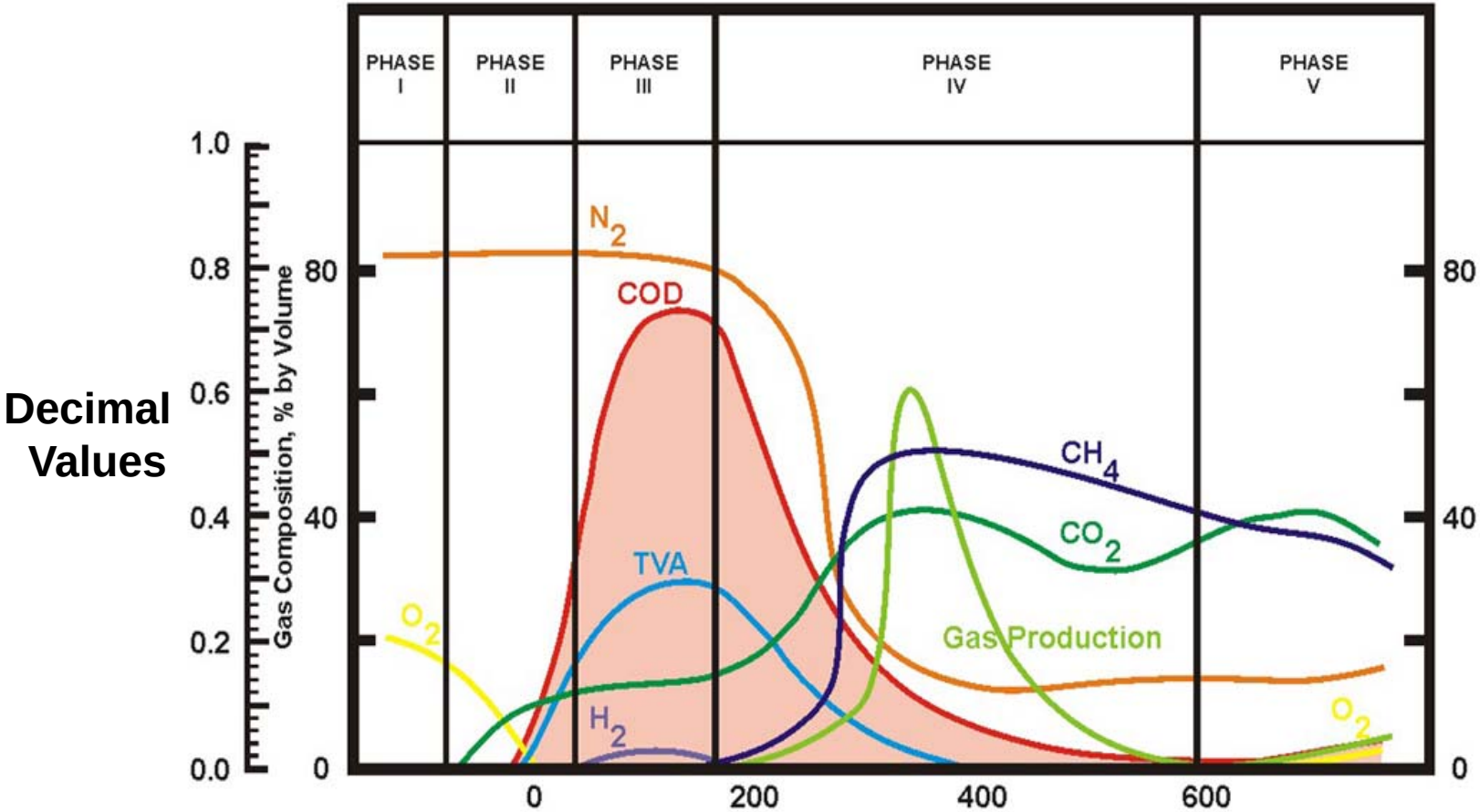
Equilibrium – This is term used to describe the state of MSW which results in stable amounts of leachate and LFG production (This refers to mass flow as opposed to concentration values.) as well as groundwater quality. It is reached by controlling the outside forces affecting the stored MSW such as liquid inputs and final cover design. It does not indicate that the stored MSW is stable; hence, if outside forces are allow to impact the MSW, then the potential for harm to **PH&SorE** is greater

Stabilization – This term refers to the MSW stability in terms of its ability to degrade as a result of outside forces; mainly, moisture, which allows indigenous microbes to process the biodegradable components of the MSW to various end products such as leachate and LFG. Stable MSW results in minimal emissions which are at equilibrium, and which provide a minimal effect on **PH&SorE**. In this case stability is synonymous to equilibrium.

Hypothetical Emission Curves

- The following three slides by different authors are variations of the same trends in leachate and/or landfill gas emission data. They represent the **instantaneous value** of each parameter **at a given time** relative to the other parameters.

MSW Stabilization – Gas Production (according to ITRC 2006)



According to Pohland/Kim (1999)

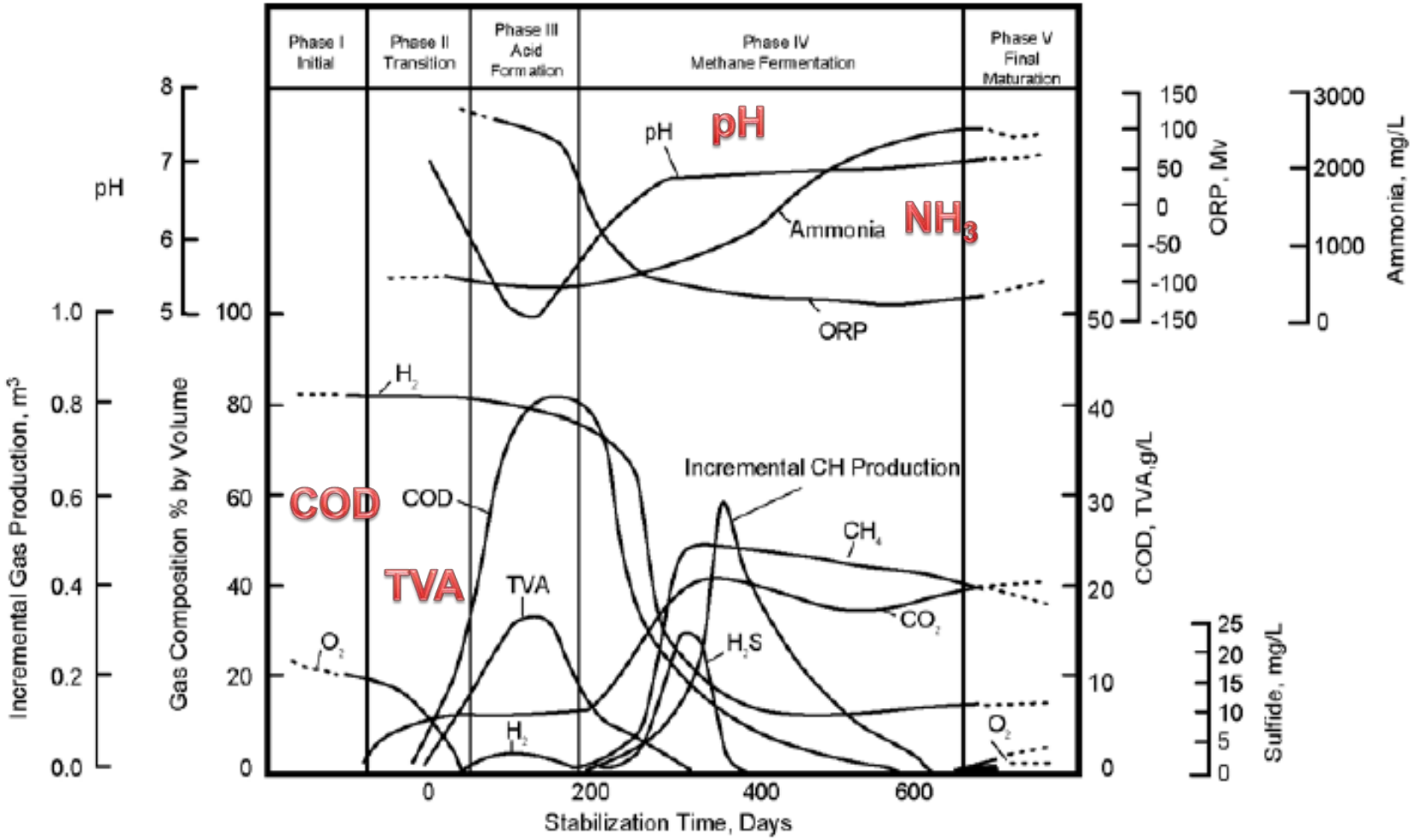


Figure 1: Phases of anaerobic decomposition in MSW landfills (adopted from Pohland and Kim 1999).

According to Kjeldsen et al (2002)

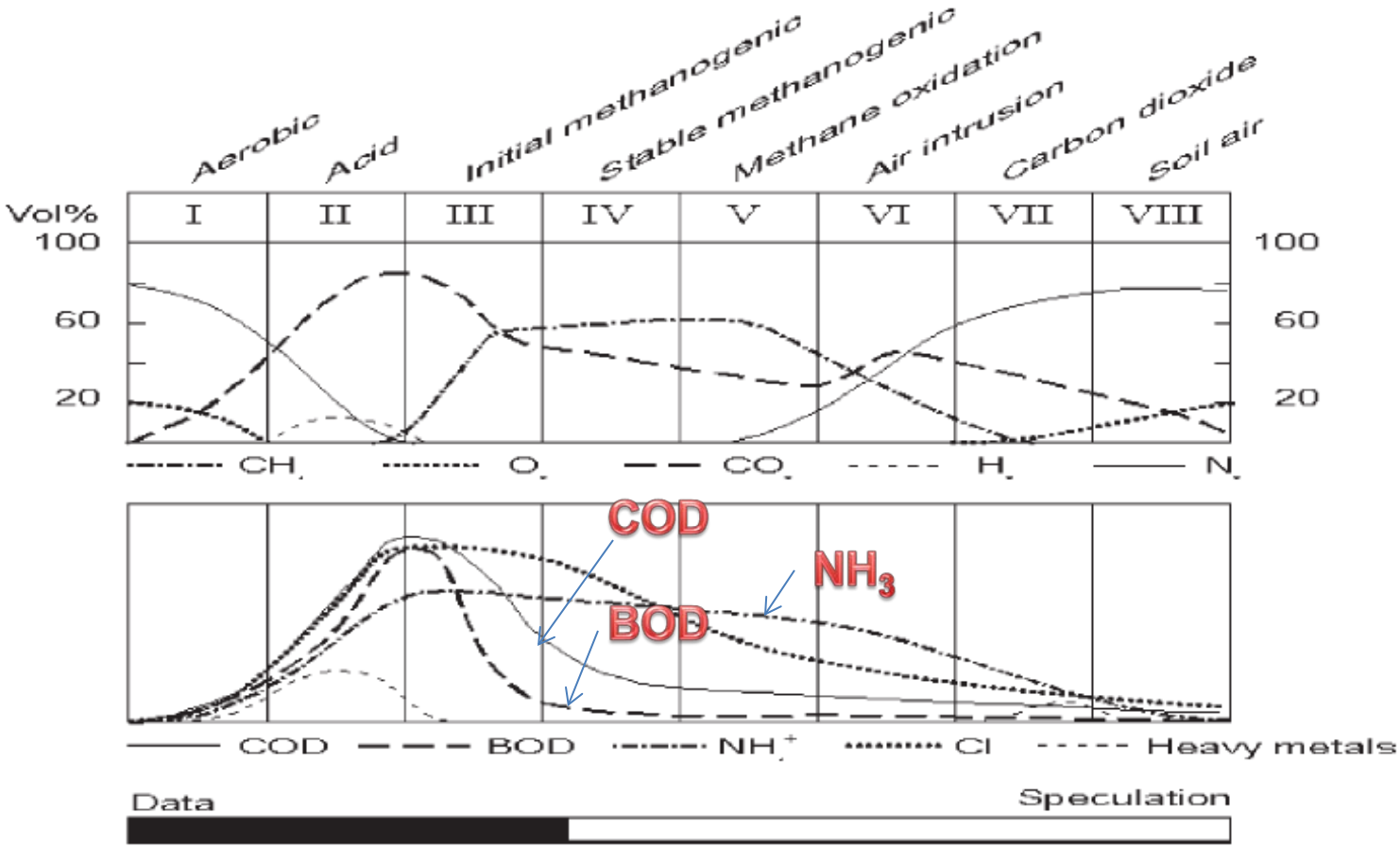


FIGURE 1. The lifetime of a landfill showing general trends in gas and leachate quality development.

Note BWM website document re to Total & Soluble BOD_5 & COD.

No. 3 - Post Closure Care (PCC) Termination Plans: Principles and Needs (11-27-12). This paper uses data collected at the Allen and Johnson County Landfills to demonstrate the basic principles for PCC termination determination and the data needs to accomplish this task. It is the basis for **Part 3** of this session; but, let's move onto **Part 2** which is a review of available leachate data for selected landfills; active and closed.

Part 2 – A review of historical leachate data.

Allen County: Phases I & II into wet well, then into SEB No. 1; Phase 1A sump discharge directly into SEB No. 1; active.

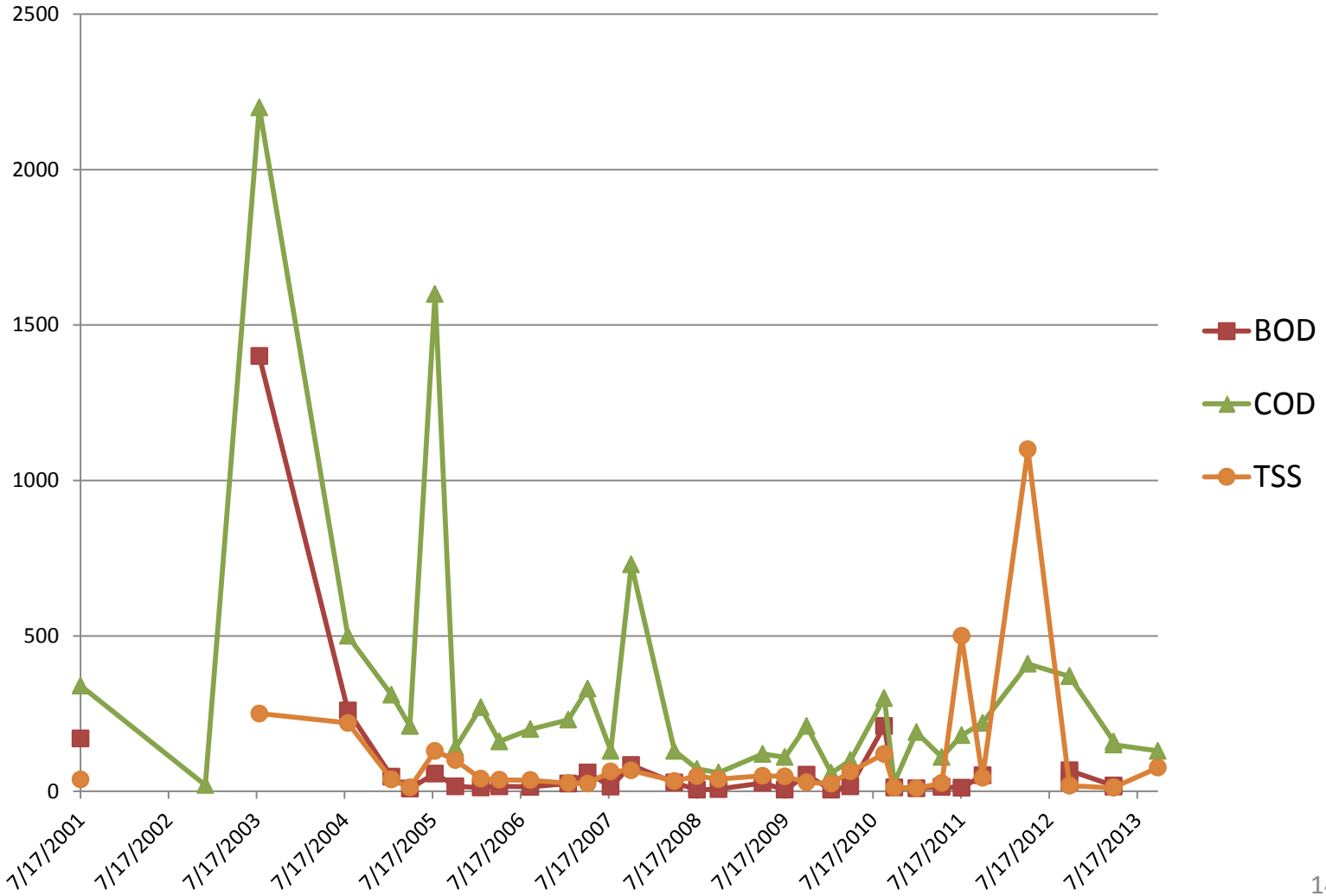
Coffey County: Phases 1 & 2 with sump discharges; active.

Oak Grove: Phases 001 with sump discharge; Phases 003 & 005 with tank discharges; active.

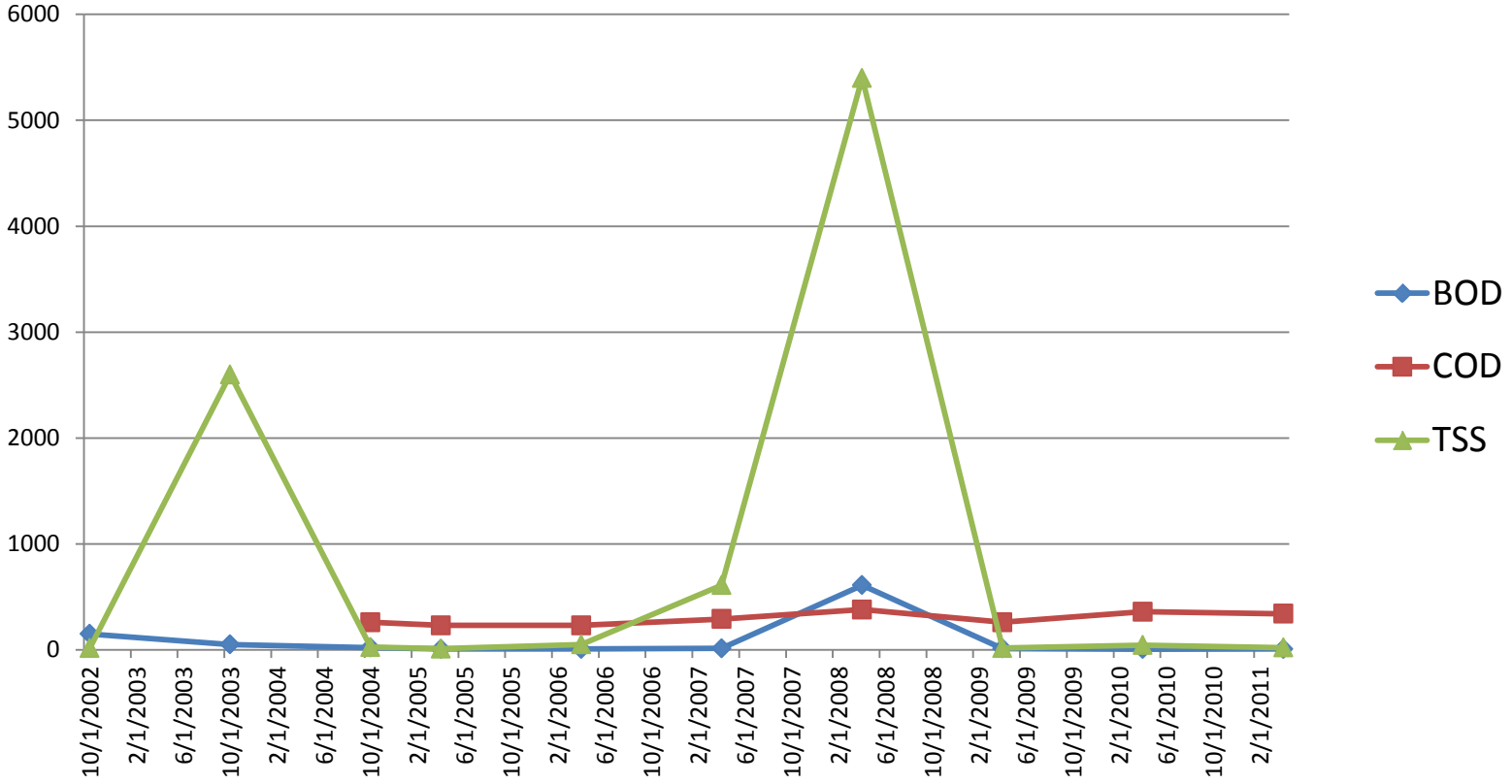
Forest View: All phases sump discharge; exception to 9-2013 data; closed 12-29-06.

Wheatland: All phases tank discharges; closed 3-1-10.

Allen County Leachate Quality of SEB Basin No. 1 (mg/L)

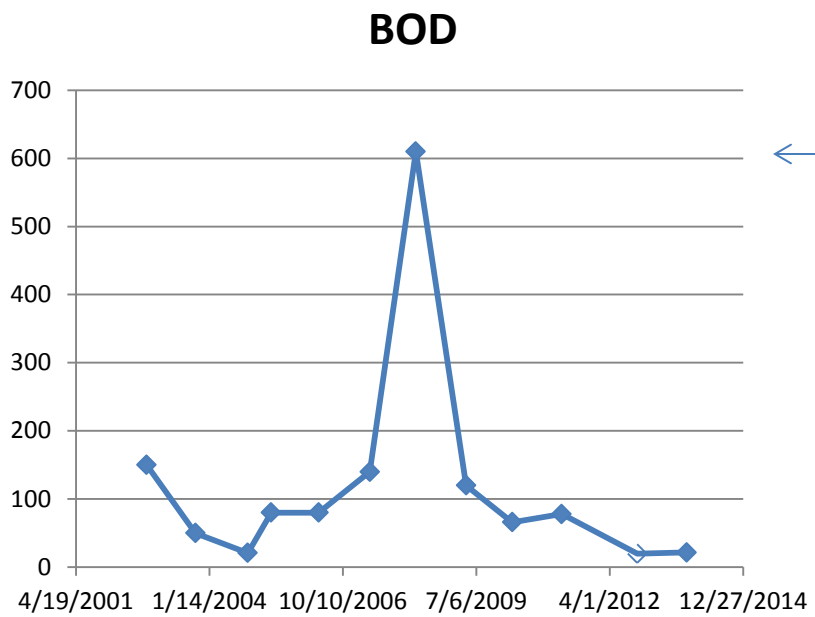


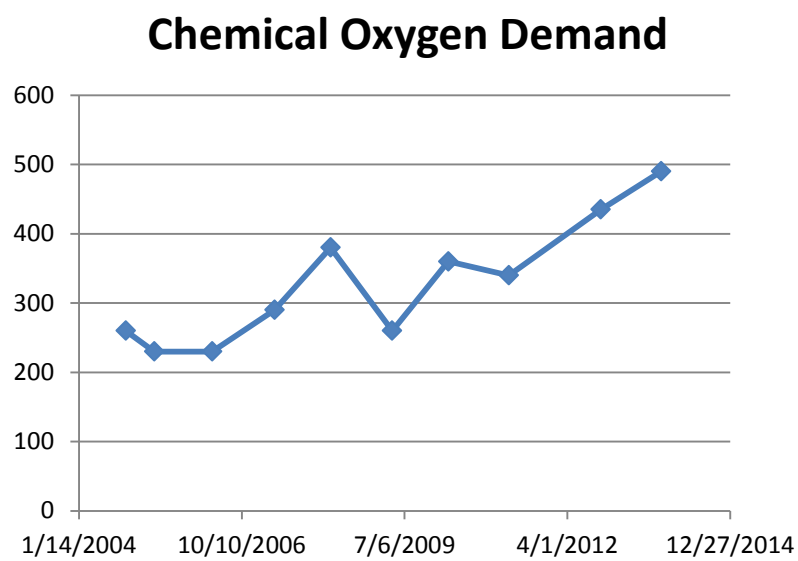
Coffey County Leachate from Sump Discharge (mg/L)



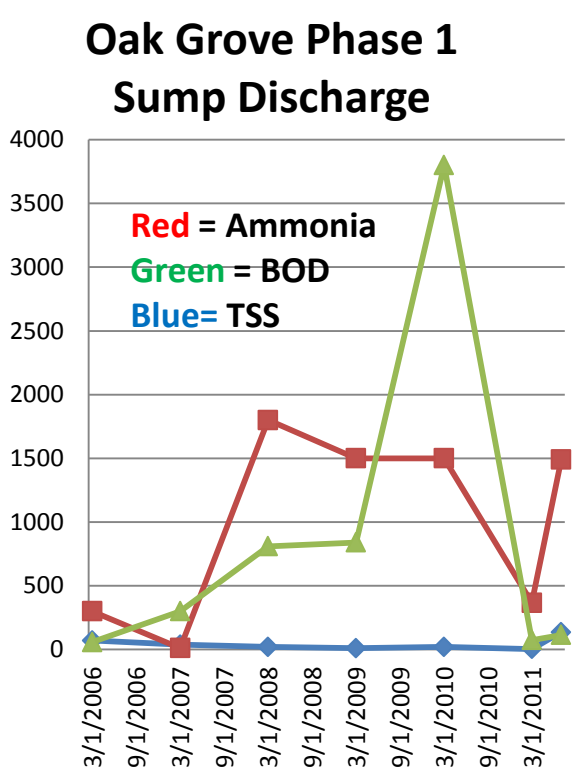
Coffey County Leachate from Sump Discharge (mg/L)

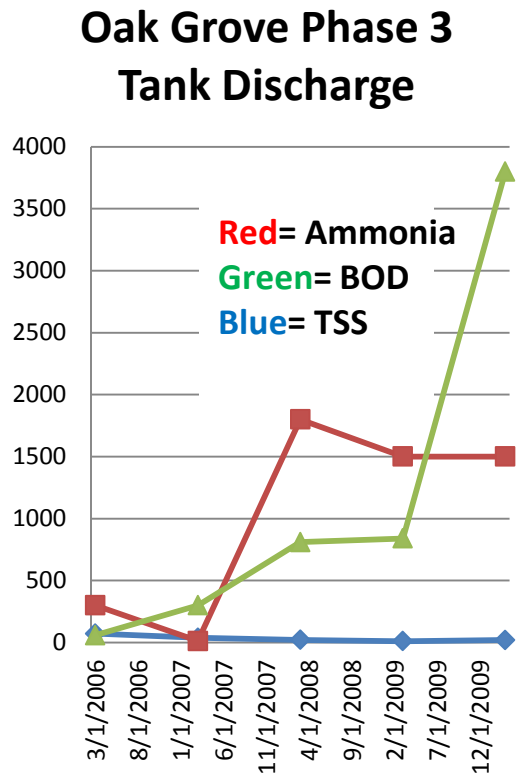
(Note more recent data included)

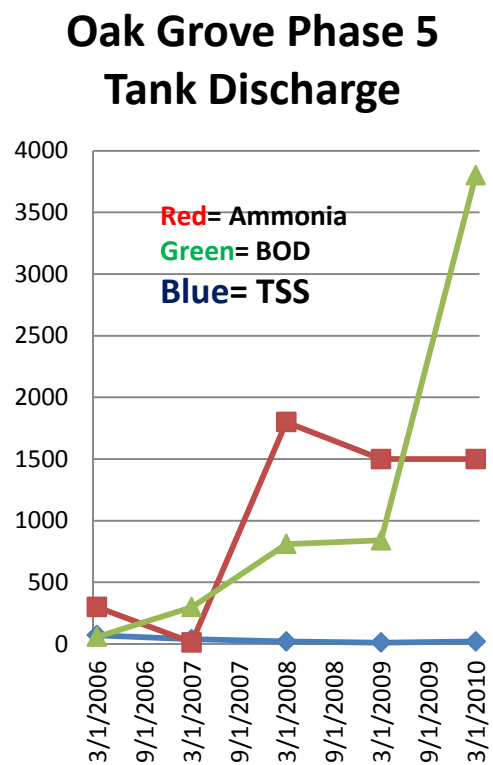




Oak Grove Leachate Concentrations (mg/L) for Different Sampling Locations

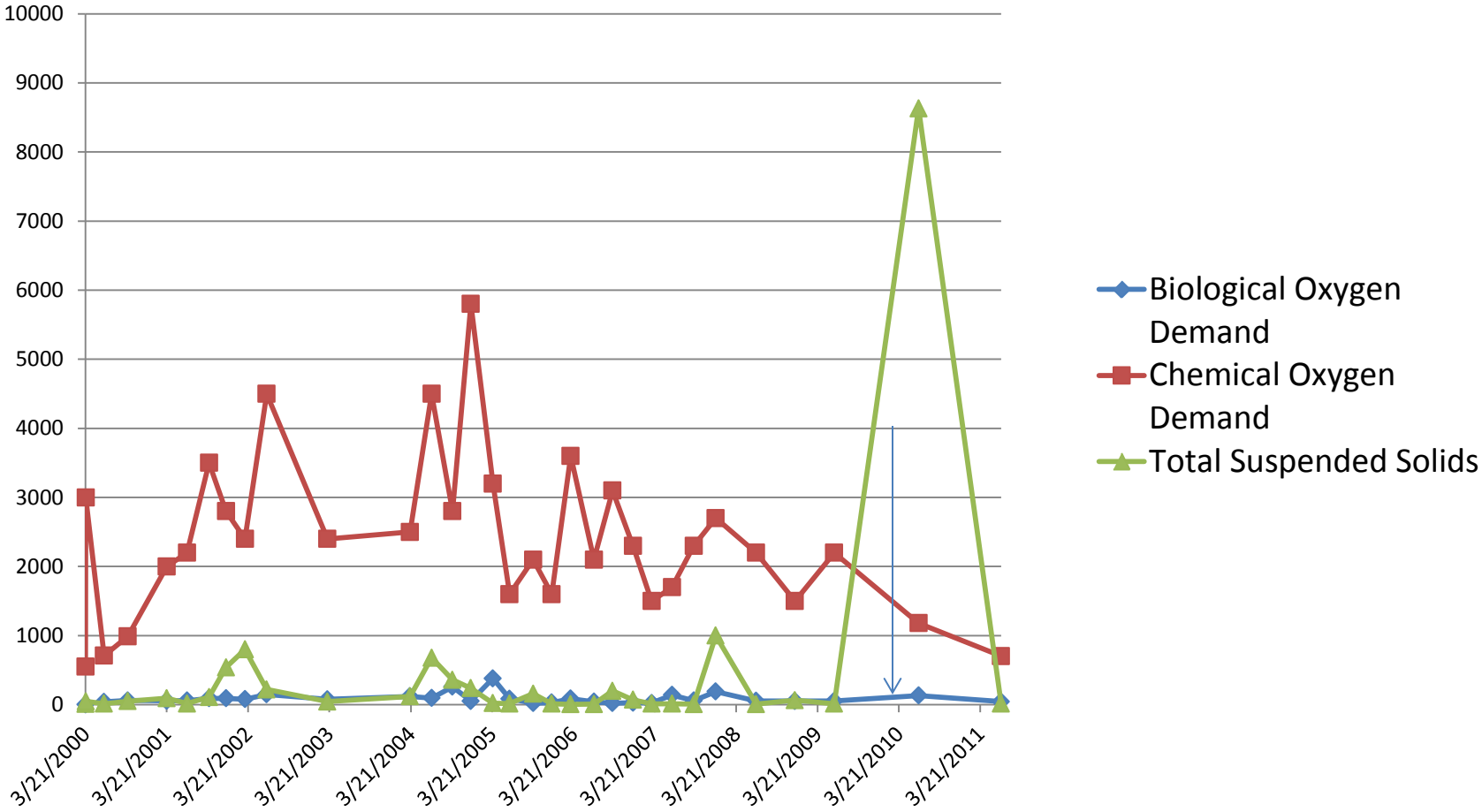






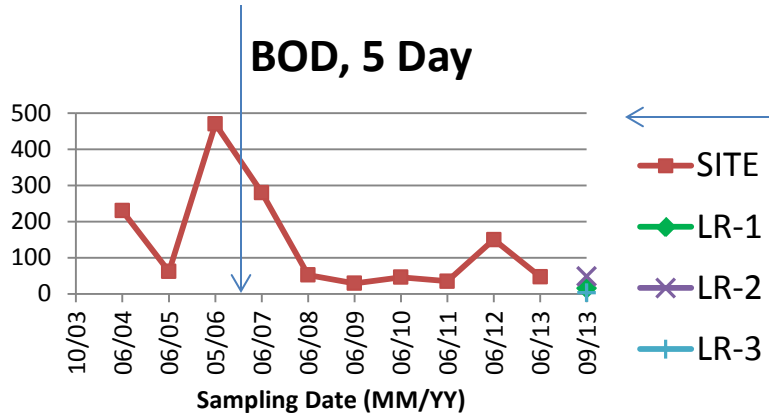
Wheatland Leachate from Tank

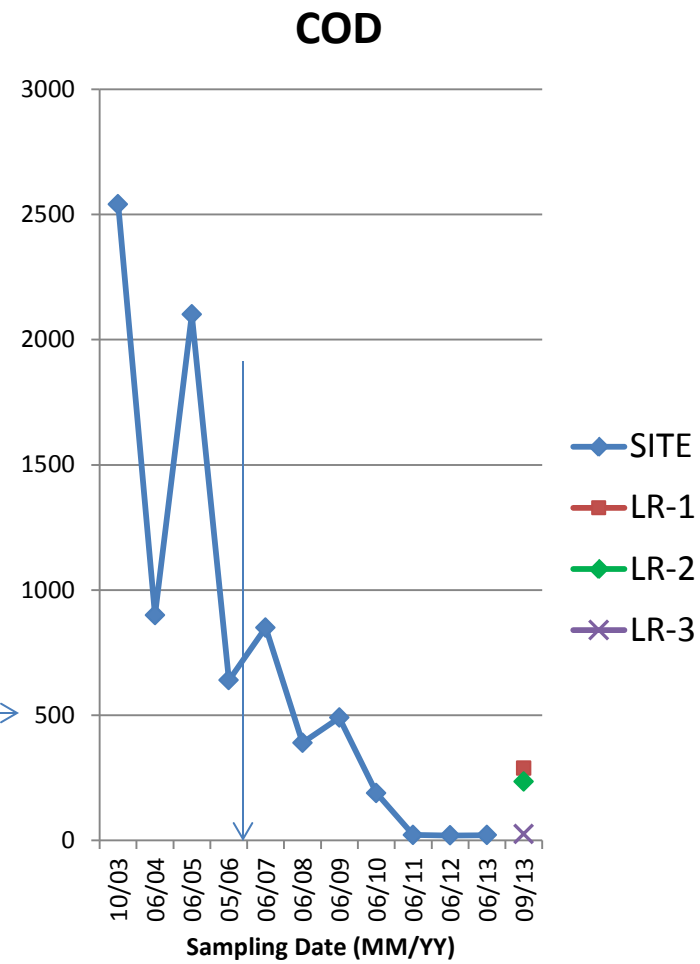
(mg/L)(Closed 3-1-10)



Forest View Leachate (mg/L)

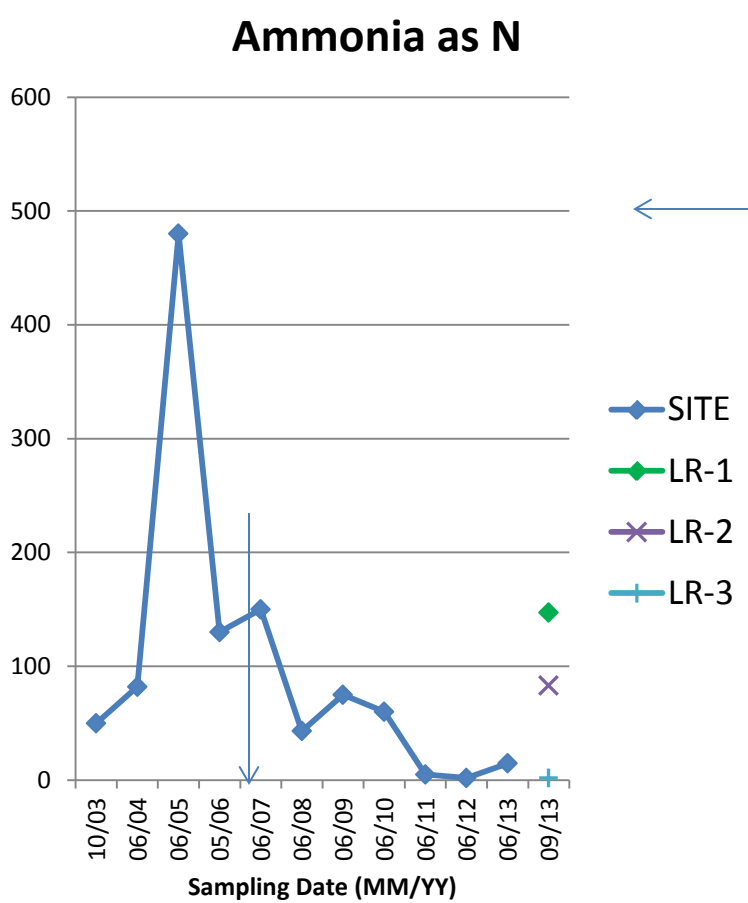
(Closed 12-29-06) LR = Leachate Riser Samples

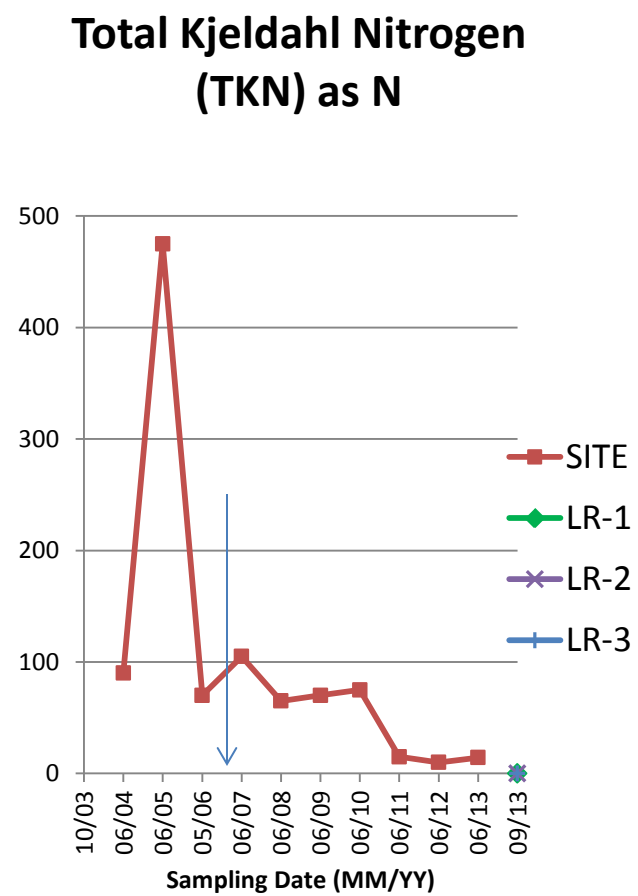




Forest View Leachate (mg/L)

(Closed 12-29-06) LR = Leachate Riser Samples





Key Emission Parameters

1. **Leachate**: Quantity, BOD_5, COD, TSS, NH_3, pH & T. **Estimated cost per sample: $100 to 340**

2. **Landfill Gas**: Flow rate, CH_4, CO_2, NMOCs & O_2. **Estimated cost per sample: $105 to 140**

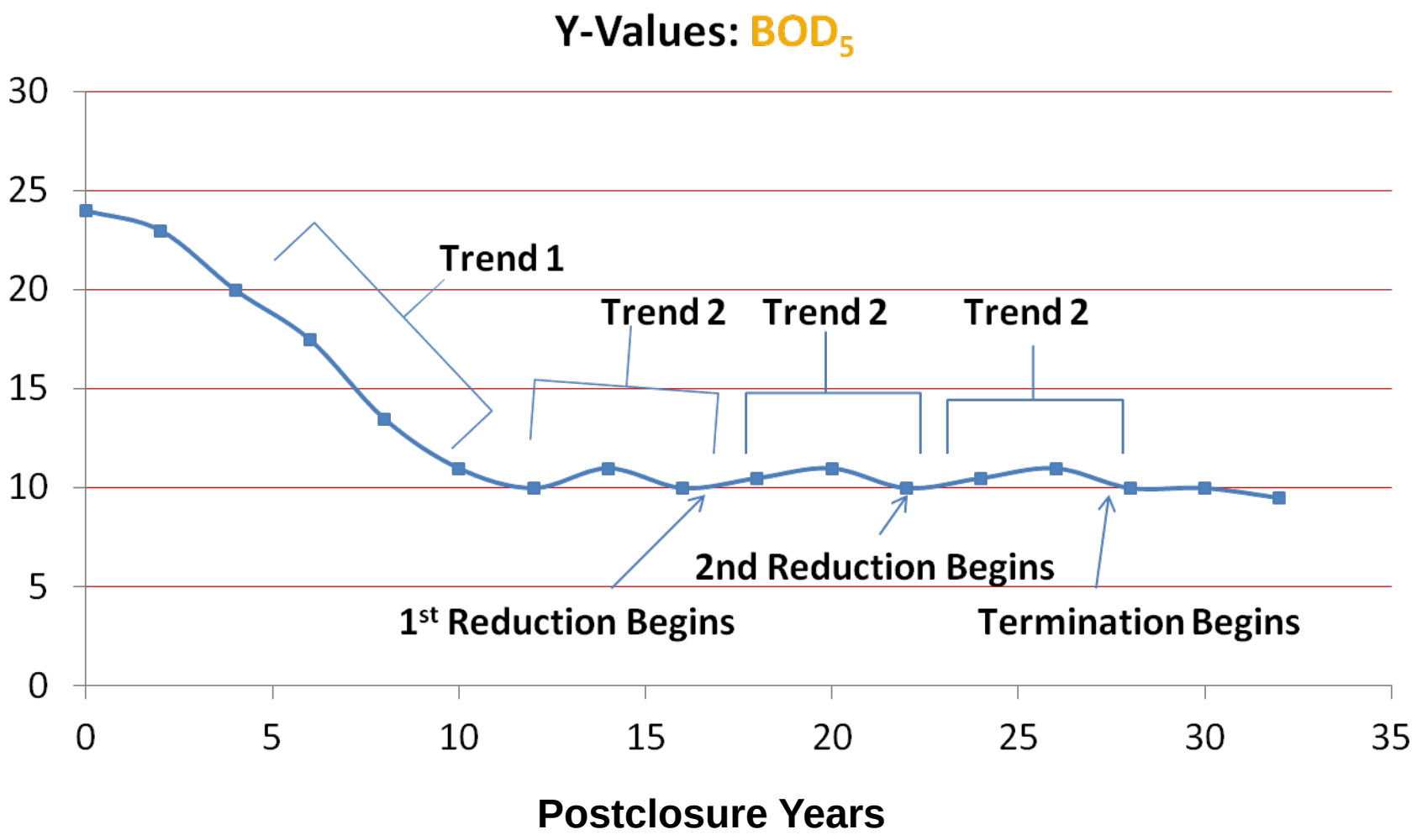
3. **Groundwater**: See KAR 28-29-104. **Estimated cost of about $2,000**

Trend Methodology determines when one or more PCC activities may be **R&/orT**. **Key requirements for key parameters are:**

1. Will involve a **minimum of 3 major evaluation periods of at least 5 years each**; each statistically verifiable.
2. Equilibrium determination for landfill emissions can be **quarterly for 5 years** with no significant difference in key parameters values with time. If different, then a new 5 year demonstration period begins.

3. After **1 demonstration period** with key parameters in equilibrium, **reduction** may begin with KDHE approval.
4. After **3 demonstration periods** with key parameters in equilibrium, appropriate activities may **terminate** with KDHE approval.

Example 5 Year Trends for One Key Parameter:



Part 3 - A recommended procedure for preparing a PCC reduction/termination plan.

TGD SW-2014-G1 for the subject task is a detailed procedure to revise an approved PCC plan. Basically, if a landfill owner/operator wants to **R&/orT** any activities before 30 years, they must have a licensed engineer submit a revised plan for BWM approval. The **heart of this plan** will be a proposed data collection effort for leachate and LFG emissions as well as GW monitoring results.

Supplemental Parameters (besides the key parameters) Justification:

(also, see No. 3 Reference - **PCC Termination Plans: Principles and Needs** paper)

"A successful PCC termination plan must be based on a *predetermined monitoring plan* designed to provide the data necessary for implementing the methodology used to determine PCC R&/orT dates."

Mass Balance Calculations

- **A *predetermined monitoring plan* should also consider the Conservation of Mass principle (besides trend analysis) where:**
- **Input = Output + Accumulation**
- **Tables 1 to 2 define the first two parts of the equation for leachate so that the last part can be estimated**

Table 1 – Ideal Input Leachate Values (ACL in green)

Values	Accounting Or Monitoring	Measurement Frequency	Data Summary
MSW et al Inputs	Tonnage	Daily	Monthly
Liquid Inputs	MSW Moisture	Estimated	Based on ppt. events
	RD&D Liquids (gallons)	As applied	Quarterly
	Leachate Recirculation (tonnage or volume)	As applied	Quarterly
	Other Liquids (e.g., Toe Drainage)	As applied	Quarterly
Climatic: Inputs	Precipitation (inches as rain or snow)	As occurs	Quarterly
Ambient	Temperature (°F)	Daily (highs & lows)	Monthly
On-Site or Local Weather Station	Various Data Available	Depends on Station Daily & Monthly (Chanute)	Daily or Internet

Table 2 – Ideal Output Leachate Values (ACL in green)

Values	Phases	Frequency	Data Summary
Quantity	Individual	Monthly	Quarterly
	Combined	Monthly	Quarterly
Quality	Individual	Quarterly	Quarterly
	Combined	Quarterly & Annual	Quarterly
Temperature	Individual	Monthly	Quarterly
	Combined	Monthly	Quarterly
Storage: Tank(s)	Individual	Weekly	Annual
	Combined	Periodic?	?
Lagoon(s)	Individual	Weekly	Annual
	Combined	Periodic	?
On-site Treatment	Individual	Daily	Monthly
	Combined	As Treated	Monthly
Off-site Disposal*	Individual	Daily	Monthly
	Combined	As Hauled	Monthly
* May include POTW	quantity and quality,	regular or periodic,	check data.

Table 3 – Ideal Output LFG Values

Values	Phases	Frequency	Data Summary
Quantity	Individual Combined	Monthly Quarterly	Quarterly Quarterly
Quality	Individual Combined	Monthly Quarterly	Quarterly Quarterly
Temperature	Individual Combined	Monthly Quarterly	Quarterly Quarterly
On-site Usage	Individual	Daily	Monthly
Flare	Combined	As used	Monthly
Off-site Usage*	Combined	As discharged	Monthly
Off-site CAA Migrations*	Individual Combined	Daily or Periodic Daily or Periodic	Quarterly Quarterly
* May include users	and/or government	quantity and quality	data.

Part 4 - What are my options?

Stay with your current **30+ year** PCC plan as defined in your approved permit along with the approved FA costs.

OR

1. Determine the cost savings resulting from the **R&/orT** of **The Big Four** activities. Use revised FA costs to identify possible savings.
2. If No.1 is favorable, prepare a proposed **R&/orT** plan and submit the plan for BWM approval.

Questions

11:30 AM to Noon

Kansas Department of Health and Environment

Kansas
Department of Health
and Environment

www.kdheks.gov