US EPA ARCHIVE DOCUMENT

Working Towards Field Implementation of LF Bioreactors

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Regulatory Drivers

- *RD&D rule, proposed June 2002*

  40 CFR part 258.
- *40 CFR Part 63, NESHAPS Rule, January 16, 2003*

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Transition of Policy Impacting the Research

- *Presently few operating sites with outside liquid addition.*
- *Agency focus on Biosolids Safety in land spreading and landfills.*
- *Need for green energy in the United States.*
- *Trading of greenhouse gas emission credits, establishment of CCX.*

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USEPA/WM CRADA

- *5 year Cooperative Research & Development Agreement.*
- *Rigid QA/QC procedures through a QAPP.*
- *Designed for Statistical Interpretation.*
- *Four LF Bioreactors, Two Control Subtitle D Cells.*

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CRADA Project Objectives

- *To determine the parameters and trends that should be monitored to assess the performance of and control a bioreactor landfill.*
  - *Leachate*
  - *Gas Management/Fugitive Emissions*
  - *Solids Decomposition*
- *Two primary sites*
  - *Area 7 – New fill*
  - *Area 5 – Existing fill to be retrofitted, and will use nitirified leachate to control ammonia levels*
  - *Shared experimental control area*

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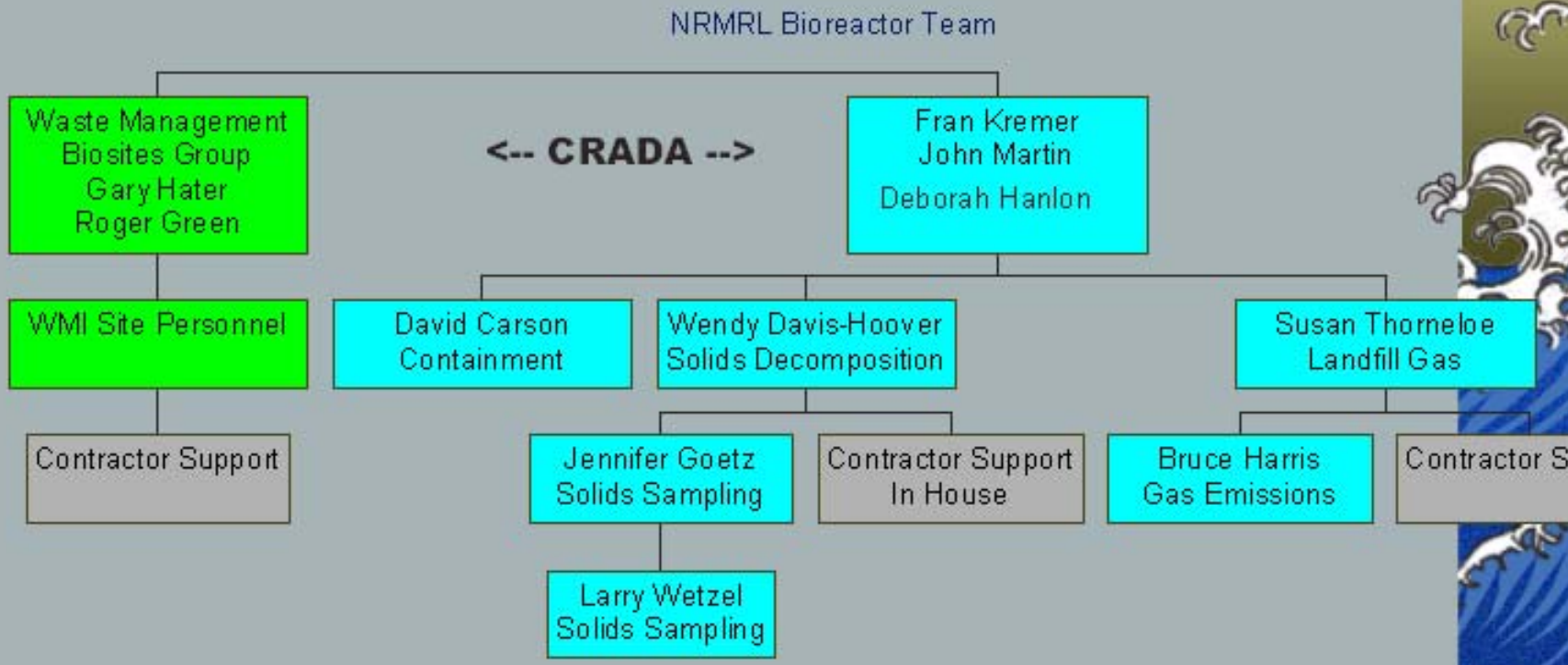
CRADA Team Structure



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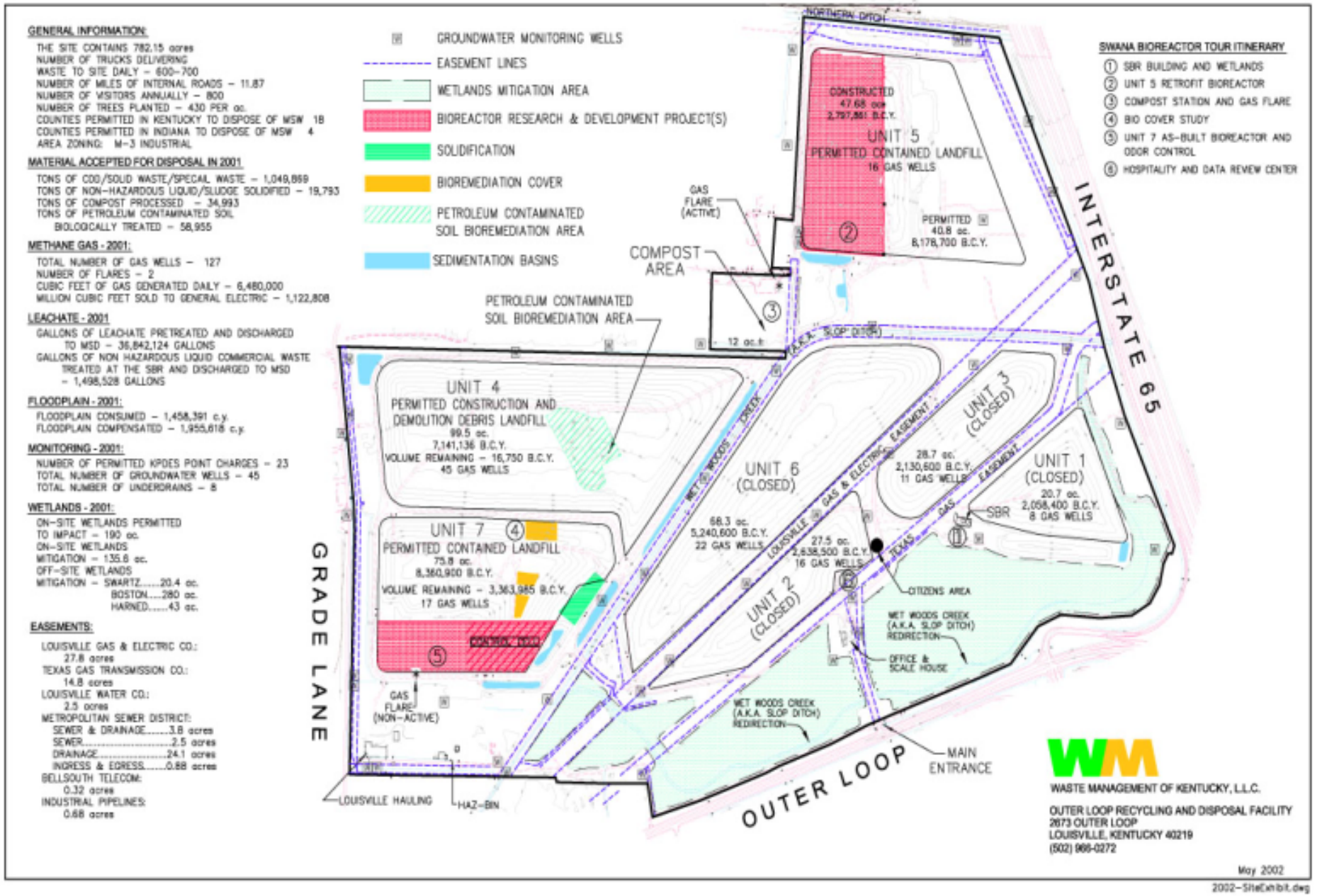
The Site


GENERAL INFORMATION:
THE SITE CONTAINS 782.15 acres
NUMBER OF TRUCKS DELIVERING WASTE TO SITE DAILY – 600–700
NUMBER OF MILES OF INTERNAL ROADS – 11.87
NUMBER OF VISITORS ANNUALLY – 800
NUMBER OF TREES PLANTED – 430 PER ac.
COUNTIES PERMITTED IN KENTUCKY TO DISPOSE OF MSW 18
COUNTIES PERMITTED IN INDIANA TO DISPOSE OF MSW 4
AREA ZONING: M–3 INDUSTRIAL
MATERIAL ACCEPTED FOR DISPOSAL IN 2001
TONS OF COD/SOLID WASTE/SPECAIL WASTE – 1,049,869
TONS OF NON–HAZARDOUS LIQUID/SLUDGE SOLIDIFIED – 19,793
TONS OF COMPOST PROCESSED – 34,993
TONS OF PETROLEUM CONTAMINATED SOIL BIOLOGICALLY TREATED – 58,955
METHANE GAS - 2001:
TOTAL NUMBER OF GAS WELLS – 127
NUMBER OF FLARES – 2
CUBIC FEET OF GAS GENERATED DAILY – 6,480,000
MILLION CUBIC FEET SOLD TO GENERAL ELECTRIC – 1,122,808
LEACHATE - 2001
GALLONS OF LEACHATE PRETREATED AND DISCHARGED TO MSD – 36,842,124 GALLONS
GALLONS OF NON HAZARDOUS LIQUID COMMERCIAL WASTE TREATED AT THE SBR AND DISCHARGED TO MSD – 1,498,528 GALLONS
FLOODPLAIN - 2001:
FLOODPLAIN CONSUMED – 1,458,391 c.y.
FLOODPLAIN COMPENSATED – 1,955,618 c.y.
MONITORING - 2001:
NUMBER OF PERMITTED KPDES POINT CHARGES – 23
TOTAL NUMBER OF GROUNDWATER WELLS – 45
TOTAL NUMBER OF UNDERDRAINS – 8
WETLANDS - 2001:
ON–SITE WETLANDS PERMITTED TO IMPACT – 190 ac.
ON–SITE WETLANDS MITIGATION – 135.6 ac.
OFF–SITE WETLANDS MITIGATION – SWARTZ.....20.4 ac.
BOSTON.....280 ac.
HARNED.....43 ac.
EASEMENTS:
LOUISVILLE GAS & ELECTRIC CO.: 27.8 acres
TEXAS GAS TRANSMISSION CO.: 14.8 acres
LOUISVILLE WATER CO.: 2.5 acres
METROPOLITAN SEWER DISTRICT:
SEWER & DRAINAGE.....3.8 acres
SEWER.....2.5 acres
DRAINAGE.....24.1 acres
INGRESS & EGRESS.....0.88 acres
BELLSOUTH TELECOM: 0.32 acres
INDUSTRIAL PIPELINES: 0.68 acres
GROUNDWATER MONITORING WELLS
EASEMENT LINES
WETLANDS MITIGATION AREA
BIOREACTOR RESEARCH & DEVELOPMENT PROJECT(S)
SOLIDIFICATION
BIOREMEDIATION COVER
PETROLEUM CONTAMINATED SOIL BIOREMEDIATION AREA
SEDIMENTATION BASINS
SWANA BIOREACTOR TOUR ITINERARY
① SBR BUILDING AND WETLANDS
② UNIT 5 RETROFIT BIOREACTOR
③ COMPOST STATION AND GAS FLARE
④ BIO COVER STUDY
⑤ UNIT 7 AS–BUILT BIOREACTOR AND ODOR CONTROL
⑥ HOSPITALITY AND DATA REVIEW CENTER
NORTHERN DITCH
CONSTRUCTED 47.68 ac. 2,797,861 B.C.Y.
UNIT 5 PERMITTED CONTAINED LANDFILL 16 GAS WELLS
PERMITTED 40.8 ac. 8,178,700 B.C.Y.
GAS FLARE (ACTIVE)
COMPOST AREA
PETROLEUM CONTAMINATED SOIL BIOREMEDIATION AREA
12 ac.±
A.K.A. SLOP DITCH
INTERSTATE 65
UNIT 4 PERMITTED CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL 99.5 ac. 7,141,136 B.C.Y. VOLUME REMAINING – 16,750 B.C.Y. 45 GAS WELLS
UNIT 7 PERMITTED CONTAINED LANDFILL 75.8 ac. 8,360,900 B.C.Y. VOLUME REMAINING – 3,363,985 B.C.Y. 17 GAS WELLS
CONSTRUCTION
GAS FLARE (NON–ACTIVE)
GRADE LANE
LOUISVILLE HAULING
HAZ–BIN
WET WOODS CREEK
UNIT 6 (CLOSED) 68.3 ac. 5,240,600 B.C.Y. 22 GAS WELLS
LOUISVILLE GAS & ELECTRIC EASEMENT
UNIT 3 (CLOSED) 28.7 ac. 2,130,600 B.C.Y. 11 GAS WELLS
UNIT 1 (CLOSED) 20.7 ac. 2,058,400 B.C.Y. 8 GAS WELLS
TEXAS GAS EASEMENT
SBR
UNIT 2 (CLOSED) 27.5 ac. 2,638,500 B.C.Y. 16 GAS WELLS
CITIZENS AREA
WET WOODS CREEK (A.K.A. SLOP DITCH) REDIRECTION
OFFICE & SCALE HOUSE
WET WOODS CREEK (A.K.A. SLOP DITCH) REDIRECTION
MAIN ENTRANCE
OUTER LOOP
WASTE MANAGEMENT OF KENTUCKY, L.L.C.
OUTER LOOP RECYCLING AND DISPOSAL FACILITY
2673 OUTER LOOP
LOUISVILLE, KENTUCKY 40219
(502) 966-0272
May 2002
2002–SiteExhibit.dwg

USEPA/WM CRADA

- *Progress Report is Due out in 2003.*
- *Conference Publish Rate is >4 /year.*
- *Additional Sites to be Added in Future.*

Unique Features:

- *Air Emissions Monitoring.*
- *Outside Liquid Addition.*
- *Compost Cover Study.*
- *High Biosolids Rate.*

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What Designs to Study?

- *As Built vs. Retrofit*
- *Anaerobic*
- *Facultative*
- *Aerobic-Anaerobic*
- *Aerobic*

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Surface Application of Liquids in
a “as built” System.

Deck Watering as Means of
Adding Moisture.

Trenching for a Retrofit

Monitoring Philosophy & Key Parameters

- *Reference USEPA/WM QAPP*
  - *Leachate*
  - *Settlement & Mass*
  - *Gas Production*
  - *Air Emissions*

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What is the Minimum, for Leachate at New Research Sites

- *Chemical oxygen demand*
- *Biochemical oxygen demand*
- *Temperature*
- *pH (field)*
- *Volatile organic acids*

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What is the Minimum, for the Waste Mass at New Research Sites

- *Waste temperature*
- *Waste settlement (GPS)*
- *Organic solids**
- *Moisture content (calculated)**
- *pH**
- *Biochemical methane potential (BMP)**

** low frequency, based on mass collection during placement and drilling.*

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What is the Minimum, for Gas at New Research Sites

- *Methane, field, lab (Summa)*
- *Carbon dioxide, field, lab (Summa)*
- *Oxygen, field, lab (Summa)*
- *Gas volume*
- *Perhaps, more frequent Surface emission monitoring*

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Frequency of Sampling

- *Leachate: monthly – quarterly**
- *Mass (GPS):quarterly –24 months*
- *Gas: monthly*
- *Surface Emissions – quarterly*

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Operational Expertise

- *Review Bibliography for Industry.*
- *Review recent Conference Literature.*
- *Visit Web Sites.*
- *Call Operating Facilities and ask for Tour of the Facility.*

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Publications

- *SWANA*
- *NSWMA*
- *LMOP*
- *Sardinia Proceedings*
- *USEPA/WM Interim CRADA Document*

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Web Sites

- http://www.bioreactor.org/
- http://www.epa.gov/projectxl/yolo/index
- http://www.epa.gov/epaoswer/non-hw/muncpl/landfill/bioreactors.htm
- http://www.wm.com/bio.asp

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Areas of Permit Applicant & Permitting Focus:

- *Collection of an Operating Record that helps the industry.*
- *Set up Key Areas of Concerns for Interaction, surface application of liquids, outside liquids, leachate breakout-repair,odors,alternate covers.*

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