Sunshine Canyon Landfill Local Enforcement Agency

SCL LEA Progress Report
on April 2, 2015 Board Motion

December 2015
Nowland “Skip” Bambard, Board of Directors
1945 - 2015

We will miss you..!
Action Item #1 – Direct the SCL LEA Program Manager, upon completion of the review of both SCAQMD consultants’ reports, to provide the Board members with a report of the SCL LEA recommendations along with the technical backup, documentation and reasoning for those recommendations.

- Completed review of SCAQMD Hydro Geo Chem report and Yazdani report SCL LEA reviewing Yazdani report
- SCAQMD to provide summary of findings
- SCL LEA compiled a comprehensive list of potential programs and actions for odor mitigation at the landfill (document will be a continually updated technical document)
  - Available on SCL LEA Website
Overview of SCL LEA “Compilation” and Recommendations

• Implement plastic ADC
  – Pilot Program began October 12, 2015

• Implement “Peel Back” of Soil
  – SCL LEA evaluating proposal

• Now focus on “Intermediate Cover”
  – SCL LEA believes this to be critical for improving LFG collection system
Sunshine Canyon Landfill
Local Enforcement Agency

Technical / Regulatory Basis for SCL LEA
Recommendations / Actions
Basis of SCL LEA Recommendations

• Extensive independent SCL LEA research / analysis
  – Supporting documentation and references
  – Provided to Interagency Task Force
  – Publically accessible
    www.dropbox.com/sh/nm5341eupq7dxj5/AAA42v6lZFt-CGYQdFffLfqta?oref=e&n=88965574

• Summary of Analysis / Recommendation
  – SCL LEA “Compilation of Potential Mitigation Practices and Programs”
Basis of SCL LEA Recommendations

• Regulatory agency/industry recognition to beneficial use of ADC over the last 30 years
• SCAQMD consultant reports recommend use of plastic ADC
  – HGC Report (Field Testing Evaluation of LFG System)
  – Yazdani Report (Independent review of HGC report and supplemental recommendations)
• SCL LEA survey of landfills utilizing EnviroCover show beneficial reduction of odors and improvements to LFG and leachate collection
Landfills Contacted about EnviroCover

Currently use the EPI EnviroCover:

• River Birch Landfill, Louisiana (Active)
• Catawaba County Landfill, North Carolina (Active)
• Fresno County Landfill, California (Active)
• Mauritius Landfill, Mauritius (Active)

Discontinued Use of EPI EnviroCover:

• Puente Hills Landfill (Closed)
• Whitfield Westside Landfill, GA (Active)
• East Calgary Landfill, Canada (Active)
Overall Findings about EnviroCover

• None of the landfills contacted experienced odor problems due to the use of EnviroCover.
• None of the landfills contacted experienced any negative impact with their gas collection systems. River Birch LF thinks their gas collection system did improved.
• None of the landfills contacted experience any negative impact with their leachate collection system. Mauritius landfill said their leachate collection system improved with the installations of the EnviroCover.
• Most of the landfills contacted experienced a slight difficulty applying the film during high wind conditions. The landfills suggested/recommended to operate slowly.
• All of the landfills saved time covering daily trash.
Basis of SCL LEA Recommendations (continued)

Examples of Regulatory/Industry Changes


• CalRecycle Best Management Practices
Basis of SCL LEA Recommendations (continued)

Examples of Regulatory/Industry Changes

• SWANA, Manager of Landfill Operations (MOLO) Training 2010

• Republic Consultant’s Reports
  – Brown and Caldwell
  – Cornerstone Environmental Group
  – Bryan A. Stirrat and Associates
  – A-Mehr Inc.

• Blue Ridge Services White Paper
  – N. Boulton (Taught CalRecycle’s ADC Course)
Review of EPA Historical Documents

- Sanitary Landfill Bibliography
  http://nepis.epa.gov/Exe/ZyPDF.cgi/9100MSFE.PDF?Dockey=9100MSFE.PDF
  Public Health Service Publication # 1819 (from 1929 to 1971)

- Sanitary Landfill Facts

  - 7.5 cm to 15.0 cm (3” – 6” of compacted soil prevents fly larvae emergence)
  - Most referenced document for 6” of soil cover to control flies
The daily soil cover may inhibit gas movement and interaction, and create pockets of gas which restrict gas collection.
Upward movement of landfill gas can be inhibited by landfill cover material (e.g., by daily soil cover...). When upward movement is inhibited, the gas tends to migrate horizontally to other areas within the landfill or to areas outside the landfill...
6.3.3 Perched Leachate

Perched leachate (which does not have full hydraulic connection to the underlying LCRS) can occur as a result of a number of conditions in a landfill. Excessively clogged filters above the drainage layer, low-permeability buffer (or protection) soils placed above the LCRS, low-permeability daily cover, and high moisture content sludges (industrial or sewage) within the waste mass all can lead to the trapping of moisture in pockets within the waste. The perched leachate can increase the unit weight of the waste and impact waste stability. Saturated conditions within the zone of perched leachate will inhibit the generation of landfill gas and reduce the effectiveness of gas extraction wells in the area. In addition, the "breakout" of perched leachate as seeps has contaminated nearby surface waters, created odor problems, and killed vegetation.
“...Prior to placing each day’s garbage, it is usually best to strip all the available soil from the footprint...”
Low permeability cover soil layer can result in preferential flow to the side slope of the landfill. This can be avoided by sloping soil layers near landfill edge inwards, avoiding low permeability cover soils, or removing soil during waste placement.
So First, Let’s Talk About Daily Cover

Daily cover...
- Is required
- Must be 6 inch minimum
- Must be applied daily

It’s Required
Subtitle D sets the standard by recommending that 6 inches of soil be used as cover soil.

Must be 6 inches of material...minimum
This is based on actual tests done to determine the minimum depth of soil that would prevent fly larvae from emerging
Because there are many layers of daily cover within a landfill, low permeability daily cover material can actually become a direct impediment to gas collection by preventing adequate vacuum distribution and coverage in the waste.
The cell height is typically taken as 8 ft (2.4 m) for design studies, although it can actually be much higher. The height should be chosen to minimize the cover material requirement consistent with the regulatory requirements. Cell slopes will be less than 40°, and typically less than 30°.
WHITE PAPER: Assessment of Alternative Daily Cover Related to Origin and Control of Landfill Odor (Boulton 2012)

Recommendations:

The current mandates requiring SCL to cease the use of ADC, cover with nine (9) inches of soil, and discontinue the practice of removing cover soil prior to placing additional waste – all in an effort to minimize odor originating at the face – are ineffective and should be rescinded immediately.

Based on a consensus of regulatory agencies, landfill experts, studies and accepted industry practice, these ineffective mandates are not helping to control odor but are, in fact, likely to increase odor. In order to effectively mitigate the odor issues, it is strongly recommended that future efforts to reduce odor focus on controlling landfill gas, rather than imposing counter-productive limitations on the daily placement/removal of cover soil and ADC.
SCL LEA Technical Methodology

Multidisciplinary System Approach:

- Public Health/Environmental Health
- Legal/Regulatory
- Fluid Dynamics/Hydrology
- Landfill Gas Modeling
- Waste Characterization Study
  - Physical and Chemical Property of Solid Waste
    » Moisture Content
    » Biological Methane Potential, etc.
- Air Emission Monitoring
- Soil Property Mechanics
- Geotechnical Analysis
- Geographic Information System (GIS)
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Detailed Example of SCL LEA Data Analysis and Reasoning
Example of SCL LEA Analysis

• SCL LEA “cross referencing” documents from landfill operators and various regulatory agencies
  – Gas Well locations (e.g., water impacted wells)
  – Location where 9” daily soil cover was used
  – SCAQMD Rule 1150.1 Quarterly Reports
    • Surface emissions data / reports
    – Conducting Field Testing (e.g., Visqueen Testing)
• Integrating data/analysis (“Data Mining”)
Complaints Reported to the SCAQMD Alleging Sunshine Canyon Landfill as the Source CY 1995 through September 27, 2015

Complaints after the implementation of the 9” of daily compacted soil
SCAQMD Rule 1150.1 Report (February 2015)
SCL LEA Composite Overlay Analysis

Water Impacted Wells

March 2015

Surface Emissions >500 ppm

SCAQMD Rule 1150.1 Report (February 2015)
SCL LEA Composite Overlay Analysis

Overlay: Exceedances on Wells

Overlay on Aerial Photo

SCAQMD Rule 1150.1 Report (February 2015)

Sunshine Canyon Landfill Aerial (2015)
SCL LEA Composite Overlay Analysis: April 2015
SCL LEA Composite Overlay Analysis: June 2015
Action Item #2 – Direct the SCL LEA to work with SCAQMD and Republic to take the steps needed to immediately improve the LFG collection performance by implementing the optimal combination of programs that will result in improved LFG system design and operations.

• Stipulated Agreement incorporated the following components:
  – SCL LEA Approved Geosynthetic Panel ADC Pilot Program
  – Improve overall LFG collection system
  – Pilot Operational Programs
  – **Improve intermediate cover performance**
  – SCL LEA Compilation of Potential Mitigation Programs/Practices

• SCL LEA worked with County Counsel, City Attorney, CalRecycle and Republic Services on finalizing language of agreement

• Stipulated Agreement signed by Republic in September and ADC program started on October 12, 2015.
Action Item #3 – Direct the SCL LEA to work with SCAQMD and Republic to modify landfilling operational practices that promote better landfill gas movement throughout the landfill and optimal leachate drainage that will improve the overall LFG collection by discontinuing the use of the 9” of daily soil cover, or allowing the peeling back of daily cover, or use of ADC to promote drainage, reduce saturation and increase permeability to promote movement of LFG, and at the same time develop methods to create a quantifiable reference performance baseline and other methods to determine measurable progress.

• TAC Approved ADC program on September 29, 2015
• ADC Pilot Program begin on October 12, 2015
• SCL LEA and SCAQMD collaboratively developed a set of “ADC Evaluation Protocols” which is currently being utilized.
• Republic submitted a proposal for the “peel-back”, and now being reviewed by SCL LEA
Update on Plastic EnviroCover
Alternative Daily Cover (ADC)
Pilot Program
ADC Application @ 6:00 p.m. (10/12/15)
ADC Assessment @ 6:00 a.m. (10/13/15)
ADC Assessment @ 11:00 a.m. (10/13/15)
Application of New Trash over ADC Working Face and ADC Interface
Application of New Trash over ADC
Application of New Trash over ADC
Application of New Trash over ADC Working Face and ADC Interface
“Why do we still have continuing odors, even with the ADC Program?”

• ADC is the first step to improving the LFG collection efficiency
  – Ends detrimental practice of 9” daily soil cover
• Focus now is on improving the intermediate cover performance
  – Covers a significantly larger surface area of SCL
  – Documentation of LFG emissions from these areas
Differentiation of Odors

Four distinct types of odors:

• Fresh trash odors from previous day(s) trash under the ADC;
• Fresh trash odors from the current day’s operation;
• Landfill gas odors existing from landfill mass impacted by application of 9” of compacted daily soil cover;
• Leachate odors
Why are there continuing odors?

With 9” Daily Soil Cover

- Intermediate Cover
- LFG Extraction Well
- Leachate
- 9” Daily Soil Cover
- New Trash (“Fresh Trash Odors”)
- Daily Cell (Trash)

Leachate and LFG (Odors)
Why are there continuing odors?

With SCL LEA Recommended ADC

Intermediate Cover

LFG Extraction Well

Daily Cell (Trash)

Leachate and LFG (Odors)

ADC
Why are there continuing odors?

With SCL LEA Recommended ADC

Intermediate Cover

LFG Extraction Well

ADC

LFG

Leachate

9” of Soil

Leachate and LFG (Odors)
Evaluation Protocols

• Cooperative development effort between SCL LEA and SCAQMD
• Focus on type/source of odor(s)
• Evaluation criteria:
  – Scientific, technically and legally defensible
  – Based on actual data (metrics), observations, analysis
  – Combination of technical quantitative data and observations with qualitative observations
Fresh Trash Odor Evaluation Protocols

• Fresh Trash Odor: Number of complaints
• Field Assessment: Fresh Trash Smells
  – Effectiveness before/during start of ADC application (evening)
  – Effectiveness to control fresh trash odors after immediate placement of ADC
  – Effectiveness to control fresh trash odors the next day (and before application of new trash layer)
    – At the working face
    – In the neighborhood
Fresh Trash Odor Evaluation Protocols

• Evaluation of ADC Implementation
  – Laydown coverage
  – Overlap coverage (seamless continuity)
  – Application of ballast soil
  – Number of tears/holes (durability)
  – Impact of wind (and other weather factors)
Landfill Gas Odors Evaluation Factors

• Landfill Gas Odors: Number of complaints
• Surface emission monitoring data (SCAQMD and Republic)
• Visqueen field test on Intermediate Cover in “New Area”
• Performance of LFG Wells in “New Area”
  – Number of “Water Impacted Wells”
• Density/permeability of “New Area”
• Volume of Leachate extracted
Action Item #4 – Direct the SCL LEA staff to implement the pilot visqueen field test, as soon as possible, to develop a reference baseline performance of the effectiveness of the daily and/or intermediate covers in a manner that provides physical and “visual” measurements of landfill gas emissions over a short period of time.

- **Visqueen Pilot Test (Completed)**
  - Protocols tested and revised

- **Visqueen Field Study**
  - Test Completed (Sept. 2015)
Impacted Gas Extraction Well Locations
Selected Location of Visqueen Test
Overview of Visqueen Test

• Visqueen is part of the overall ADC Performance evaluation methods
• SCL LEA developed / implemented and within SCL LEA control (QA/QC)
• “Physical” and “visual” documentation
• Easily monitored (e.g., time-lapse camera)
• Provides continuous “monitoring”
• Utilized in conjunction with other factors
• Can have in multiple locations
Pilot Visqueen Study Installation (May 2015)
Selected Location of Visqueen Installation Study

Feb 2015

>500 PPM

Selected Location
Visqueen Installation (July 2015)
Time Lapse Photography of Visqueen
Freeze Frame at 2:52:30 PM
Visqueen Installation (August 2015)
Action Item #5 – Direct the SCL LEA staff to work with Republic to improve the performance of the intermediate cover, e.g., increase thickness of intermediate cover, utilization of lower permeability intermediate cover materials, utilization of higher compaction to increase density of the intermediate cover, utilizing cured/mature compost to improve vegetative growth (and potential biofilter affect), utilization of less steep intermediate slopes, and/or utilization of biodegradable plastic ADC in combination with the statutory soil intermediate cover.

- SCL LEA developed a list of alternatives to improve the performance of the intermediate cover (part of the SCL LEA “Compilation”)
- SCL LEA started discussion with Republic on various options to improve intermediate cover performance
- SCL LEA and SCAQMD will work together to develop pilot programs to test various methods of improving the intermediate cover. Each program will have quantitative evaluation protocols/procedures
Action Item #6 – Direct the SCL LEA staff to work with the respective local enforcement agencies to evaluate Republic’s Transfer Station Odor Reduction/Mitigation Program at their own transfer stations as to its effectiveness. SCL LEA shall independently determine the best management practices for transfer stations, and develop any additional recommendations for improving their performance.

– SCL LEA has compiled Best Management Practices
– Outreach to other LEAs and Industry
– Transfer station surveys begin in November 2015
– Assessment form and protocols being finalized
SCL LEA Assessment of Transfer Station Odor Mitigation Protocols

- SCL LEA revising facility evaluation protocols
- SCL LEA continuing compilation of best management practices
- SCL LEA to work with other LEAs to coordinate site visits

SCL LEA assessment of odor mitigation practices at Republic-Owned transfer station (Falcon Transfer Station, November 2015)
Action Item #7 - Direct the SCL LEA staff to work with the respective local enforcement agencies to conduct site assessments of transfer stations (which are not Republic-owned/operated) to determine the potential to implement similar odor reduction/mitigation practices as part of the conditions to bring waste to the landfill.

- Compiled list of non-Republic transfer stations
- Will be implemented after the Republic transfer stations
- Will start site assessment of non-Republic transfer stations with City of Los Angeles’ CLARTS facility
Action Item #8 - Direct the SCL LEA to report back within 45 days on the results and analysis of the SCL CAC waste characterization study that was done on the wastestream from the City of Los Angeles transfer station.

- Waste Characterization Study (CLARTS)
  - Report completed and presented to CAC
  - Final Report presented at previous Board meeting
  - Report Submitted to CalRecycle
  - Report published on MSW Management Magazine
  - Report posted on SCL LEA Website
    - Provided to CalRecycle
Action Item #9 - Direct the SCL LEA staff to immediately plan and conduct additional comprehensive waste characterization studies of the overall SCL waste stream which can be utilized as a baseline (and to determine future changes) of the material types, physical and chemical characteristics, and any other data that can be utilize do develop additional odor mitigation measures.

- Waste Characterization Study (SCL Wasteshed)
  - Coordination with SCAQMD & CalRecycle
  - Physical Sort Complete (August 2015)
  - Lab / Chemical Analysis (Completion by December 2015)
  - Final Report (Expected Delivery: February 2016)

- SCL LEA trained CalRecycle as part of project, and SCL LEA invited to Sacramento to provide briefing
SCL LEA Waste Composition Study
Ultimate/Proximate, BTU, & BMP Samples
Demobilization: Equipment Cleaning / Return
CalRecycle Staff Visit (August 26, 2015)

- Compare / Contrast with CalRecycle’s Uniform Waste Characterization Method
- Learn New Characterization Protocols / Procedures
- Evaluate QA/QC Procedures
- Evaluate Health & Safety Procedures
- Learn Utilization of New Types of Waste Data
Action Item #10 - Direct the SCL LEA staff to report back within 45 days on the status of each of the above directives, and any support/assistance that the SCL LEA will require from the Board of Directors.

- Status Report on Adopted Board Motion completed and distributed to Board members (and posted on website)
- Copy sent to following groups:
  - South Coast Air Quality Management District
  - City Planning Department
  - County Regional Planning
  - Los Angeles Regional Water Quality Control Board
  - County Department of Public Works
  - Sunshine Canyon Landfill Community Advisory Committee
  - City Attorney Office
  - County Counsel
  - Republic Services
Action Item #11 – Direct SCL LEA to work with Republic to determine and maintain an ongoing inventory, updated monthly, of all landfill gas collection wells which have more than 10% of their overall length below grade filled with leachate or water.

- Republic required to submit monthly report on all landfill gas collection wells impacted by liquids
- Provide SCL LEA with a map of the impacted collection wells
- Republic will submit to the SCL LEA drawings of watered-in well locations for purpose of analyzing “overlays”.
Sunshine Canyon Landfill
Local Enforcement Agency

Summary of
SCL LEA Odor Mitigation Programs
SCL LEA Approach to Odor Mitigation

• Holistic, multi-pronged and multi-disciplinary systems approach, to create infrastructure changes

• **Short Term**
  – Landfill operations within SCL LEA control
  – Facilities within Republic’s control
  – Other facilities within other “LEAs’ control

• **Medium / Long Term**
  – Developing/supporting infrastructure changes to solid waste management system
    • Locally / Regionally / Statewide
Short Term Approach to Odor Mitigation

• Within direct SCL LEA control at landfill
  – Alternative Daily Cover
  – Improve intermediate cover
  – Improve LFG collection system efficiency
  – Load rejection at scale-house

• Republic-owned Transfer Stations
  – Odor mitigation at Republic-owned transfer stations
  – Load “treatment” or load rejection
  – Requiring generator (source) treatment

• All “Other” transfer stations in LA County
Medium/Long Term Approach to Odor Mitigation

• Local Infrastructure Collaboration
  – Organics diversion mandates (City Franchise 2017)
  – SCL LEA collaboration with Bureau of Sanitation on generator and facility oversight and enforcement
• CLARTS Waste Characterization Study (2015)

AB 1826 Organics: Food, greenwaste, clean wood, food contaminated paper, etc.
Medium/Long Term Approach to Odor Mitigation

• Regional / State Infrastructure Collaboration
  – SCL LEA collaboration with CalRecycle on infrastructure requirements for Statewide landfill organics ban (2025)
  
• SCL LEA / CalRecycle Waste Composition Study (ongoing)

AB 1826 Organics: Food, greenwaste, clean wood, food contaminated paper, etc.
Additional SCL LEA Community Efforts

• SCL LEA providing detailed briefings CAC members

• SCL LEA also providing detailed technical briefings on overall odor mitigation programs / issues via in community small group settings.
SCL LEA’s Landfill Mitigation Efforts in International Spotlight

- Two articles already published in October 2015
  - Continued coverage of the SCL LEA efforts
- SCL LEA efforts to be “transparent” and decisions to be have defensible technical and legal basis.

Shedding Daylight on Landfill Odors

John Trott • October 7, 2015

Located in Northwest Los Angeles County near the city of Sylmar, CA, and operated by Republic Services, Sunshine Canyon Landfill has found itself in the crosshairs of public attention over a variety of odor complaints. In response to public concerns, the Sunshine Canyon Landfill–Local Enforcement Agency (SCL-LEA) was formed to properly manage the situation, whose compilation of potential mitigations practices and programs is the most comprehensive report on the subject of landfill odors, going beyond those associated with “fresh trash” to those of a more general nature.

Click here to download: “Sunshine Canyon Landfill LEA Odor Mitigation”

SCL-LEA is an entity created to be the primary local agency providing the regulatory permitting, enforcement, and operational compliance oversight for the California Environmental Protection Agency’s Cal Recycle (formerly California Integrated Waste Management Board).
SCL LEA Dropbox Account

• Public Access “Dropbox” Folder (via www.scllea.org):

  SCL LEA ODOR MITIGATION FOLDER

www.dropbox.com/sh/nm5341eupq7dxj5/AAA42v6IZFt-CGYQdFffIfqta?oref=e&n=88965574

• Adopted Board Motion
• 45-Day Status Report (and Attachments)
• Reference Materials and Documents
• Binders: Technical Backup Materials
• SCL LEA Compilation (Recommendations)
Sunshine Canyon Landfill Local Enforcement Agency

Questions?

David Thompson  213-252-3932

david.thompson@lacity.org
Sunshine Canyon Landfill Local Enforcement Agency

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ADDITIONAL TECHNICAL DOCUMENTATION
Radius of Influence vs Density

Minimum, Maximum and Used Radius of Influence with Differing Waste Densities and Permeability in Darcy

SCAQMD Interagency Task Force, Source SCL LEA 2012
Water Vapour Transmission Test Results

Precision Geosynthetic Laboratories
ASTM Test Method E96, PGL Job No. 010965

Enviro™ Cover Water Vapor Transmission

1.5 mil Daily Enviro™ Cover: 0.023 g/m²/day
2.0 mil Progressive Daily Cover: 0.011 g/m²/day
Comparison with Soil Cover

Using the water vapor transmission data of the 1.5 mil daily Enviro™ Cover and making assumptions about typical temperature, humidity and pressure, the permeability of water vapour through the 1.5 mil daily Enviro™ Cover is calculated in Appendix 1 to be roughly $6 \times 10^{-17}$ m/s. This is $1/167,000,000$th of the typical permeability of well-compacted clay of $1 \times 10^{-8}$ m/s. Therefore, Enviro™ Cover deployed over the active working face is far more effective than soil in controlling odours through the cover material.
EQUIVALENT DARCY’S LAW FLOW RATE FOR POLYETHYLENE CALCULATED FROM GAS TRANSMISSION DATA

Methane Gas Loss Through Polyethylene Film
(Matrecon Laboratories, Oakland, Calif., 1991, ASTM E96)

1.25 mil, permeation = 6.1 scm/acre/day
5 mil, permeation = 3.3 scm/acre/day

vs.

Soil/Green Waste Covers >> 1,000 scm/acre/day
## Methane Gas Loss Through Daily Cover Soil

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<tr>
<th>Soil Conditions</th>
<th>Flow Through (1,000 m² Area) Soil</th>
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<tr>
<td>kw=10-8 m/sec, compacted clay over firm subgrade</td>
<td>117 m³/day</td>
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<tr>
<td>kw=10-6 m/sec, typical clayey soil compacted over poor subgrade (such as landfill waste)</td>
<td>11,700 m³/day</td>
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<tr>
<td>kw=10-5 m/sec, typical sandy/clayey soil over poor subgrade</td>
<td>117,000 m³/day</td>
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### Methane Gas Loss Through Polyethylene Film (1,000 m² Area)

(From Matrecon Laboratories, Oakland, Calif., 1991)

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<tr>
<th>Thickness</th>
<th>Permeation</th>
<th>Rate</th>
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<tr>
<td>2mil</td>
<td>92 cm³/100 in²/day = 1.4 m³/day</td>
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<tr>
<td>3mil</td>
<td>73 cm³/100 in²/day = 1.1 m³/day</td>
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<tr>
<td>5mil</td>
<td>49 cm³/100 in²/day = 0.76 m³/day</td>
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