Testimony of Erik Blachford before the Select Committee on Energy Independence and Global Warming
July 18, 2007

I wish to thank Chairman Markey and members of the Select Committee on Energy Independence and Global Warming for the invitation to speak today. Two months ago I became CEO of TerraPass, a leading retailer of carbon offsets. TerraPass has helped over 50,000 citizens balance their emissions from driving, flying or home energy use by purchasing offsets from clean energy and efficiency projects in the U.S. voluntary carbon market. The carbon calculators on our web site have also helped ten times that number calculate their total carbon dioxide emissions, or "carbon footprint," increasing awareness of the overall environmental impact of lifestyle choices and spurring consumers to take ongoing action.

TerraPass applauds the work of the Committee and welcomes the opportunity to answer questions about the scope, environmental integrity, progress on standards, and future of the voluntary carbon market.

TerraPass' involvement in the voluntary carbon offset market

Founded in 2004 in a classroom at the Wharton School of the University of Pennsylvania, TerraPass was the result of Professor Karl Ulrich's desire to balance his own carbon footprint by supporting clean energy production. Ulrich challenged his students to create a consumer-friendly offsetting service. Six weeks later, TerraPass was born. Today you can buy a TerraPass for your automobile, flights, home energy use, dorm room, and even your

wedding. TerraPass is available through a variety of outlets, including a successful partnership with Expedia.com, the world's largest online travel agency.

Over half a million Americans have calculated some aspect of their carbon footprint on the TerraPass web site. We have sold over 65,000 units, representing carbon reductions totaling 175,000 metric tons. We produce a popular email newsletter on fighting climate change distributed weekly to over 30,000 readers. Recent research suggests that 39% of TerraPass members implemented new energy conservation strategies after purchasing their TerraPass.

As a retailer of carbon offsets, TerraPass does not engage in project development. Rather, we have designed a portfolio of high-quality carbon reductions which we offer to consumers at a mark-up that provides a path to allow us to cover our overhead expenses. We also offer a variety of calculators, sustainability tools, and environmental content relevant to Americans interested in fighting climate change and fostering energy independence. We are exclusively focused on the consumer segment of the voluntary carbon market, and we work with other consumer-facing firms such as Ford, Expedia, and Sam's Club to reach their customers.

Our current staff is seven, which we expect to double by early 2008.

TerraPass projects

TerraPass projects fall into three categories, each representing one-third of our portfolio.

1. Wind Power. We support wind energy generation by purchasing and retiring Green-e certified renewable energy certificates (RECs).[1]

2. Anaerobic digestion. Dairy farm methane digesters (or "cow power") create a direct offset by destroying the greenhouse gases associated with agricultural byproducts. We buy SES-certified[2] offsets directly from farmers.

3. Reductions from corporations. We support direct reductions from corporations and municipalities with carbon-producing assets. To date, our efforts here have focused on landfill gas flaring projects certified by First Environment.[3]

TerraPass negotiates purchases from anaerobic digestion and landfill projects directly with project developers and then registers the trades on the Chicago Climate Exchange (CCX). TerraPass joined the CCX in January 2005 as the first offset retailer on the exchange. We were also one of the first to make use of provisions in the CCX allowing for direct bilateral contracts with project developers. This unique approach combines the auditing, certification, registration and market-making benefits of the CCX with the full flexibility and integrity of project-based offsets. We do not buy generic credits, often referred to as "allowances," on the CCX, as we feel customers benefit from a more direct connection with the carbon reducing projects their monies support.

TerraPass' approach to environmental integrity

TerraPass believes that the best way to uphold environmental integrity in the voluntary carbon market is through the development of industry standards that provide clear rules to market participants and guidance to consumers. TerraPass actively participates in the voluntary standards development process presently underway, and our own quality

assurance process has served as a test bed for many practices now being more widely adopted in the industry. This is a young industry still wrestling with several important policy questions, so we seek continuous feedback and improvement as we chart a path forward.

TerraPass' own quality efforts focus on multiple aspects of our operations.

First, we enforce project-level quality using a combination of existing industry protocols and internal review. TerraPass sources verified, permanent, and additional reductions from clean energy and efficiency projects in the U.S. All wind projects are certified under the Green-e program of the non-profit Center for Resource Solutions (CRS). All other projects issue detailed verification reports that have been accepted by the CCX offset committee (which includes the World Resources Institute (WRI) as a member) and reviewed by TerraPass staff.

Second, TerraPass adheres to a variety of portfolio-level quality metrics. In particular, we employ a matched maturity model, meaning that all offsets we sell are generated in the same year as the consumer purchase. This quality practice precludes most tree-planting projects and projects whose carbon accounting extends into the future.

Third, TerraPass adheres to strict disclosure and transparency guidelines. We list all projects that we support on our web site, as well as every single carbon transaction (date, source, and amount), a practice which we believe to be unique in the industry. Every product we sell comes with a Product Content Label (PCL)[4] that lists the amount and source of the offsets, and provides consumer protection disclosures.

Fourth, TerraPass is audited by an independent third-party to ensure that we adhere to our stated quality practices. The CRS performs an annual statistical audit of our customer database to assure that our carbon purchases match our customer obligations. TerraPass was the first U.S. offset retailer to publish a verification report[5] containing the results of this third-party audit. We commit to our portfolio make-up at the beginning of each calendar year, and we provide our customers with a toll-free number for our third party auditor.

Fifth, TerraPass applies quality guidelines to our marketing and communications, as well as the communications of our partners. Marketing literature for both TerraPass and TerraPass marketing partners is reviewed by CRS to ensure we are making responsible claims.

Despite these safeguards, TerraPass has not been immune from criticism directed at the voluntary market for real and perceived problems. We take all such criticism as an opportunity to improve our own processes. The following case study illustrates how we have addressed such criticisms, sheds light on challenges facing the industry, and suggests ways for the government to help by structuring market institutions and processes.

Case study: Tontitown landfill gas flaring project

On March 26, 2007, *BusinessWeek* magazine published an article critical of the voluntary carbon market that specifically examined projects in TerraPass' portfolio and elsewhere. The article devoted particular attention to the Tontitown landfill gas flaring project.

The offsets generated by Tontitown had been verified by First Environment, approved by the CCX offset committee, and reviewed by TerraPass. By all counts they seemed consistent with prevailing rules and standards.

The article's primary allegation was that the Tontitown LFG project was "non-additional" – that is, not undertaken in anticipation of carbon offset sales – because it was implemented under regulatory compulsion due to groundwater contamination problems. One of the most basic additionality tests is that a project must be voluntary, or "super-regulatory."

But the article based its charges on comments from people not involved in the original project and unfamiliar with the carbon abatement aspects of the landfill flaring system. To assess the allegations, we assembled a panel of academics with expertise in carbon abatement.

We then launched a public evaluation of the Tontitown project via a series of tests used by the international community, publishing regular updates on our website for the benefit of our customers and the public at large, and published the final analysis for review on May 7, 2007.[6]

The panel disagreed with *BusinessWeek* and judged the reductions as additional. It also proposed a series of process improvements which TerraPass has incorporated into our standard procedures. (We have included both the letter from the panel and our own report on the Tontitown project in an appendix to our written testimony.)

The case illustrates the current market reality. Credible participants in the market do their best to seek out high-quality reductions based on available rules and standards. Outside observers in the press and elsewhere, often acting without a thorough understanding of the prevailing rules and standards, either support or cast doubt on the quality of reductions, resulting in consumer confusion. And until there are broadly accepted and well-understood standards in place, there can be no authoritative arbiter when questions arise. This situation is not optimal for retailers like TerraPass, for consumers, or for entrepreneurs and clean energy developers attempting to forecast future revenue likely to come from the sale of reductions.

We discuss in the next section ways in which the industry is working to clarify the rules and how the government can help.

Industry-wide and government-led efforts to improve the voluntary carbon market

The time is right for the development of a consumer protection standard in the retail voluntary carbon offset market. The voluntary carbon industry will greatly benefit from the development of an industry-wide standard governing both project quality and marketing practices. Because disagreement remains on even basic technical matters such as the establishment of additionality, we believe that only a stakeholder-based standards effort will see successful adoption. A standard will also provide guidance and reassurance to consumers, who today are unable to evaluate the competing claims of offset retailers.

Two high-profile standards-development efforts will come to fruition later this summer. The first is the Green-e Certified Greenhouse Gas Emission Reduction Product Standard,[7] established by Center for Resource Solutions. CRS has prior success in establishing standards for voluntary consumer markets. Over 100,000 Americans buy green power certified under CRS' Green-e program every year.[8]

The new Green-e offset standard establishes a consumer protection program, a set of stakeholder-based rules and a governance process for various voluntary and regional offset schemes in the voluntary market. Representatives from leading U.S. non-governmental organizations such as National Resources Defense Council and WRI serve as advisors to the CRS process. The new standard has been board-approved and was publicly released this week.

The second is the Voluntary Carbon Standard (VCS), promulgated by The Climate Group and the International Emissions Trading Association (IETA). This standard provides a mechanism for adoption of the rules of the UNFCCC in the voluntary carbon market. Supported by international project developers and financiers, this standard would bring a well-developed set of tools into non-Kyoto countries for carbon offset project development.

The two standards are not necessarily redundant. VCS provides a project-level standard. CRS is a meta-standard that can be used to validate VCS for use in the U.S. voluntary market. Further, CRS specifies consumer protection guidelines for the market as a whole.

TerraPass and other key members of the voluntary carbon market have participated in both standards' stakeholder processes.

A useful role exists for the government in ensuring the integrity of the voluntary carbon market. We make the following recommendations:

1. The government's primary focus should be the passage of economy-wide carbon legislation to reduce U.S. carbon emissions to a scientifically recommended safe level as quickly as possible. The voluntary market is not a substitute for a regulatory solution, and we believe that the passage of economy-wide legislation will quickly force the voluntary market to match the quality of the regulated market.

2. The government should participate as a stakeholder in the open standards development processes already underway. The Environmental Protection Agency has provided useful input but no formal comment. TerraPass welcomes greater participation from government representatives.

3. The government can further aid the development and integrity of the voluntary carbon market by offering to become itself the convening party for the development of a retail carbon standard. The stamp of approval from a government-led standard would help mitigate risk to entrepreneurial project developers who are concerned about market acceptance of their offsets. A government standard would also provide maximum assurance to consumers.

Any government-led standard must take care not to stifle the innovation that characterizes the young voluntary market. It must be flexible enough to accommodate new project types and business models. Further, the government should not take on roles successfully being performed now by the private and non-governmental sectors, such as project certification.

The role of the voluntary offset market in the future

The voluntary carbon market provides a number of useful functions that it will continue to serve even after the adoption of economy-wide carbon regulation.

First, the voluntary market is creating incremental greenhouse gas reductions now. Several years are likely to pass before the adoption and implementation of economy-wide carbon regulation in the U.S. Even the laudable Regional Greenhouse Gas Initiative (RGGI) will not require emissions reductions until 2015.[9] In the interim, we expect to see continued growth of the voluntary market, resulting in a revenue stream for the promotion of domestic clean energy production and for carbon abatement programs that financially reward forward-looking entrepreneurs such as small dairy farmers who install methane digesters.

Second, the voluntary market is a useful laboratory for policy innovation and experimentation that can eventually be incorporated into formal legislation. Despite being strictly voluntary, the CCX is the second largest carbon market in the world. Various protocols and lessons from the voluntary market are being used to inform and improve the regional initiatives now under development. Such policy innovation is costless to the

American taxpayer and should help the U.S. avoid many of the difficulties that have affected other attempts at large-scale carbon regulation.

Third, even in the presence of a regulated market, the voluntary market will help bring carbon reductions to areas of the economy that don't fall under regulation. Once a clear price signal is set, the voluntary market can move rapidly to find unexploited niches and cost-effective sources of greenhouse gas reductions.

Fourth, the voluntary carbon market gives individuals and businesses useful experience with the process of managing their carbon impact. Most businesses find that seeking efficiency improvements can actually be a source of cost savings, but they first have to clear the initial hurdle of understanding, measuring, and monitoring their impact. A healthy desire to stay ahead of the policy curve explains much of the current interest in the voluntary market on the part of corporations.

Fifth, the voluntary market serves as a useful tool for those individuals and businesses that want to go beyond the minimum requirements for reducing their impact. Some critics have suggested that the voluntary market is a distraction from necessary measures, a way to avoid undertaking real change. The data from TerraPass members tell a different story. The tens of thousands of Americans who have purchased carbon offsets are the seed of a grassroots movement that is deeply committed to addressing climate change.

Results from a recent survey are striking. 86% of TerraPass customers watch the thermostat and 64% have installed energy-saving light bulbs. 69% donate to non-profit environmental

groups. TerraPass customers are five times more likely than other Americans to commute by public transportation. They are 31 times more likely to drive a hybrid vehicle, and a whopping 210 times more likely to have a solar energy system installed on their houses.

And most importantly for this Committee, these climate change fighters strongly believe that our government must lead the way. Over half of our members have contacted government representatives to express concern over global warming.

In conclusion, TerraPass believes that the voluntary retail carbon market can drive citizen awareness of the impact of their lifestyle choices, educate citizens on actions they can take in their everyday lives to reduce carbon emissions, and generate incremental carbon emission reductions by giving citizens a simple mechanism for funding American entrepreneurs and companies who wish to reduce carbon emissions. American citizens want to take action in the fight against climate change, and TerraPass welcomes government involvement to make those citizens more confident in the effectiveness of these and ongoing innovations in the voluntary retail carbon offset market.

Notes and References

[1] Each REC represents a megawatt-hour of renewable energy generation. TerraPass makes carbon claims on these RECs using methodologies published by CRS, a non-profit renewable energy standards and market monitoring group. More information is available at http://www.green-e.org/

[2] SES verifies both the quantities of GHG reductions as well as adherence with the requirements specified in the relevant CCX protocol. For more information see: http://www.ses-corp.com/GAS.htm

[3] First Environment verifies both the quantities of GHG reductions as well as adherence with the requirements specified in the relevant CCX protocol. For more information see: http://www.firstenvironment.com

[4] For a sample product content labels, please see http://www.terrapass.com/projects/verification.html

[5] See http://www.terrapass.com/news/terrapass-verification-report-2004-2005.pdf

[6] For complete analysis, see http://additionality.terrapass.com

[7] Please see: http://www.green-e.org/getcert_ghg_standard.shtml

[8] For a full report on the impact of the Green-e standard, please see: http://www.green-e.org/docs/2005-Green-e_Verification_Report-forweb.pdf

[9] New Carbon Finance, Deep Dive, North America, June 2007

Appendix A: Sample Product Content Label

CROSS COUNTRY FLIGHT TERRAPASS : PRODUCT CONTENT LABEL

TerraPass is a Carbon Dioxide (CO2) offset product for airline travel. CO2 is a greenhouse gas (GHG) that contributes to global warming. According to the U.S. Department of Energy (DOE), 2002 airline jet fuel consumption represented about 13% of US transportation CO2 emissions from energy use and about 4% of total US CO2 emissions from energy use. TerraPass estimates of per-flight emissions are based on the WRI/WBSCD protocols for emissions reporting, but your actual emissions may vary from these estimates due to differences in aircraft utilized, capacity utilization, length of your flight and cargo load. For each Cross Country Flight TerraPass purchased, 2,500 lbs of CO2 reductions are purchased and retired on your behalf. TerraPass does not actually reduce the CO2 emissions created during your flight, but offsets the release of 2,500 lbs of CO2 emissions elsewhere. TerraPass will not prevent the release of or offset the emissions of other harmful pollutants from your flight, such as particulate matter, methane, ozone, lead and nitrous oxide (NOx). This product matches 100% of the estimated CO2 from your flying.

This product is comprised of the following mix of RECs and carbon credits:

Renewable Energy Certificates

A REC represents the environmental attributes associated with a unit of renewable electricity. For every unit of renewable electricity generated, an equivalent amount of RECs are created. The purchase of RECs supports renewable electricity generation, which helps offset conventional electricity in the region where the renewable generator is located. RECs can be quantified in tons of CO2 based on regional data provided by the Department of Energy's E-GRID program.

Percentage	Total kWh	Pounds of CO_2
33.3%	440 – 1,034	833

Renewable Resources	General Location
Wind	Nationwide

The Green-e Program certifies that the RECs used in this product meet the minimum environmental and consumer protection standards established by the non-profit Center for Resource Solutions. For more information on Green-e certification requirements, call 1-888-63-GREEN or log onto www.green-e.org.

33% Renewable

Carbon credit offsets

A Carbon Credit Offset represents the reduction of one unit of carbon (typically a metric ton) from a baseline scenario or regulatory requirement by an emitting entity. A lynchpin feature of the Kyoto Protocol, Carbon Credits rely on the concept of flexible trading to allow that a market based system directs funding to the lowest marginal cost project areas.

Carbon Credits can be generated when a corporation or organization makes a reduction of carbon beyond a baseline scenario. The purchase of Carbon Credits helps support carbon reduction by giving a payment for each unit of carbon reduced beyond a baseline scenario. Where a protocol is available, TerraPass Carbon Credit Offsets are registered, and retired on the Chicago Climate Exchange.

Percentage	Purchasing Market	Pounds of CO_2
66.7%	CCX or bilateral contracts adhering to CCX protocols	1667

Carbon Credit Resources	General Location
Biomass (including agricultural and landfill methane abatement and biofuels)	Nationwide
Industrial efficiency	Nationwide

For specific information about this product, you may contact TerraPass toll free at (877) 879-8026, or contact TerraPass at http://www.terrapass.com or info@terrapass.com.

Appendix B:

Committee letter and additionality report for the Tontitown Landfill Gas Flaring Project (documents follow)

May 7, 2007

TONITOWN PROJECT DETERMINATION

William Schlesinger, Duke University
Dan Kammen, University of California, Berkeley
Michael Gillenwater, Princeton University

The following is the consensus response of the Tontitown review committee.

Overall Summary

Q1. Does the Tontitown LFG Project adhere to the rules and regulations of the CCX offset rulebook?

Yes, the project meets the CCX rulebook requirements, but the rulebook is not an adequate test of project additionality.

Q2. Does the committee concur with the Business Week assessment that Tontitown project was forced by Arkansas regulators?

No. Some (possibly most) of the reductions at the site are likely to have been the result of voluntary actions. However, it is not clear why Waste Management took these actions. Corporate commitments or other internal environmental policies and impending regulatory or other legal liabilities or risks may have all been factors.

Q3. Should TerraPass submit the Tontitown tons in our 2006 annual verification audit? If not, should we repurchase the 2005 tons from other projects?

Our overall assessment is that the project meets a minimal threshold of additionality. TerraPass does not need to repurchase any tons from the Waste Management for 2005 and may submit the Tontitown tons for the 2006 annual audit.

Q4. Should TerraPass continue to dedicate funding to Waste Management projects in the future?

We recommend that TerraPass apply a stricter definition of additionality to projects in the future and prioritize other projects over Tontitown and other Waste Management projects.

The analysis suggests that the project passes commonly applied additionality tests. However, the sale of offset credits has not clearly led to the implementation of the project. We can

accept a modified definition of additionality based on the claim that the offset credit revenues from this project are making the implementation of other projects possible. This type of argument is an unusual approach to determining additionality, and it introduces questions regarding the additionality of the other landfill gas methane projects funded by this "project breeder" scheme.

This situation is an example of a broader issue related to determining project additionality in a developed country, where corporate entities voluntarily take on commitments to reduce their emissions. If an entity commits to reducing greenhouse gas emissions from its own operations, can it then decide to sell emission reductions from some of the project activities? It is typical for Clean Development Mechanism projects to regard that the sale of offset credits as a necessary factor for projects that are validated after the project start date.

Detailed Additionality Tests

Q5. Does the committee believe the project passes the financial additionality test?

Yes. The project does not have a viable financial return without carbon offset revenues. However, it is possible that Waste Management may still have elected to implement the project in the absence of offset revenue.

Q6. Does the committee believe the project passes the timing test?

Yes. The project's timing is consistent with an intention to sell carbon credits on the Chicago Climate Exchange.

Q7. Does the committee believe the project passes the regulatory test? Is the baseline substantially accurate even given local environmental pressures at the facility?

The evidence provided indicates that Waste Management went beyond the minimum required for regulatory compliance by installing a comprehensive landfill methane collection and flaring system at the Tonitown landfill.

Final determination

TerraPass should consider the following determination formally binding:

The Tontitown project meets a minimum threshold of additionality. TerraPass does not need to repurchase any 2005 credits, and it can submit Tontitown credits as part of its 2006

verification audit. For future commitments, TerraPass should prioritize other projects over Tontitown.

TerraPass should apply stricter additionality tests to future projects. We recommend implementing the following procedures:

1. Make public a formalized set of interview questions and answers with all project developers and site owners.
2. Include contractual attestations to the voluntary nature of all projects from which carbon credits are purchased.
3. Perform a public literature review on all projects prior to purchasing, with a focus on local environmental or regulatory issues.
4. Establish a 30-day public comment period prior to purchasing.

Further suggestions

TerraPass should consider the following items as non-binding but recommended:

TerraPass could employ the new UK/DEFRA Code of Best Practice for the provision of carbon offsetting by procuring offset credits from CDM projects or emission allowances from Phase II of the EU Emissions Trading Scheme. The lack of standardization in the U.S. voluntary offset market is likely to continue to present risks for TerraPass as a business.

Title: Consultation on establishing a voluntary Code of Best Practice for the provision of carbon offsetting to UK customers
Department: Department for Environment, Food and Rural Affairs
Year: 2007
URL: http://www.defra.gov.uk/corporate/consult/carbonoffsetting-cop/index.htm

Tontitown LFG Project Review Document

V1.1 - 4/7/07

Note: this document is also available, with a full history of edits at http://terrapass.pbwiki.com/project-review-document

Additional resources including blog posts, full document library and interview notes: http://terrapass.pbwiki.com

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Introduction

Waste Management, Inc. (WM) operates a Class 1 landfill in Tontitown, Arkansas. As a founding member of the Chicago Climate Exchange (CCX), Waste Management has developed a number of landfill gas (LFG) flaring projects to reduce methane emissions. These projects, including one at the Tontitown facility, serve as a source of carbon offsets traded on the CCX.

In the absence of a regulatory requirement to flare methane, carbon offsets from LFG projects such as the one at Tontitown are generally considered to be highly additional. That is, they represent a reduction of greenhouse gas emissions beyond a business-as-usual baseline, because the only revenue stream to the projects come from the sale of credits.

An article that appeared in the March 26, 2007 issue of BUSINESSWEEK magazine raised questions about the additionality of the Tontitown LFG project, based on local regulatory requirements and other factors. The purpose of this document is to evaluate the claims of the BusinessWeek article in greater detail through a public review of relevant documents and interviews with project participants.

In this review, we find that:

1. Waste Management undertook the LFG flaring project at Tontitown voluntarily.
2. Waste Management subsequently used the LFG flaring system to satisfy a regulatory requirement to address groundwater contamination and surface air issues at the site.
3. The LFG system in place at Tontitown represents a significant material investment and reduction in greenhouse gas emissions beyond what was necessary to address the regulatory requirement.
4. The Tontitown carbon offsets are generated from elements of the LFG system distinct from the portion required to address the regulatory requirement.

Based on these findings, we conclude that the carbon offsets generated from Tontitown are additional.

TerraPass involvement with Tontitown

As one of the leading retailers of carbon offsets in the voluntary market, TerraPass has assembled a portfolio of greenhouse gas reductions drawn equally from three sources: wind energy projects, dairy farm methane digesters, and landfill gas flaring projects. All carbon offsets purchased by TerraPass must meet an outside additionality review, and TerraPass' own purchase history and adherence to quality standards is verified by a third party, the Center for Resource Solutions.

TerraPass has purchased approximately 15,600 metric tons of carbon offsets from the Tontitown LFG project since the summer of 2005.

- 8/19/05: 1,000 tons of 2005 and 2006 credits from Tontitown
- 10/17/05: 1,600 tons of 2005 and 2006 credits
- 5/2/06: 3,000 tons of 2006 credits
- 1/22/07: 10,000 tons of 2006 credits from Tontitown and CrossRoads landfill. Exact quantities pending verification report totals.
- **TOTAL purchases: up to 15,600 tons.**

TerraPass' original assessment of project additionality was based on CCX eligibility, a performance standard that takes into account the timing of the project and the regulatory regime under which it operates.

Additionality controversy

On March 9, 2007, Ben Elgin, a reporter for *BusinessWeek* magazine, contacted TerraPass with information calling into question the additionality of the Tontitown project. In addition to raising questions about the timing of the project, Elgin highlighted regulatory pressures exerted on Waste Management by the Arkansas Department of Environmental Quality (ADEQ).

Both Waste Management and ADEQ agree that Waste Management began the LFG project voluntarily in 1999. Further, both parties agree that Waste Management was never under a formal regulatory requirement to implement an LFG flaring system.

However, over a year after the project began, ADEQ placed Waste Management under a "corrective action" and compelled remediation of two issues: a groundwater contamination problem and a surface air problem.

Although ADEQ did not specifically require Waste Management to install an LFG flaring system, the LFG system already underway was eventually put forth as the solution to the environmental problems cited in the corrective action. Installation of the system did, in fact, successfully address both problems. Despite the lack of a formal regulatory requirement to install an LFG system, the corrective action raises questions about whether the system installed is truly additional to the business as usual case.

Additionality review

TerraPass conducted a brief review of the Tontitown project by March 13, 2007, in time to issue a comment affirming our initial assessment of project additionality before the

BusinessWeek story closed for publication. The purpose of this document is to expand on that brief review, and to present formally the project details to an outside committee for consideration. Based on the committee's determination of project additionality, we will perform any corrective required to ensure the environmental integrity of our portfolio. We also hope to use this public review process as a test case for an improved set of project review procedures.

The additionality of the Tontitown project hinges primarily on a few questions:

1. Did Waste Management install the LFG system due to de facto regulatory pressure from a state agency?
2. Were alternative solutions to the requirements of the corrective action available to Waste Management?
3. Does the LFG system represent a material investment and reduction in greenhouse gas emissions above and beyond the available alternatives?

To answer these questions, we will establish a detailed project timeline and then apply a series of additionality tests: regulatory, financial, and timing. We will also apply the CDM framework for demonstrating additionality to the Tontitown project as an alternative lens through which to gauge project additionality.

Project background

History of the Tontitown facility

Prior to the issuance of solid waste permits, the property at the Tontitown landfill was used as a local solid waste disposal site by private individuals. In response to environmental concerns raised by ADEQ, the Tontitown landfill was permitted on January 27, 1978 to Sunray Services. The two Tontitown waste disposal sites initially operated by Sunray were known as Site #3 and Site #4. Both sites were originally unlined gully-fill waste disposal areas. As required by ADEQ, landfill liner and leachate collection systems were installed beneath the sites. WM still recovers leachate from Site #3 and Site #4 today.

Waste Management assumed responsibility for the Tontitown landfull as a result of the August 1995 acquisition of Sunray Services by USA Waste and the 1998 merger between USA Waste Services and Waste Management.

Two additional Class 1 waste disposal cells, the north phase and the south phase cells, were constructed at Tontitown prior to 1996. The north and south phase cells were designed and constructed to meet more stringent Regulation 22 standards for Class 1 landfills.

Today Tontitown landfill consists of a Class 1 Municipal Solid Waste (MSW) landfill and a Class 4 landfill located in Springdale, Arkansas. Based on an operating permit of 2.555 Mg/yr, the facility is governed by federal New Source Performance Standards (NSPS) and required to monitor its non-methane organic compound (NMOC) emissions. Even after a 2004 revised permit expanding the landfill's size, the current NMOC levels of 19.3Mg/yr are well within the 50Mg/yr limit. Therefore the facility has no federal obligation to install a gas collection and control system (GCCS).

For a more complete documented history of the Tontitown project, please see http://wiki.terrapass.com/f/10239.pdf.

Project baseline and offset generation

Greenhouse gas reductions must be measured from an emissions baseline to determine the number of carbon credits generated from a project. The TerraPass baseline planning assumption for landfills not under NSPS requirements is that all methane created by the landfill is vented directly into the atmosphere. Therefore, all measured and flared methane is typically eligible as a source of carbon credits.

TerraPass uses a performance standard of additionality for LFG projects. We regard LFG project eligibility under the performance standard of the CCX LFG protocol (Ch 9, CCX rulebook) as an indication of additionality. This simple rule is appropriate for LFG projects because financial additionality is assured by the lack of alternative revenue streams. For a landfill gas flaring project that doesn't generate electricity, carbon credits represent the only economic return to the project.

In the Clean Development Mechanism (CDM) tool for the demonstration of additionality, LFG projects use the simple cost analysis method rather than a benchmark or investment comparison analysis (http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf).

With financial additionality assumed, the primary question centers on the regulatory regime. Using federal guidelines to establish the regulatory baseline is a standard approach. The authority for federal air standards, including emissions from landfills, falls under the Clean Air Act. State rules may also be implemented, and they must be at least as strict as the federal rules.

The relevant regulations, codified in 40 CFR Subpart WWW (http://www.epa.gov/ttn/atw/landfill/fr12mr96.pdf), are the New Source Performance Standards, which apply to landfills of a certain capacity (over 2.5 megagrams) and date of

service (active on or after May 30, 1991). Tontitown meets both criteria and therefore is subject to the NSPS rules. However, being subject to NSPS rules is not a sufficient condition for mandatory installation of a GCCS. The EPA rules only require a GCCS on sites with NMOC emissions rates of 50Mg/yr.

The eligibility requirements for CCX offsets from LFG projects are cited here (Ch 9, CCX Rulebook):

> Exchange Methane Offsets will be issued to owners of GHG emission reductions achieved by landfill and agricultural methane collection and combustion systems placed into operation in the [sic] on or after January 1, 1999. Landfill methane collection and combustion systems in the U.S. may be registered with CCX and may earn XMOs only for mitigation occurring during time periods for which the landfill was not required to collect and combust methane in accordance with U.S. regulations requiring such actions under the New Source Performance Standards.

The following measurements of NMOC emissions indicate that the Tontitown landfill has consistently been below the level of 50 Mg/yr necessary to trigger mandatory GCCS under the NSPS rules.

- 6/22/1999: 13.7 Mg/yr
- 2/11/2000: 16.9 Mg/yr
- 5/23/2003: 22.7 Mg/yr
- 5/19/2003: 25.3 Mg/yr
- 6/14/2004: 26.3 Mg/yr
- 1/13/2005: 15.9 Mg/yr
- 3/01/2006: 19.3 Mg/yr

Waste Management claims their model does not show the 50 Mg/yr threshold being reached until 2024 (http://wiki.terrapass.com/f/24757.pdf). Consistent with the judgment of the CCX Offset committee, TerraPass found that the project was eligible for CCX credits.

Local environmental regulations

TerraPass did not investigate local rules regarding landfills prior to selecting the Tontitown project. Solid waste facilities in the state of Arkansas are governed by the Arkansas Pollution Control and Ecology Commission's Regulation 22 (http://www.adeq.state.ar.us/regs/default.htm). Regulation 22 was reviewed in the 2004-2006 time period, and a revised document was put into service April 26, 2006. A brief review of the document indicates no material changes in the regulations for surface gas or groundwater regulations.

Two aspects of the local regulations pertain to the project. The first is the regulation of groundwater quality and specification of a process for dealing with exceedance of acceptable groundwater contamination levels (http://wiki.terrapass.com/f/Reg22_Ch12.pdf). The second is a requirement of regulated landfills to control combustible emissions (http://wiki.terrapass.com/f/Reg22_415.pdf). These regulations are relevant to both a potential regulatory mandate to control methane emissions at Tontitown and a calculation of the proper baseline for credit generation.

The *BusinessWeek* article alleged that a confluence of these local environmental issues was the real reason an LFG system was installed (http://www.businessweek.com/magazine/content/07_13/b4027057.htm).

> Asked about Waste Management's response, Gerald Delavan, a supervisor at the Arkansas environmental agency, says: "It started out as a voluntary effort" by the company. "But it ended up being guided by corrective action,'" imposed by the state.

TerraPass' own interview with Gerald Delavan corroborates this point.

> "It was like the confluence of two freight trains. Between the water issues and the LEL [Lower Explosive Limit] limits, they had to do this project."

Groundwater contamination

The site of the Tontitown facility has a long history of groundwater issues. Over time, the site has hosted completely unregulated cells (pre-1978), unlined cells (#3 and #4), and modern lined cells (north and south cell, collectively the Tontitown Class 1 landfill). A Class 4 landfill also exists on the site. Groundwater issues at the site are further complicated by a cave-filled karst geology susceptible to rapid water flow.

Regulation 22, Chapter 12 specifies that a groundwater monitoring program must be in place in all modern operating Arkansas landfills to monitor a variety of elements for a statistically significant increase above established background levels or applicable absolute values. Monitoring is accomplished through a series of monitoring wells (MW) placed around the landfill.

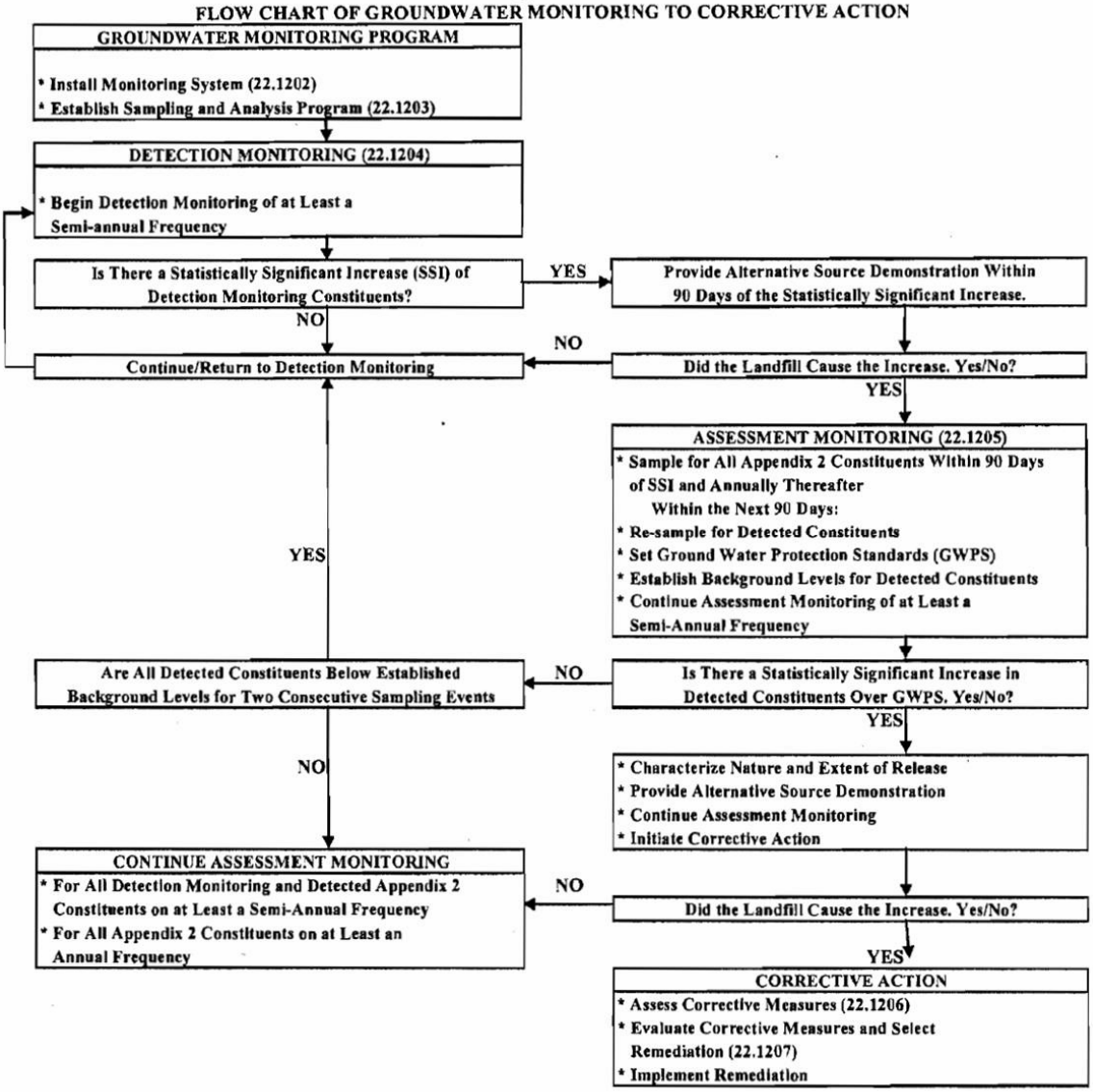
A distinction is made between "in-refuse" and "out-of-refuse" monitoring wells. In-refuse refers to any wells in the active landfill cell. Out-of-refuse refers to any wells placed in undisturbed earth. All monitoring wells at Tontitown are placed in out-of-refuse areas. A detailed map shows all monitoring wells, gas proves (GP), extraction wells (EW) and other

features of the Tontitown facility (http://wiki.terrapass.com/f/TTLF-EXIST%20SITE%20FULL%20SITE-200%20scale%20ow%20wells.pdf).

As noted in the *BusinessWeek* article, the Tontitown facility was placed in "corrective action" as a result of contamination of groundwater with vinyl chloride. A corrective action is a defined step in a process laid out in Reg 22, Ch 12, triggered by successive groundwater tests that show levels of contamination exceeding limits set in a performance standard agreed to by Waste Management and ADEQ. The figure below from ADEQ shows the process surrounding corrective action as related to groundwater issues.

Figure 12-1

FLOW CHART OF GROUNDWATER MONITORING TO CORRECTIVE ACTION



Surface air issues

A second issue at the Tontitown facility involved the incidence of high methane emissions at the surface of the landfill. Under Reg 22.415, monitoring procedures must be put in place to ensure that the concentration of methane gas does not exceed 25% of the lower explosive limit (LEL) in facility structures and 100% of the LEL at the property boundary. Elevated Level Contingency Measures are to be put in place if the gas limits are exceeded. These measures include the development of a remediation plan within 60 days.

As *BusinessWeek* reported:

> "After probes subsequently detected methane levels exceeding allowable levels, Dennis John Burks, then chief of the Solid Waste Management Div. of the Arkansas Environmental Quality Dept., wrote to Waste Management on June 27, 2001, saying that the state "strongly urges WM to bring the newly installed Tontitown Landfill gas extraction system online as soon as possible."

These claims were substantiated in our own interview with Gerald Delavan.

Project design

Well placement

As noted, a distinction is made in the formal documentation between in-refuse and out-of-refuse wells. A landfill gas flaring system can consist any number of extraction wells, and the exact placement and number of wells reflects the different purposes to which they can be put. Out-of-refuse wells refer to wells drilled in undisturbed ground. In-refuse wells refer to wells drilled in either active or historical landfill cells.

A review of the geography and site history suggests that the environmental benefits to groundwater are distinct across three different areas of the landfill site. The fundamental issue of groundwater contamination by landfill gas is believed to be caused by the collection of landfill gas over pools of water. The purpose of a GCCS is to create an extraction barrier to ensure the landfill gas does not meet groundwater.

The modern subtitle D area of the landfill as well as the closed sites #3 and #4 already contain barriers to limit the expansion of landfill gas. The subtitle D area has a full "bathtub" style barrier, installed prior to operation. Sites #3 and #4 have less complete landfill liners, installed after the sites stopped accepting waste.

The 46 out-of-refuse wells are sited where no barriers exist to control landfill gas migration. The 37 in-refuse wells, on the other hand, are placed in the subtitle D area and sites #3 and #4, areas that do contain gas barriers. (Map available at http://wiki.terrapass.com/f/well-map.pdf)

From the initial 1999 discussions of a GCCS, Waste Management planned a site-wide LFG system. In interviews, Waste Management claims that the out-of-refuse wells are the only aspect of the system that have a role in controlling the groundwater and surface air problems, both of which occurred in the out-of-refuse areas.

Project costs

Project cost for an LFG flaring system is mainly determined by the number of wells. Drilling a well costs between $5,000 and $10,000 per well. In-refuse wells are typically more expensive, as care must be taken to not penetrate the landfill liner. The wells share a central flare, which costs between $75,000 and $150,000. Miscellaneous additional costs include piping, headers, blower systems and construction labor.

Based on these estimates we calculate a cost for the in-refuse system alone between $260,000 and $520,000, and for the out-of-refuse system alone between $305,000 and $610,000. The full system costs between $490,000 and $980,000 (the totals don't add as both systems share one flare).

We have not been able to corroborate these estimates with formal P&L data from the site. However, a 2002 newspaper article declares that Waste Management spent $1.3 million on the full landfill gas flaring system.

A 2006 upgrade to the flare, header, and monitoring systems cost an additional $800,000.

Abbreviated timeline

The following abbreviated timeline traces the development of the Tontitown LFG project, including efforts to address the groundwater and surface air problems. A far more detailed timeline, with supporting documentation, is available in Appendix A.

- October 1996: volatile organic compounds (VOCs) are detected in the groundwater at levels that do not require a corrective action.
- July 1999: Waste Management begins planning and design of an LFG system.
- November 2000: ADEQ places Waste Management under corrective action in response to groundwater contamination at Tontitown.
- March 2001: Drilling begins on first 26 in-refuse wells.
- April 2 2001: Waste Management proposes 21 additional out-of-refuse wells as an interim corrective for the groundwater problem.
- May 31 2001: First 26 in-refuse wells are completed.
- June 14 2001: Notice of elevated surface air methane levels is delivered to Waste Management.
- July 24 2001: ADEQ sends a letter to Waste Management strongly urging that the flares be lit on the in-refuse wells to address the surface air problem.
- October, 2001: Waste Management lights the flares on the in-refuse wells.
- February - November 2002: Remainder of wells are installed.

- November 2003: Waste Management provides an assessment of corrective measures that only discusses the out-of-refuse wells. No mention is made of the in-refuse wells.

Additionality analysis

Key issues

The question of project additionality hinges on a few critical issues. It is helpful to examine each of these issues in turn as a prelude to applying a series of formal additionality tests.

Was the LFG System ever formally mandated?

Both ADEQ and Waste agree that no full or partial LFG system was ever mandated by ADEQ. But Gerald Delavan at ADEQ suggests that installation of the LFG system was an inevitable result of the groundwater contamination issues. When asked whether the LFG system was mandated, Delavan responded:

> "No, this was a voluntary effort initially that made more sense as the evidence built."

A review of documents supports the contention that at the time of the installation, the LFG system was viewed by both parties as a voluntary decision and that the state was in fact skeptical of some of the benefits of an LFG system:

- After a June 24, 1999 meeting in which GEC proposed that landfill gas was the source of the groundwater problem, ADEQ staff geologist Dave Ann Pennington wrote a memo criticizing Waste Management for "pressuring us to 'hurry' up and concur with their conclusion that landfill gas is causing the problem at the landfill."
- In a July 12, 1999 memo, ADEQ stresses the voluntary nature of the LFG project (referred to as the Gas Demonstration Project) and the fact that installation of the system will have no effect on a requirement to address the groundwater issue.
    - "First, ADEQ would like to reiterate that WMI's plan to move forward with the Gas Demonstration Project following ADEQ review and approval is at the sole discretion of WMI. The final outcome of the Gas Demonstration Project, even if it is determined landfill gas has adversely impacted groundwater will not ultimately change or effect the present status of WMI's groundwater assessment activities as prescribed under Regulation No. 22."
    - "As you are well aware, WMI is presently under assessment monitoring at the Tontitown landfill. If the data gathered at the next scheduled groundwater sampling event places WMI into corrective action, ADEQ under the terms of and conditions of Regulation 22 will require WMI to proceed with implementation of corrective measures for the Tontitown landfill."

- On January 4, 2002, after installation of the LFG system, the ADEQ Solid Waste Management Division (SWMD) sent a letter to the EPA regional administrator highlighting the history of groundwater issues at Tontitown and expressed skepticism that the LFG system would provide a complete solution to the problem.
    - "ADEQ SWMD staff have not inferred capturing and flaring of the landfill gas at the Tontitown landfill will solve all the water contamination issues at this facility. SWMD staff believe landfill gas is a contributing factor to ongoing ground water contamination at this facility but, also believe as previously stated, that releases of leachate from old poorly lined cells is also a contributing factor to ground water contamination in and around the site. SWMD staff do not believe reducing the volume of landfill gas will solve all the existing ground water contamination problems identified to date."
- The documents from ADEQ cited above show that installation of the Demonstration Gas Project did not remove the obligation under Reg 22 to control the groundwater issues. The regulations prescribe target levels for groundwater contamination, but do not prescribe any particular course of action.
- The surface air issue likewise did not come to light until after the LFG project was underway and decisions regarding design and construction were already made. In fact, the agreement to light the flare was signed before the elevated methane levels were detected.
    - Engineering drawings for the gas extraction system were submitted on June 1, 2001
    - The Administrative Agreement to light the flare for the system was signed June 6, 2001
    - The date of the exceedance of allowable methane gas reading occurred on June 7, 2001
    - The notice of elevated meter readings was delivered on June 14, 2001
    - ADEQ issued a letter strongly urging WM to bring the flare online on July 24, 2001
    - The flare was lit in October, 2001.

By the time the “urging” letter was published, only blowers and miscellaneous flare piping had to be installed for the wells already in place. Both required either approval from the state under the lengthy air permit process or an agreement from the state to waive those requirements. Moreover, the bulk of expenses associated with installation of an LFG system are incurred by the drilling of the wells. Drilling logs show that drilling of the in-refuse wells was completed between mid-March and mid-April 2001 (http://wiki.terrapass.com/f/16065.pdf).

In summary, both parties agree that the LFG was initially undertaken voluntarily. Further, much of the planning was done prior to the corrective action, and work on the original wells

was completed (and expenses incurred) prior to the detection of the surface air problem. Finally, ADEQ never prescribed any particular response to either environmental problem, and in fact expressed some doubt that an LFG would be a full solution.

Did alternatives exist to remedy the problem?

Regardless of whether a formal requirement was in place to compel Waste Management to install an LFG system, if the LFG system was the only or clearly most attractive means of addressing the groundwater or surface air problem, the corrective action may have represented a de facto requirement to implement the project.

It is important to note that LFG systems can vary dramatically in scope and purpose. The costs and effects of such a system depend on the placement and number of wells. It is reasonable to consider different types and configurations of LFG systems as possible alternatives to the project Waste Management actually pursued.

We asked Waste Management if they examined alternatives to the LFG system. They provided the following list of alternative solutions to the groundwater problem examined under assessment of Corrective Measures (http://wiki.terrapass.com/f/23274.pdf). This process started in April 2001 and ended in November 2003.

- Control of landfill gas migration
- Installation of a barrier wall
- In situ treatment
- Pumping and treating groundwater
- Natural attenuation

Our analysis of the first alternative, control of landfill gas migration, suggests from the documents that this is generally understood to be control of out-of-refuse landfill gas.

Waste Management has provided to TerraPass the approximate financial impact, including cost ranges and median cost estimates, for each alternative. These estimates are consistent with the assessment of corrective measures report (http://wiki.terrapass.com/f/21816.pdf). Other factors were also considered in the Waste Management document, including performance, reliability, and ease of implementation. These are discussed fully in the assessment of corrective measures report.

The financial estimates for the LFG system are based on a per-well estimate of drilling costs of $5K to $10K per well, and a flare cost of $75K to $150K. A cost estimate from an outside firm provided in March, 2001 indicated a project cost of $332K, in line with the estimate below (http://wiki.terrapass.com/f/13434.pdf).

Table 1: Alternatives to Project		
Corrective Measure	**Cost Range**	**Median Cost**
LFG System for out-of-refuse landfill gas migration (37 wells)	$260K to $520K	$390K
Installation of Barrier Wall	$750 to $1500K	$1125K
In situ Treatment	$250 to $1000K	$625K
Pump and Treat Groundwater	$250 to $1000K	$625K

We note that the out-of-refuse LFG system is the least-cost method and also was judged to be the most effective method of interim corrective assessment by Waste Management. The evidence presented supports the assessment from Delavan that "it was easy to see early on that the LFG system was the best. Others were costly or not appropriate for the site. [The] most reasonable approach was to control with an LFG system."

Waste Management stated in an interview that the rationale for the out-of-refuse system was "to use the LFG system in the out-of-refuse area to form a barrier...It was the best way to get ahead of the groundwater issue."

For the surface air problem, no formal documentation exists that shows an exploration of alternatives to the LFG project. However, interviews with both Waste Management and ADEQ suggest that other more localized alternatives may have also been appropriate solutions.

In an interview, Michael Caldwell from Waste Management suggests that without the LFG system already installed they would have considered three other alternatives:

One option, lets call this option A, would be to get as close to the edge of the landfill as possible and install a trench inside the landfill itself. Then you get some pipe and some risers and a few whirligigs like you see on attics. This helps the methane escape.

Option B would be probably get all the way up to the edge and try to relieve the pressure with a passive system. No blower, no flare, no pressure head.

Option C would be a series of approaches external to the landfill. Maybe a passive vent system here could short circuit it. Or sometimes we like to use the solar powered tiki torches. These are like your backyard tikis, with a solar unit to relight the gas when the flow gets too low. It’s got a little magneto set up. It’s not unusual for these things to burn 24x7.

We note for clarity that among the alternatives, only tiki torches involve any adjustment to the emissions baseline. According to Waste Management, "the levels are so low [from tiki torches], that you can't even measure the methane."

In summary, we find that reasonable alternatives to the present LFG system do exist. A subset of out-of-refuse wells would likely be adequate to address the groundwater contamination problem, with a price tag considerably lower than the $1.3 million Waste Management spent on its LFG system. And in the absence of an already installed LFG system, localized solutions to the surface air problem could be deployed with negligible effect on baseline emissions.

Does the LFG system go above and beyond the requirements of the corrective action?

The existence of alternatives to the LFG system is only relevant if the alternatives have a different impact on greenhouse gas emissions at the site. In other words, for the LFG system to represent a reduction in emissions over a business-as-usual scenario, the project should represent a reduction in emissions above and beyond credible alternatives.

For the surface air issue, it is simple to demonstrate that the LFG system goes above and beyond the alternatives. Of the three alternatives proposed, only one -- solar tiki torches -- results in the destruction of any methane, and the amount is considered negligible. Further, only two of twenty gas probes at the site registered surface air problems. The 83 wells installed far exceed the number required to address a localized surface air problem.

Greater contention exists over whether the LFG system goes above and beyond the requirements posed by the groundwater problem. Waste Management claims that the in-refuse wells are not necessary to address the groundwater problem, which by its nature involves landfill gas migration outside of the landfill cells. According to Waste Management, "[we] could clean up the groundwater with nothing more than the out-of-refuse wells."

ADEQ does not have a formal position on whether the LFG system goes beyond the requirements of the corrective action, as assessing such matters is outside of their purview. They are tasked with reviewing and approving Waste Management's plans, not with considering possible alternatives.

Nevertheless, when asked, members of ADEQ have offered conflicting opinions regarding whether the out-of-refuse wells would be sufficient to address the groundwater problem. Initially, Delavan disagreed with this premise:

> "Just collecting the gas from the out of refuse area? That's probably not appropriate -- it's just not how it's done. You really want to capture across the waste mass, across both out-of-refuse and in-refuse."

Delavan did qualify his statement, however: "But I don't really know. I'm not a gas engineer. I don't deal with these issues" He further acknowledged that other solutions to the groundwater issue may have been feasible, although it was not possible for him to offer a full determination without more details: "I guess they could have gone with a passive system. But did they go beyond the scope of regulation? I don't know."

Others at ADEQ offer support for Waste Management's contention that the LFG system exceeds any requirement imposed by the corrective action. Brian Leamons from ADEQ states, "They went well beyond the scope of the original design plans"

Given the disagreement between the two parties, we consulted the documents produced in the selection of interim corrective assessments and found numerous occasions where the interim corrective assessment referred only to the out-of-refuse wells. These statements were mainly made in letters submitted by Waste Management. The November 18, 2003 formal "assessment of corrective measures" report submitted by Waste Management only mentions out-of-refuse wells as an interim corrective measure (http://wiki.terrapass.com/f/21816.pdf).

- SCS Engineers' first Scope of Work in March 2001 for a comprehensive LFG system at the facility shows 10 out-of-refuse wells (http://wiki.terrapass.com/f/13434.pdf).
- As an interim corrective action, Waste Management provides formal notification to ADEQ of the preliminary gas system design system. In this notification Waste Management re-proposed 10 out-of-refuse wells for an initial phase and an additional 11 out-of-refuse wells (http://wiki.terrapass.com/f/13453.pdf).
- September 26, 2001: Waste Management indicates that as part of interim measures they will be installing out-of-refuse collection points to control landfill gas emissions from the facility.
- February 13, 2002: Waste Management provides a plan to install an additional four in-refuse wells and approximately 10 out-of-waste wells in the northeast side of the facility (http://wiki.terrapass.com/f/16079.pdf). See also Feb 27 drilling logs for out of refuse wells (http://wiki.terrapass.com/f/16139.pdf).
- November 12, 2002: Waste Management provides a plan to install additional interim corrective measures in support of the gas system in the southwest of the facility including 4 in-refuse wells and an undetermined number out-of-refuse wells (http://wiki.terrapass.com/f/18765.pdf)

- November 18, 2003: Waste Management provides an assessment of corrective measures analyzing the interim corrective measures of 16 out-of-refuse wells. The report contains no discussion of in-refuse wells as being a part of corrective measures (http://wiki.terrapass.com/f/21816.pdf).

This documentation supports the notion that both parties regarded the out-of-refuse system as the primary interim corrective measure. The timing of implementation also supports the notion that the in-refuse wells were not conceived as part of the solution to the groundwater problem. The in-refuse wells were implemented first, the result of planning that had begun in 1999, over a year before the corrective action was issued.

Application of Additionality Tests

Timing Test

A timing test is used to determine whether the timing of the project is compatible with the notion that carbon offsets played a role in its development. The *BusinessWeek* article was critical of the timing of the Tontitown project:

> Regardless of who deserves credit for taking the initiative, one thing is clear: The methane system was launched long before any promise of carbon-offset sales.

The specific timing test for the CCX is codified in the eligibility requirements for CCX Offsets from LFG projects and are cited below (Ch 9, CCX Rulebook).

> Exchange Methane Offsets will be issued to owners of GHG emission reductions achieved by landfill and agricultural methane collection and combustion systems placed into operation in the [sic] on or after January 1, 1999

The LFG system at Tontitown was placed into operation in October, 2001, almost two years past the CCX cutoff. We therefore conclude the timing test for CCX eligibility requirements is satisfied.

It also makes sense to examine whether the CCX timing performance standard is appropriate in this instance. The Chicago Climate Exchange was formally founded in May 2000. Waste Management is a founding member of the Chicago Climate Exchange, and along with 25 other corporations participated in the design phase for CCX. The announcement of the founding companies occurred on May 30, 2001. In July 2001, Waste Management became one of the original design phase members of CCX.

Waste Management has a stated interest in carbon accounting and offset projects that they claim drove the decision to join the CCX. Amy Banister of Waste Management told TerraPass:

> The CCX provides a valuable opportunity to learn how to establish an emissions baseline and inventory our emissions, develop, maintain and verify offset projects and trade offsets in a functioning market.

Therefore we also conclude that the specifics of the project timing are compatible with the notion that carbon offsets played a role in the project development.

Financial Test

The financial test asks whether a project would be financially justified in the absence of revenue from carbon offsets. A variety of accounting methods can be employed for a financial additionality test. Generally speaking, it is not enough for a project merely to break even for it to be considered financially justified. Rather, a project has to either provide comparable returns to an alternative project that yields the same ends, or a project must meet some typical NPV or IRR benchmark for the project developer.

However, no such methods are necessary to establish financial additionality for LFG flaring projects. The project generates no financial or economic benefits other than the revenue stream from carbon offsets, so a simple cost analysis can be used to demonstrate that the project is not financially justified in the absence of offsets. In the case of Tontitown, $1.3 million price tag associated with the LFG project is material. (More recently, Waste Management has invested an additional $800,000 in the LFG system.)

However, given that some action was necessary to address the groundwater problem, we must select an appropriate cost baseline. We accept Waste Management's contention that the out-of-refuse wells alone would be a viable alternative solution to the groundwater problem. Given an estimated median cost of $390,000 for the out-of-refuse wells alone, the actual project cost is materially larger than the credible alternative.

Regulatory Test

The regulatory test is the central additionality hurdle for Tontitown. Although it is indisputably true that Waste Management was under no strict or legally binding requirement to implement a methane flaring system, it is also true that Waste Management used the methane flaring system to correct groundwater contamination and surface air problems that it was under pressure to fix.

Since there is no clear regulatory mandate that led to the project, we focus our examination of the super-regulatory nature of the project with the question of whether alternatives available to Waste Management were compatible with local regulations. The text of the CDM tool for establishing project additionality is a useful framework here. The outcome of our alternatives analysis should show:

Identified realistic and credible alternative scenario(s) to the project activity that are in compliance with mandatory legislation and regulations taking into account the enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations.

Determining which strategies are realistic and credible is a challenge. Waste Management claims that each of the corrective measures analyzed were valid alternative strategies to the project activity. Those alternative corrective measures analyzed were:

- Control of landfill gas migration
- Installation of a barrier wall
- In situ treatment
- Pumping and treating of groundwater
- Natural attenuation

ADEQ is less sure about the viability of alternatives. Delavan said, "We probably would have not accepted these as reasonable corrective measures." When asked whether such alternatives would even be considered by ADEQ if accompanied by relevant data, he said, "Yes, we would have considered it. We didn't tell them they couldn't do it."

The Arkansas regulations provide some guidance about what level of viability is required and which party is responsible for selection of corrective measure selection. Regulation 22.1207 specifies that the "owner or operator shall select a remedy" to achieve the groundwater protection standards (http://wiki.terrapass.com/f/Reg22_Ch12.pdf). The regulations even let an owner an operator abandon a chosen remedy if it is not achieving the desired results. We have also confirmed that all the alternative solutions are listed and described on the Federal Remediation Roundtable (www.frtr.gov), a reasonable measure of common practice.

Although a full cost and feasibility analysis of the proposed alternatives would be prohibitively expensive and time-consuming to conduct retrospectively, they do nevertheless appear credible mechanisms to address the requirements of the corrective action. Perhaps more importantly, the LFG system actually in place appears to go far beyond the requirement to address the groundwater problem.

Case study: CDM-approved projects where regulatory compulsion exists

The LFG system at Tontitown appears to be serving multiple purposes. On the one hand, Waste Management has designed a number of wells to address a specific groundwater contamination problem. Additionally, some of the originally planned wells have been instrumental in alleviating a surface gas problem. Finally, a number of in-refuse wells primarily exist to draw off and destroy landfill methane.

Precedent exists for projects in which carbon offsets are generated from activities that are at least partially brought about by regulatory compulsion. It may be instructive to investigage how such projects have been treated under the CDM. One such project is the Salvador da Bahia Landfill Gas Project in the Municipio de Salvador, Estado da Bahia, Brazil. (http://wiki.terrapass.com/f/CDM_ConcessionLFG_methodology.pdf)

Bahia's CDM documents establish a methodology for distinguishing between contractually demanded actions and voluntary actions. The method, in brief, is to adjust the emissions baseline downwards to reflect the contractual obligations of the developer. By adjusting the baseline downwards, the developer only claims reductions above those required by law or contract as a source of carbon offsets. From the concession methodology, additionality is established:

If the actual quantity of methane flared is greater than the baseline quantity flared, the project activity is additional. The emissions reductions will be zero if the project activity is not additional. Since the baseline quantity flared is determined by the contractual requirement, which is established through a competitive bidding process the baseline reflects what would occur in the absence of the project activity.

We could apply a similar methodology to the Tontitown project, on the assumption that some portion of the LFG system is a mandatory requirement of the corrective action. Although the system was never formally mandated and credible alternatives existed, Waste Management's selection of the out-of-refuse system for interim corrective assessments provide grounds for taking a conservative view of the project baseline.

The key question in applying a concession methodology is to determine what portion of the reduction from baseline is at risk due to regulatory issues. To gain insight into this question, we first review the architecture of the landfill (http://wiki.terrapass.com/f/well-map.pdf).

The landfill consists of an in-refuse area consisting of both active areas (subtitle D, Class 4) and inactive areas (sites #3 and #4). Surrounding these sites are undisturbed out-of-refuse areas. Below we review the problem areas and note that all are out-of-refuse.

Problem category	Well #	Location
Surface emissions	GP1	Out-of-refuse
Surface emissions	GP-12	Out-of-refuse
Groundwater	MW-7	Out-of-refuse
Groundwater	MW-8	Out-of-refuse

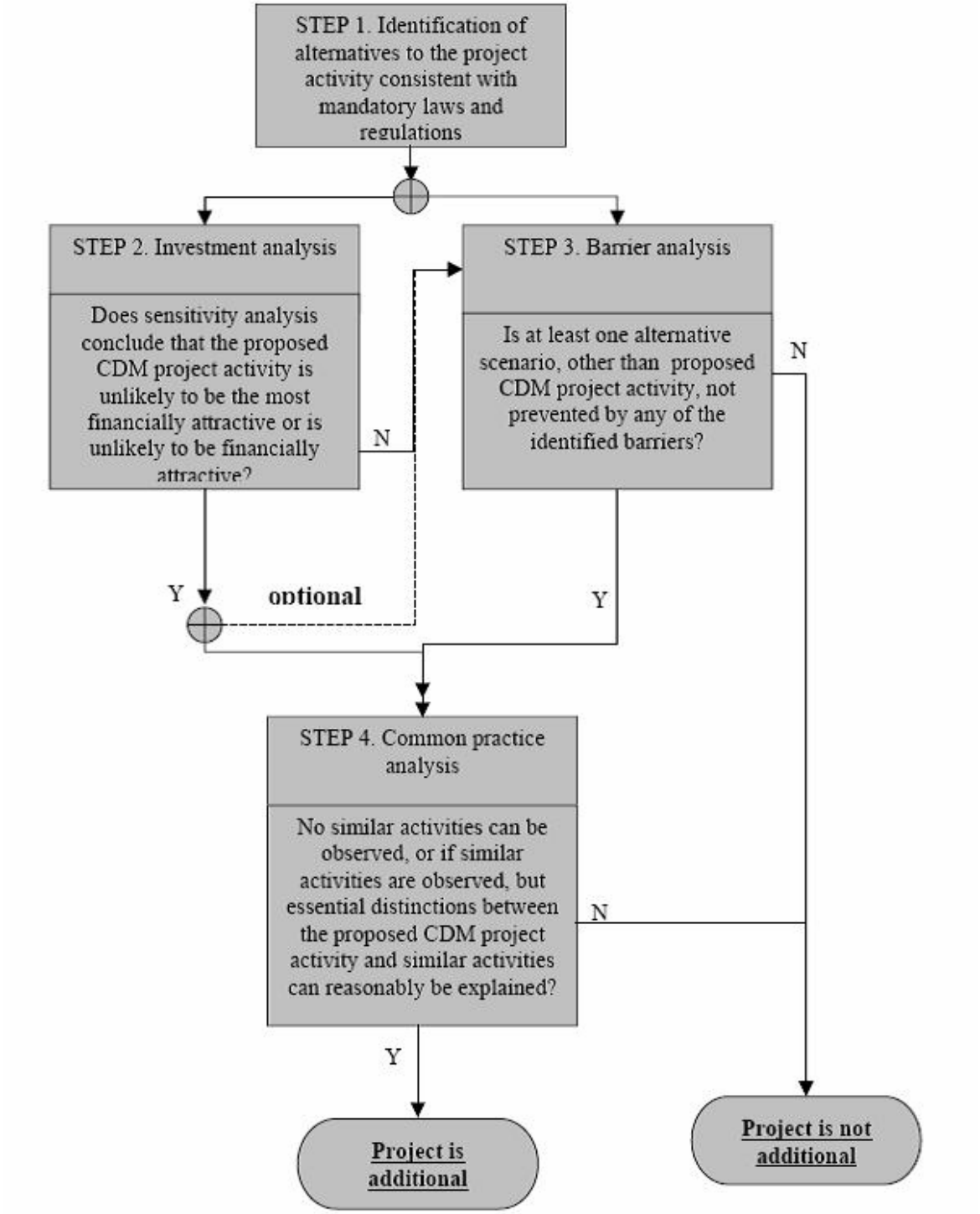
Remediation of these problems, whether formally required or simply reasonably expected, is limited to these localized areas. Mike Caldwell of Waste Management states, "The only imaginable thing we could have been required to do was install the LFG system in the out-of-refuse area. Everything else we did was completely on our own."

It is worth examining the impact on baseline emissions is if we assume the 46 out-of-refuse wells are part of a regulatory requirement. Based on preliminary readings from one month's emissions, less than 10% of the total volume of air (in standard cubic feet per minute) comes from the out of refuse wells, and about 1% of the total methane flared. 99% of the methane flared at the site comes from in-refuse wells, which we regard as the strictly voluntary portion of the LFG system.

We have formally asked Waste Management to perform a short field work exercise to document and confirm these monthly figures. They anticipate a week's worth of work and have agreed to share this information with us.

Application of CDM accepted methodology for demonstration of additionality

Although not widely used in the US market, the UNFCC's "Tool for the Demonstration of Additionality" provides another useful framework through which to examine the Tontitown project. Below we show the schematic of tests that accompany the tool:


STEP 1. Identification of alternatives to the project activity consistent with mandatory laws and regulations
STEP 2. Investment analysis
Does sensitivity analysis conclude that the proposed CDM project activity is unlikely to be the most financially attractive or is unlikely to be financially attractive?
STEP 3. Barrier analysis
Is at least one alternative scenario, other than proposed CDM project activity, not prevented by any of the identified barriers?
N
Y
optional
Y
N
STEP 4. Common practice analysis
No similar activities can be observed, or if similar activities are observed, but essential distinctions between the proposed CDM project activity and similar activities can reasonably be explained?
N
Y
Project is additional
Project is not additional

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations

For most LFG projects, the baseline alternative is simply venting the methane into the atmosphere. While there was no formal regulation requiring an LFG system, local regulations compelled Waste Management to address groundwater and surface air problems, either through an LFG system or some other means. Consistent with the application of Step 1b, we void the "do nothing" alternative and instead contemplate other options consistent with controlling groundwater under local regulations. For clarity, the effect on the emissions baseline is also noted.

Table 2: Alternatives to Project

Project alternative	Median cost	Effect on baseline
LFG System for out of refuse landfill gas migration	$309K	1% decrease due to flaring out of refuse emissions if forced by regulator to adopt
Installation of Barrier Wall	$1,125K	None
Insitu Treatment	$625K	None
Pump and Treat Groundwater	$625K	None
In-refuse and out-of-refuse LFG system	$735K	As determined by review

Step 1b. Consistency with mandatory laws and regulations

As discussed above in our regulatory test, we believe all alternatives to be consistent with mandatory laws and regulations.

Step 2. Investment analysis

The project activity generates no financial or economic benefits other than offset related income, so a simple cost analysis is used (Option I). The costs in the table above are estimates from Waste Management experts. Reported financial data has been requested. Based on preliminary numbers, it is concluded the proposed project is not financially attractive in-refuse and out-of-refuse LFG system is not financially attractive compared to other credible options.

Step 4. Common practice analysis

Sub-step 4a. Analyze other activities similar to the proposed project activity:

The project activity is unique. We are not aware of other voluntary flaring initiatives in Arkansas or by Waste Management that do not involve registration of carbon offsets.

Sub-step 4b. Discuss any similar options that are occurring:

Federal regulations mandate LFG systems across Arkansas and the U.S. The technology is mature and common. These projects are universally financially unattractive and the result of regulatory compliance rather than an economic benefit.

TerraPass recommendation

In light of the information revealed in this document, TerraPass makes the following Recommendation:

We find the Tontitown project passes the application of all the necessary tests to establish project additionality.

1. The LFG project timing is consistent with both CCX and common-sense criteria.
2. The LFG project meets CCX project eligibility requirements because NSPS regulations do not apply to the site.
3. The LFG project, by common agreement, was not specifically mandated by ADEQ.
4. Credible alternative mechanisms exist to address local regulatory issues at the Tontitown facility.
5. The LFG project represents both a financial investment and a reduction in greenhouse gas emissions that materially exceeds the baseline scenarios established by those credible alternatives.

However, as a matter of conservative practice, we recommend an adjustment to the project emissions baseline to reflect the multiple purposes served by the LFG project. Granting that the project, though voluntary, has developed at least partially in response to local regulatory issues, we feel that it is prudent to except methane extracted from the out-of-refuse wells from carbon offset eligibility.

Based on sample readings, this exception requires a 1% adjustment in the emissions baseline, or the repurchase by TerraPass of 156 metric tons of carbon offsets. Before making a final determination on the size of the adjustment, we will ask Waste Management to proceed with a formal study of out-of-refuse methane generation.

We further propose the following improvements to the TerraPass project selection and purchasing process:

1. *Project developer and stakeholder interviews*

   Current practice focuses on informal interviews with project developers and site owners. These interviews should be formalized. Specifically, a set of common project interview questions should be developed and answers to each of these questions should be published as part of the public review process. These interview questions should cover local impact issues specific to the activity where the carbon offset project is taking place. Generally, at least three stakeholders should be identified and interviewed for each project.

2. *Contract attestation*

   Current attestation and carbon purchase agreements should include specific language from the project developer attesting to the voluntary nature of the offset credits.

3. *Public Literature search*

   A formal newspaper and literature search should be conducted on the last 10 years of history for the project location.

4. *Public Stakeholder Review*

   Before supporting a new project, TerraPass should open a public comment period for the project for a period of 30 days. All comments should be published and made publicly available.

We look forward to the questions and feedback of the committee. We further wish to thank all who have been generous with their time in helping us assemble and review this document.

Appendix A: detailed project timeline and documentation

Consistent with the process under Regulation 22 Chapter 12, the following events led to the Tontitown facility being placed under corrective action. Where publicly available, files are linked to documentation recording the sequence of events.

- March 31, 1995: Assessment monitoring formally began for volatile organic compounds (VOCs) in monitoring well 1 (MW-1).
- August 1995: USA Waste buys Sunray Services.
- Aug 1996: The facility began hydrogeologic investigations.
- Oct 1996: Environmental consultants Genesis Environmental Consulting (GEC) draft a memo listing possible reasons that VOCs had been detected in the groundwater:
    - (a) Well proximity to waste mass
    - (b) Upgradient source concentration
    - (c) Landfill gas migration
    - (d) Leachate seepage into groundwater
- March 11, 1998: USA Waste agrees to merge with Waste Management.
- June 24, 1999: GEC drafts a letter summarizing the history of the groundwater monitoring project, and presents it at a meeting between ADEQ, GEC, and WM (http://wiki.terrapass.com/f/9034.pdf). The letter notes that the facility remains in assessment monitoring, but "detected concentrations have not statistically exceeded the groundwater protection standards and appear to be decreasing in most cases." In this meeting GEC suggests that concentrations of VOCs in the groundwater are the result of landfill gas migration (http://wiki.terrapass.com/f/9089.pdf) . This is also the first time a Gas Demonstration Project is proposed. The Gas Demonstration Project includes a plan to drill additional landfill gas monitoring probes to attempt to determine the volume and flow of gases in the landfill area, and contemplates installation of a gas collection and capture system. GEC requests an Alternate Source Demonstration to show that older landfills are the likely source of groundwater contamination.
- July 9, 1999: Dave Ann Pennington, geologist at ADEQ, writes a memo criticizing WM for "pressuring us to 'hurry' up and concur with their conclusion that landfill gas is causing the problem at the landfill." (http://wiki.terrapass.com/f/41546.pdf).
- July 12, 1999: ADEQ denies the Alternate Source Demonstration but encourages WM to "proceed with the landfill 'gas collection project' as a system designed to improve air quality and to possibly lessen the adverse impact from the landfill gas on local ground water supplies." (http://wiki.terrapass.com/f/July%2012-1999%20Letter.pdf).

- July 14, 1999: WM and ADEQ meet to discuss the Gas Demonstration Project. The meeting summary notes that "WM submitted the Gas Demonstration Report and currently has plans to design a landfill gas system, on a voluntary 'proactive' status and not as a regulatory driven mandate." (http://wiki.terrapass.com/f/9192.pdf)
- July 29, 1999: ADEQ reminds WM of several issues related to the Gas Demonstration Project (http://wiki.terrapass.com/f/7-29-99.pdf):
    - "First, ADEQ would like to reiterate that WMI's plan to move forward with the Gas Demonstration Project following ADEQ review and approval is at the sole discretion of WMI. The final outcome of the Gas Demonstration Project, even if it is determined landfill gas has adversely impacted groundwater will not ultimately change or effect the present status of WMI's groundwater assessment activities as prescribed under Regulation No. 22."
    - "As you are well aware, WMI is presently under assessment monitoring at the Tontitown landfill. If the data gathered at the next scheduled groundwater sampling event places WMI into corrective action, ADEQ under the terms of and conditions of Regulation 22 will require WMI to proceed with implementation of corrective measures for the Tontitown landfill."
- June 5, 2000: Tontitown facility has triggered assessment of corrective measures (http://wiki.terrapass.com/f/33082.pdf).
- November 30, 2000: Notice of corrective action (CAO) is delivered to WM. This notice requires assessment of corrective measures within 90 days (http://wiki.terrapass.com/f/10239.pdf). The CAO prescribes the following actions:
    - (1) Within 14 days, WM will make a record of which appendix 2 parameters have been exceeded
    - (2) Within 30 days, WM will perform a hydrogeological investigation
    - (3) After characterizing the nature and extent of the contamination, WM will implement interim remedial measures
    - (4) Within 60 days, WM will submit a full remedial action plan and proposed schedule for implementation
- February 27, 2001: WM advises ADEQ that they have started assessment of measures including the construction of a landfill gas system, investigation of in situ treatment options and further hydrogeologic study (http://wiki.terrapass.com/f/13161.pdf).
- March 16, 2001: WM delivers Scope of Work for comprehensive LFG system at the facility (http://wiki.terrapass.com/f/13434.pdf). The plan encompasses 10 out-of-refuse wells and carries a total cost estimate of $332K.
- March 26, 2001: Waste Management proposes a schedule for the LFG system (http://wiki.terrapass.com/f/3-26-01.pdf).
    - March 26 2001 - Mobilize drill rigs to the site
    - April 15, 2001 -Completion of installation of gas probes

  - April 20, 2001 - Completion of Preliminary Assessment and Engineering Deslgn
  - May 30, 2001 -Completion of installation of extraction wells
  - June 1, 2001 - Submittal of As-Built Engineering Drawings of Gas Extraction System
- April 2, 2001: As an interim corrective action, the facility notifies ADEQ of the preliminary gas system design and drawings. 10 wells are re-proposed for an initial phase and an additional 11, all out-of-refuse, for a total of 21 out-of-refuse wells (http://wiki.terrapass.com/f/13453.pdf).
- April 24, 2001: WM applies for a minor air source permit. The permit reflects the 21 out of refuse wells (http://wiki.terrapass.com/f/13818.pdf).
- May 30, 2001: The in-refuse gas collection system is complete. This contains the 26 wells in the in-refuse area (http://wiki.terrapass.com/f/16065.pdf).
- June 6, 2001: The parties agree to an administrative agreement to light the flare (http://wiki.terrapass.com/f/flare-agreement.pdf).
- June 27, 2001: In relation to surface air issues, ADEQ tells Waste Management that it is hoped that, "utilization of this gas extraction system will reduce or eliminate excess methane gas build-up in the landfill and reduce the potential for gas migration offsite" (http://wiki.terrapass.com/f/6-27-01.pdf).
- September 26, 2001: WM indicates that as part of interim measures they will be installing out of refuse collection points to control the emissions from landfill gas from the facility (http://wiki.terrapass.com/f/15363.pdf).
- October 5, 2001: The minor air source permit is received (http://wiki.terrapass.com/f/15481.pdf).
- January 4, 2002: ADEQ officials, in a letter (http://wiki.terrapass.com/f/41521.pdf) to the EPA regional administrator, highlight the history of groundwater issues and place the gas collection system in perspective with the groundwater challenges.
  - "SWMD staff believe landfill gas is a contributing factor to ongoing ground water contamination at this facility but, also believe previously stated, that releases of leachate from old poorly lined cells is also a contributing factor to ground water contamination in and around the site. SWMD staff do not believe reducing the volume of landfill gas will solve all the existing ground water contamination problems identified to date."

- February 13, 2002: Waste Management provides a plan to install an additional four in-waste collection wells and approximately 10 out-of-refuse collection wells in the northeast side of the facility (http://wiki.terrapass.com/f/16079.pdf). See also Feb 27 drilling logs for out-of-refuse wells (http://wiki.terrapass.com/f/16139.pdf).
- November 12, 2002: Waste Management provides a plan to install additional interim corrective measures in support of the gas system in the southwest of the facility

including 4 in-refuse wells and an undetermined number out of refuse wells (http://wiki.terrapass.com/f/18765.pdf).

- November 18, 2003: Waste Management provides assessment of corrective measures report analyzing the interim corrective measures of 16 out of refuse wells and natural attenuation. There is no discussion of in-refuse wells as being a part of corrective measures (http://wiki.terrapass.com/f/21816.pdf).
- May 21, 2004: Waste Management summarizes the analysis of alternative measures and selects the corrective remedy (http://wiki.terrapass.com/f/23274.pdf).
    - The corrective measures analyzed were
        - Control of landfill gas migration
        - Installation of a barrier wall
        - Insitu treatment
        - Pump and treat groundwater
        - Natural attenuation
    - "The primary selected remedy is control of landfill gas migration through the extraction and collection of landfill gas from the waste unit(s). A supplemental remedial measure that has been determined to be effective for site-specific constituent of concern and subsurface geologic conditions is natural attenuation."
- July 1, 2004: Waste Management provides schedule for initiating and completing remedial activities (http://wiki.terrapass.com/f/23572.pdf). This letter includes a useful graphical summary of the actions taken and dates of completion: