



Pay for Performance Pilot Study

Division of Waste Management
Underground Storage Tank Section

October 1, 2007

North Carolina
Department of Environment
and
Natural Resources

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125 copies of this document were published on recycled paper at a cost of \$85.00 or \$0.68 each.

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Executive Summary:

In October 2001, House Bill 1063 authorized the Pay for Performance (PFP) Pilot Study. The basic concept of PFP is that the total remediation costs are set and reimbursements are made as pre-determined cleanup milestones are met. This varies from the current process in which reimbursements are made as cleanup work is done, with no fixed total cost and no cleanup milestones. Following funding authorization in July 2003 and completion of rulemaking in September 2004, the Underground Storage Tank (UST) Section solicited bids from firms willing to assess and remediate petroleum UST releases using the PFP model. One contract was awarded for the risk-based cleanup of Incident Number 22406 and one PFP-based settlement agreement was entered into for the unrestricted use cleanup of Incident Number 14545. A total of \$477,225 was authorized for the pilot study, and remedial systems have been installed at both sites. Incident Number 14545 has reached the 99% cleanup level within five years of the seven years allotted and Incident Number 22406 has reached the 50% cleanup milestone within the first year of the three years allotted. Of the \$477,225 authorized for the pilot study, \$324,502 has been reimbursed.

Introduction:

Pay for Performance is a cleanup model in which reimbursements for cleanup costs are made as pre-determined goals are met. The PFP model establishes timelines for completion of the cleanups, which include defined goals and budgets for projects, as well as clear, up-front expectations of the goals to be met and guarantees reimbursements for work performed. The PFP model creates incentives for technically effective, cost-controlled, and rapid cleanups.

Legislative and Rule-Making Process:

On October 15, 2001, the NC General Assembly enacted House Bill 1063 which gave the Division of Waste Management's Underground Storage Tank Section the authority to conduct a pilot study of performance-based cleanups of discharges and releases of petroleum from underground storage tanks. Implementation of the pilot study involved identifying releases that would be good candidates for PFP cleanups and whose responsible parties would voluntarily enter into PFP contracts. The pilot study also involved using the North Carolina Interactive Purchasing System to accept bids from and award performance-based contracts to qualified environmental services firms that submitted the lowest, technically qualified bids for acceptable cleanups of the identified releases. A series of milestones were established describing PFP process achievements (generally percentage reductions in contaminate levels in the soil and groundwater) that would have to be met before reimbursements could be made from the Commercial Fund or Non-Commercial Fund.

On November 2, 2001, the Division of Waste Management convened a stakeholders workgroup consisting of representatives of the Professional Engineers of North Carolina, the Consulting Engineers Council of North Carolina, the North Carolina Board for the Licensing of Geologists and the North Carolina Petroleum Marketer's Association. Their goal was to develop a temporary PFP rule. A follow-up meeting on November 9, 2001 resulted in further refinement of the rule and discussions of the contract and bidding procedures proposed for use with the rule.

The proposed temporary rule was presented to the Groundwater Committee of the Environmental Management Commission (EMC) on December 12, 2001 and received a favorable vote to proceed to full commission review in February 2002. On February 14, 2002, the EMC voted to approve the publication of the temporary rule in the North Carolina Register. The temporary rule was published for public comment between March 15 and April 15, 2002 in Volume 16, Issue 18, p. 2019 of the NC Register. No comments were received. The Commission adopted the temporary rule on May 14, 2002. On July 11, 2002 the Commission voted to allow the Division of Waste Management to proceed with permanent rulemaking and to publish the permanent rule in the NC Register. The permanent rule was published in the September 2004 Issue of the NC Register.

In July of 2003, House Bill 897 was passed, allowing \$2.5 million from the Commercial Fund and \$250,000 from the Non-Commercial Fund to be allocated for the Pay-for-Performance Program in each fiscal year. At the time of House Bill 897 passage, there were four commercial releases identified as candidates for the pilot program. Of those releases, one reached cleanup levels by natural attenuation and a Notice of Residual Petroleum land use restriction prior to the start of the pilot study.

Contracting Process:

In 2001, the UST Section entered into a Pay for Performance cleanup contract as part of a third party lawsuit settlement agreement. This contract, while not allowing for flexible cleanup goals due to the settlement agreement between the responsible party and the affected party, did set the cleanup timetable and fix the cleanup costs. Over the past five years, this site has met all contractual milestones up to and including the 99% contaminant reduction goal. At present, the consultant of record is trying to meet the final cleanup goals and begin the one year of monitoring following system shut down to ensure that the cleanup milestone has been met and that the contamination levels do not rebound at the site.

In June of 2005, the UST Section opened and reviewed six bids for the first Pay for Performance contract. Unfortunately, the six offers were not detailed enough in the technical proposal to justify the cost proposals submitted. The performance contract was placed back out to bid, with an updated technical proposal description, on July 21, 2005 with a closing date of August 31, 2005.

On January 4, 2006, the first voluntary Pay for Performance contract, #N06004, was awarded to Pyramid Environmental & Engineering, P.C. and then amended on May 12, 2006 to finalize the contract terms and conditions. In June and July of 2006, the first milestone was met, and installation and startup of the remediation system commenced. Monitored natural attenuation of the plume will be conducted under the terms of the contract until the site has met the cleanup levels stipulated in the contract.

In order to be considered for the Pay for Performance Program, a site must have had a completed Comprehensive Site Assessment (CSA) and not be an emergency situation. Any responsible party who would have liked their incident considered for the program, and could have met the requirements, was requested to contact the UST Section.

Site Summaries:

Incident #22406 Pantry #932, Kinston, NC

In 2001, the Pantry, Inc. reported a release from underground storage tanks (USTs) at Pantry store #932 (former Kwik Mart #4) located at 701 West Vernon Avenue, Kinston, NC 28501. The DENR designated the release UST Incident #22406. The Pantry worked with the DENR to complete on-site and off-site petroleum contamination assessment. The CSA was completed in 2003, and it included assessment of properties to the south of the site across Vernon Avenue, in the direction of petroleum contaminant transport. The assessment was accepted by DENR. The Pantry volunteered the site to the UST Section as a potential site for the Performance Based Cleanup program, and the site was accepted.



(Pantry #932, Kinston, NC. Courtesy of Pyramid Environmental & Engineering, PC.)

In June and July 2005, the DENR submitted a Request for Proposal (RfP) #16-N06004-RC to select a contractor for a performance based corrective action on behalf of the Division of Waste Management, Underground Storage Tank Section for the release as listed here.

Site Name/Address: The Pantry #932 (former Kwik Mart #4);
DENR Incident #22406
701 West Vernon Avenue, Kinston, NC 28501

Responsible Party: The Pantry, Inc.
Contact Person: Ms. Reneé Thomas
P.O. Box 1410, Sanford, NC 27330
Phone (919) 774-6700 Ext. 5206

The contract was awarded to Pyramid Environmental & Engineering, P.C. in September 2005 for a 36-month cleanup period costing \$101,225. The contract signed and submitted to Pyramid in January 2006. The Pantry and DENR worked on a tri-party agreement that included DENR, The Pantry, and Pyramid to allow access to and remediation of the property. After a meeting in Raleigh in March 2006, the tri-party agreement was signed by all parties in May 2006. The Underground Injection Control (UIC) Permit was received by the State of NC Aquifer Protection Section on May 18, 2006. The UIC permit was approved in a letter dated June 19, 2006. The work plan summarizes the planned remediation activities, including injection of oxygen to promote enhanced natural attenuation and degradation, proposed by Pyramid and agreed to by the DENR. The work plan provides additional details of the work and a firm schedule to

accomplish the tasks. Figure 1 and Table 1 shows the relationship between the milestone completion points, payments made for completion, and the reduction in contaminant mass and project completion percentage .

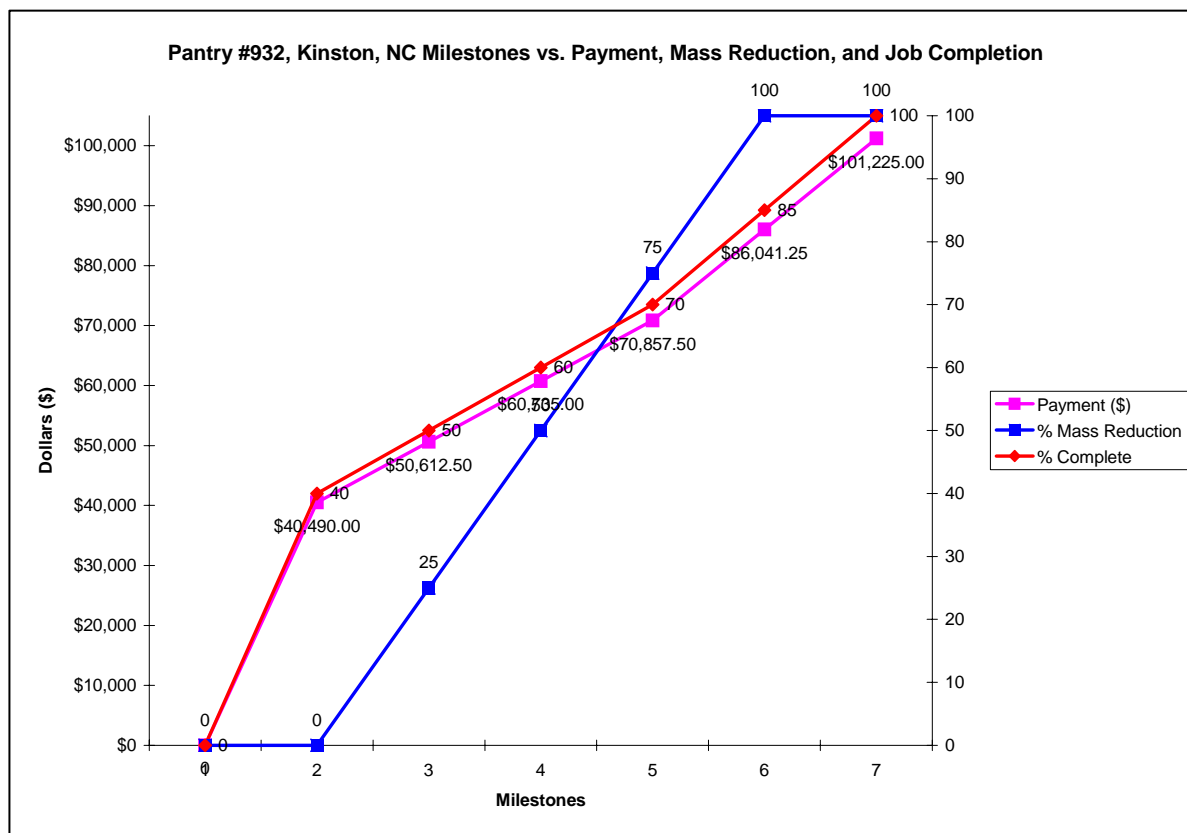


Figure 1: Pantry #932, Kinston, NC Milestone Completion vs. Mass Reduction and Cost. This site is currently at Milestone 2 w/ no mass reduction and 40% project completion w/ \$40k of \$101K spent.

Milestone	Comments	Mass Reduction	Payment (\$)	Total Payment (\$)	% Complete
1 (5/12/06)	Contract in Place	0	0	0	0
2 (7/20/06)	System Installed	0	\$40,490.00	\$40,490.00	40
3	25% Reduction	25%	\$10,122.50	\$50,612.50	50
4	50% Reduction	50%	\$10,122.50	\$60,735.00	60
5	75% Reduction	75%	\$10,122.50	\$70,857.50	70
6	100% Reduction	100%	\$15,183.75	\$86,041.25	85
7	Final Sampling	0	\$15,183.75	\$101,225.00	100

Table 1: Pantry #932, Kinston, NC Milestone Completion vs. Mass Reduction and Cost. This site is currently at Milestone 2 w/ no mass reduction and 40% project completion w/ \$40k of \$101K spent.

The remediation system was installed as planned and has been operating well through the first year of treatment. The overall amount of oxygen pumped into the groundwater has been slower than predicted in the source area and may reflect a greater mass of hydrocarbons present in this area than anticipated. The oxygen dispersion in the aquifer has been less than predicted because the reported hydraulic conductivity of the aquifer materials appears to be much less than

predicted in the CSA, and there are potentially naturally occurring total organic carbon (TOC) concentrations in the soil in the source area.

To overcome these conditions, additional nutrients and oxygen have been injected through the permitted injection wells and natural biodegradation has been stimulated. To lower contaminant concentrations in monitoring well (MW) 3, an Aggressive Fluid Vapor Recovery (AFVR) event was conducted on July 26, 2007. AFVR is a process in which a vacuum is placed on the MW to extract groundwater and vapor from the soils in order to reduce overall contaminate mass. A reduction in groundwater concentrations is associated with this event. Pyramid utilized an iSOC® and gPRO® oxygen infusion unit to oxygenate well water from an off-site source to 50-60 ppm oxygen and inject this water by gravity into the injection wells in order to enhance the growth of micro-organisms to degrade the petroleum contamination present. The stimulation of biological activity has been excellent, and will play a significant role in the overall remediation of the site.



(A completed iSOC well vault with oxygen cylinder. Courtesy of Pyramid Environmental & Engineering, PC.)

The next sampling event is planned for October 1, 2007, 90 days from the last injection of oxygen in the key monitoring wells. After the results are reported, Pyramid will prepare a system monitoring report to summarize the site activities and results. Once the Remediation Goals (RGs) are met, Pyramid will work with the Pantry and the DENR to complete the deed recordation process and abandon the remediation and monitoring wells at the site.

The PFP contract specifies a total reimbursement of \$101,225 for a three-year cleanup which must reduce Gross Contaminate Levels of petroleum contaminants by 50%, must reduce petroleum contamination concentrations in selected wells to 50% of the concentrations observed on April 18, 2005, and must close the release incident under risk-based standards and rules.

Incident #14545 Kwik Mart #17, Raleigh, NC

As a result of litigation between the responsible party (Wooten Oil) and affected adjacent property owner (CRTS) due to the migration of the petroleum contamination originating from Kwik Mart #17, Wooten Oil, CRTS and the DENR entered into a settlement agreement to cleanup the CRTS property. ATC was selected by the responsible party to perform the cleanup under a negotiated PFP contract that was executed in December 2001 with a seven year cleanup period.



Photo 1: View looking north from adjacent CRTS towards Pantry store (former Kwik Mart #17)



Photo 2: View from Pantry store (remediation equipment to left), looking south towards CRTS property

At the time of the PFP contract, the Trust Fund had expended \$105,560.87 in assessment and reporting costs. The PFP contract called for a total reimbursement of \$380,000 to clean up the property unrestricted use standards within seven years.

In 2002, ATC designed and constructed an air-sparge/soil vapor extraction (AS/SVE) remediation system at the site that included 10 AS wells and 8 SVE wells and began operating the system in October 2002. The system continued to operate through 2006. Figure 2 and Table 2 shows the relationship between the milestone completion points, payments made for completion, and the reduction in contaminant mass and project completion percentage.

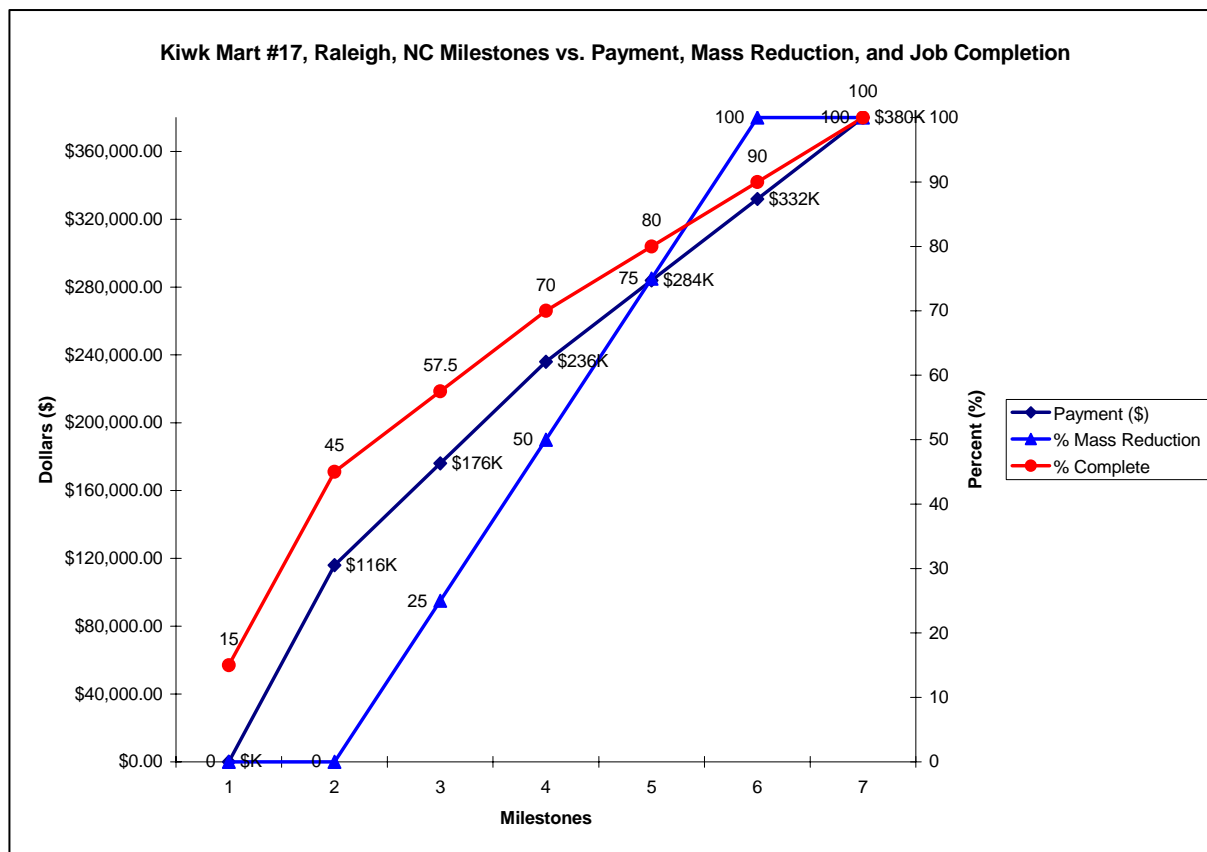


Figure 2: Kwik Mart #17, Raleigh NC Milestone Completion vs. Mass Reduction and Cost. This site is currently at Milestone 5 w/ 75% mass reduction and 80% project completion with \$284K of \$380 spent.

Milestone	Comments	Mass Reduction	Payment (\$)	Total Payment (\$)	% Complete
0 (12/12/01)	Contract in Place	0	0	0	0
1 (10/11/02)	Insurance	0	\$100,000.00*	\$0.00	15
2 (10/11/02)	System Installed	0	\$116,000.00	\$116,000.00	45
3 (5/10/04)	25% Reduction	25%	\$60,000.00	\$176,000.00	57.5
4 (4/15/05)	50% Reduction	50%	\$60,000.00	\$236,000.00	70
5 (4/15/05)	75% Reduction	75%	\$48,000.00	\$284,000.00	80
6	100% Reduction	100%	\$48,000.00	\$332,000.00	90
7	Final Sampling	0	\$48,000.00	\$380,000.00	100

Table 2: Kwik Mart #17, Raleigh NC Milestone Completion vs. Mass Reduction and Cost. This site is currently at Milestone 5 w/ 75% mass reduction and 80% project completion with \$284K of \$380 spent.

*The first \$100,000 was paid by the RP directly to satisfy the \$100,000 third-party deductible.

ATC also secured an injection permit from DENR to conduct in-situ chemical oxidation at the site using Fenton's reagent. Various injection wells and monitoring points were installed and five separate injection events were conducted during the period June 2003 through February 2006. Results showed significant reductions in volatile organic compounds (VOCs).

By May 2005 ATC had achieved over 99% reduction in the contaminants of concern (COCs). Chemical injection events and subsequent monitoring events have indicated that ATC has removed a greater amount of COCs than originally thought to be present at the time of the development of the agreement. ATC is in the process of completing another sampling event and pending favorable results, documentation of performance objectives met will be sent to DENR for evaluation.



Photo 5: Air sparge compressor unit



Photo 6: SVE knock out tank and control panel

Results:

Based on information from other states that were using the PFP process, the UST Section determined that the most beneficial point to initiate the PFP process was after the site assessment phase and at the beginning of the remediation phase. Beginning the PFP process at that point makes it easier for the responsible party, their consultant, and DENR to design the remedy, estimate the time period during which the remedy must function, and calculate the total cleanup costs.

To assess the effectiveness of the PFP process, the UST Section analyzed data for all commercial releases that had been closed after some amount of remediation and had received reimbursement since the inception of the UST Program, a total of 966 releases (See Figure 3 and Table 3). Remedial work on these releases generated a requested reimbursement amount of \$243,868,523, of which amount \$200,126,552 was approved and reimbursed. These figures show that the average remedy (from the start of the remedial process to release incident closure) generates a request for reimbursement of \$252,451, of which amount \$207,170 is actually reimbursed. Remediation costs incurred for the two releases involved in the PFP pilot study show a requested reimbursement amount of \$481,225, of which amount \$324,502 has actually been reimbursed to date, or average remediation costs reimbursement requested of \$240,612.50, of which amount \$162,251 has been reimbursed.

	Traditional	PFP
Sites	966	2
Requested	\$243,868,523.41	\$481,225.00
Approved	\$200,126,552.05	\$324,502.00

Table 3: Results of Analysis of cost of remedial cleanup.

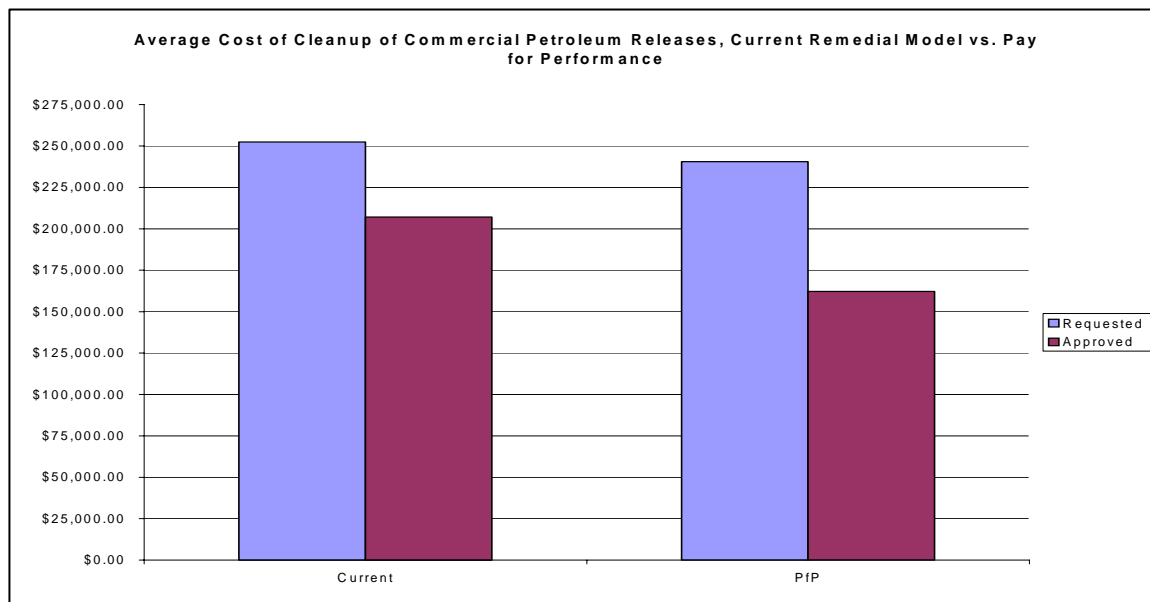


Figure 3. Comparison of current remedial model to PFP.

Although neither PFP pilot study release remediation has been completed, both are on schedule and the total cleanup costs have been set by contracts. In addition, a comparison of average costs based on 766 releases versus two releases is not the best of comparisons, but it does provide an indication of cost reduction as indicated in Figure 3. If more PFP remediations are completed, average costs comparisons will become more meaningful and the UST program will be able to better assess the efficiency of PFP cleanups. Even with limited experience with PFP cleanups, they benefit the UST program by providing fixed costs of remediation allowing the program to more accurately encumber trust fund reimbursement costs

States which incorporate the use of PFP programs for corrective actions, have reported a reduction in their costs for cleanups over non-PFP, based cleanups. According to the United States Environmental Protection Agency (US EPA), “A number of states - Vermont, New Hampshire, Florida, South Carolina, Oklahoma, Utah, California, Nebraska, and Michigan - are using PFP cleanups in their leaking underground storage tanks (LUST) programs. Florida, South Carolina, and Oklahoma have reported that their PFP cleanups have resulted in faster and more effective tank cleanups [<http://www.epa.gov/OUST/pfp/toolbox3.htm>].

A shortcoming of this pilot study is that it only includes two release incidents, primarily because (1) responsible parties had to be volunteers for the study; (2) the UST statute had to be changed to allow funds to be used for the study; and (3) details of the contracting process, including tri-party agreements and some restrictions due to the Mini-Brooks Act, had to be worked through.

Recommendation:

Reinstate the Pay-for-Performance Program for an additional three year period as a voluntary program for responsible parties of UST releases to consider. Allow the Department of Environment and Natural Resources to continue to monitor the costs for the current PFP contracts and the costs of future contracts, and compare them to non-PFP cleanup remediation costs for evidence of cost savings.