Retail Gasoline Sales Sector
Environmental Results Project
VT Department of Environmental Conservation
Waste Management Division

For the Period:
July 1, 2005 to September 30, 2005

Marc Roy
Underground Storage Tank
Section Chief

This is the third report for the VT Department of Environmental Conservation "Retail Gasoline Sales Sector, Environmental Results Project (ERP). The report covers the time period July 1, 2005 to September 30, 2005.

Much of the time spent on the ERP in this quarter included administrative tasks necessary to implement the ERP. This included drafting of regulatory revisions (ongoing), outreach to the regulated community (ongoing), and arranging for Information Technology (IT) support for this project (ongoing). In addition, we have been working with the Cadmus Group on the development of the inspector checklist, self-certification forms and workbook, and the statistical package. We have also begun our baseline inspections.

Progress Toward Milestones (based on the 11/15/04 draft timeline):

1. Contractor Tasks– Beginning in April 2005, The Cadmus Group was on board to help us develop materials necessary for the ERP. Work began with an internal review of the documents developed by Rhode Island to see what modifications were needed to make the documents work for VT. After an initial review, the documents were forwarded to Cadmus for VT-specific modifications. We have received our "final" checklist and have begun using it in the field. Cadmus is working on the self-certification forms and workbook; we anticipate drafts in October, 2005.
   We received our statistical package from Cadmus in August. We have used the statistical package to develop our baseline inspection phase.
2. IT Position – We have hired an Information Technology specialist to assist us in the database phase of the project. The IT specialist started work on 9/12/05.
3. Industry Outreach: We sent out a "Self-Certification" edition of our newsletter in September. The newsletter was sent to all permit holders. A copy of the newsletter is attached as an appendix.
4. UST Regulations Revisions: We continue to make steady progress on this task, which is necessary in order to implement the self-certification program. Our current time line is for starting the formal review and adoption process in October or November 2005.
5. Baseline Inspections: We have begun conducting our baseline inspections. We are aiming for 100 inspections before the "end" of the VT field season (approximately November 21). 100 inspections will give us the desired 95% confidence level with a margin of error of 9.2%. This is an ambitious field inspection schedule, but we have made significant progress. As of 10/3/05, we have conducted 45 inspections.

Impediments:

1. IT support: We have hired an IT specialist to work the data base, electronic filing of self-certification forms, and other items necessary to make the project as automated as possible. Despite this piece of good news, it remains to be seen whether one additional staff person will be able to do the work necessary to enable us to conduct the first round of self-certifications in Spring 2006.
2. Revised UST Regulations: Although we have made great progress in revising our UST Regulations, it remains to be seen whether we will be able to get the

new regulations in place before the Spring 2006 target date. One issue identified is that the regulatory review committees will likely want to see the Self-Certification workbook, since this is a major change in the regulations. Our current schedule calls for receipt of a draft workbook from the contractor sometime in late December.

Financial Report:

Information removed by EPA as confidential business information

QAPP Revision: The revised QAPP is attached for review.

Appendix I. Revised QAPP

Vermont Department of Environmental Conservation

Retail Gasoline Sector Environmental Results Project

Quality Assurance Project Plan

Draft of April 18, 2008

Vermont Department of Environmental Conservation
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A PROJECT MANAGEMENT

A1. Approval Sheet

_____ _____

Marc Roy, Project Manager Date
Vermont Department of Environmental Conservation
Chief, Hazardous Waste Management & Prevention Section

_____ _____

Winslow Ladue Date
Vermont Department of Environmental Conservation

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A3. Distribution List

Each person listed on the approval sheet and each person listed under Project/Task Organization will receive a copy of this Quality Assurance Project Plan (QAPP). Individuals taking part in the project may request additional copies of the QAPP from personnel listed under Section A4.

This document has been prepared according to the United States Environmental Protection Agency publication *EPA Requirements for Quality Assurance Project Plans* dated March 2001 (QA/R-5).

A4. Project/Task Organization

Personnel involved in project implementation are listed in Table 1, and shown as an organization chart in Figure 1.

Table 1: Project Implementation Personnel

Individual	Role in Project	Organizational Affiliation
Marc Roy	Project Manager	VT DEC
	QA Manager/Officer	VT DEC
Ted Unkles	UST Program Coordinator	VT DEC
June Middleton	Outreach/Compliance	VT DEC
Andrew Shively	Inspections/Verification	VT DEC
Susan Thayer	Inspections/Verification	VT DEC
Tim Cropley	Inspections/Verification	
Michael Inners	Data Management and Project Support	VT DEC
ERP Contractor	Support on Project Design and Implementation (Detailed below)	The Cadmus Group
VT DEC IT Group	IT Support/Database Mgt	VT DEC

The VT DEC Project Manager will be responsible for the following activities:

- Conduct outreach with regulated industry and internal/external stakeholders
- Coordinate with Contractor
- Maintain official, approved QAPP
- Develop revised QAPP
- Issue quarterly and annual reports to U.S. EPA

Contractor will be responsible for the following activities:

- Assist with project design
- Develop statistical methodology

- Assist VT DEC Information Technology (IT) staff in the development of necessary data systems and hardware infrastructure
- Assist VT DEC staff in review and presentation of outreach materials
- Assist VT DEC staff in stakeholder outreach
- Assist VT DEC staff in analysis of project data and presentation of results
- Review data and provide QA/QC

The participating facilities will be responsible for submitting self-certification materials and, if applicable, returning to compliance.

Figure 1: Project Organizational Chart

See attached project organizational chart.

A5. Problem Definition/Background

Rationale for initiating the project.

There are approximately 2,600 Underground Storage Tanks (USTs) at approximately 1,100 facilities in Vermont, and the majority of these facilities are in the Retail Gasoline Sector (RGS). In the past, releases from USTs resulted in extensive soil and groundwater contamination that required costly remedial actions. In response to this growing problem, the federal Underground Storage Tank program was developed (a part of the Resource Conservation and Recovery Act of 1976 (42 U.S.C. §§ 6991 et. seq.).

The early priorities of this program were to establish: (1) a national inventory of UST facilities through a registration requirement; and (2) minimum environmentally protective standards for UST systems and a milestone by which all subject facilities would need to meet these standards (December 22, 1998). While the rules and programmatic requirements did go beyond these two priorities to areas such as spill and overfill protection, requiring upgrades that would prevent catastrophic releases (such as through sudden failure of a tank or piping system due to corrosion) was the primary focus.

Now that the UST system upgrade milestone has passed (and VT facilities have achieved compliance with this requirement), the focus of the program has turned to the operation and maintenance (O&M) of UST systems. Unlike the hardware upgrades of the 1998 deadline, which were a “one-time” event to attain and sustain compliance, O&M compliance is a daily, ongoing task. This difference applies to ascertaining compliance as well – while a single inspection (or third party evaluation) will provide enduring documentation of compliance with the upgrade requirements, compliance with O&M requirements is continually changing at all 1,100 facilities.

While the goals of the UST Program have remained constant – to prevent releases by requiring effective design, operation, and maintenance of UST systems – the focus of the

program has changed as the sources of the worst risks have changed. The change in focus of the program has led to a need for more frequent compliance evaluations for the O&M requirements, which, when neglected, are now the greatest source of risk of release.

The Vermont UST Program, with current resources, can inspect approximately 100 facilities per year. At this rate, it takes over ten years to inspect each facility once. Significant new resources are not expected in the future from either EPA or the Vermont Legislature. In addition, to justify additional resources, a program must be able to document that the work that it does is effective at solving the problem it is expected to address. With existing resources and programmatic operations, the program is: (1) unable to inspect facilities for compliance with O&M requirements at a level that would adequately protect the environment; and (2) unable to gather sufficient program performance data to show either where the problems lie in O&M compliance or that any of the existing or future approaches to solving these problems is effective.

Project Objectives

This project is designed to improve environmental results by: reducing the threat of releases of petroleum hazardous wastes and materials to groundwater (a significant source of drinking water in Vermont) and soils through enhanced compliance with UST, RCRA, UIC, and sector-specific Best Management Practices (BMPs); reducing air emissions through enhanced Stage I & II vapor recovery compliance; and reducing hazardous waste generation through the use of the BMPs.

The ERP model will allow for the measurement of annual compliance progress for the entire sector, with several environmental laws. This proposed ERP model consists of an initial round of inspections of a statistically valid number of facilities, sector-based multimedia outreach and education, a mandatory multi-media self-certification on a sector-specific form, random inspections to confirm self certifications, and data analysis that will result in statistically valid compliance reports to document project performance. Targeted inspections will be used to promote submission of self-certifications as well as assure compliance.

Where facilities indicate they are not in compliance with all applicable regulations under this project, or where inspections find non-compliance, a return to compliance plan will be required. All non-compliance will be documented. When self-certifications indicate non-compliance, the facility will be required to submit a return-to-compliance schedule to the VT DEC. Random and targeted inspections will be used to confirm return to compliance at selected facilities. These schedules will be tracked in the project database. When inspections identify facility non-compliance, the VT DEC will respond by both informing facility personnel on-site and sending a letter documenting the non-compliance and requiring a return to compliance by a date certain.

This proposed Environmental Results Project will include the following components:

- ✓ A workbook that includes Best Management Practices (BMPs) and compliance requirements. The workbook is a guide to compliance with the self-certification form mentioned below;
- ✓ A BMP checklist for use by the facility in assessing the status of compliance, pollution prevention, and other health and safety practices;
- ✓ A compliance self-certification form that the facility owners and operators are required to complete, sign and return. On the form, the facility owners and operators must certify the current compliance status of the facility and acknowledge that the facility must comply with all applicable environmental laws;
- ✓ A Return to Compliance form which is used to address compliance problems identified in the self-certification process that cannot be corrected before the submission date. The form establishes a return to compliance schedule and deadline for compliance. This form must be signed and returned when a facility cannot certify full compliance with all applicable regulatory requirements;
- ✓ Workshops to provide technical and compliance assistance to facility owners and operators, and to provide training on the requirements of the ERP process;
- ✓ Inspections by the VT DEC to confirm the accuracy of the certifications and compliance with the applicable environmental regulations; and
- ✓ Ongoing technical and compliance assistance by telephone, on-site assistance (as resources allow), and a project-specific web page with FAQs and additional resources.

Regulatory information, applicable criteria and action limits.

This project focuses on priority environmental issues by targeting an industry sector that is present statewide with significant potential for environmental releases and emissions. The project is intended to improve compliance within the sector with requirements of four federally-delegated programs: UST, RCRA generator requirements, the Clean Air Act (CAA) Stage I & II requirements, and the Safe Drinking Water Act (SDWA) UIC requirements.

This project will develop a sector-specific, cross-media workbook covering regulatory issues as well as BMPs. The purpose of the BMPs is to encourage facilities to go beyond compliance to reduce waste, pollution, and emissions. This project will encourage the regulated community to achieve reduced compliance costs by addressing all compliance and environmental issues at once through cross-media BMPs (that lead to compliance) rather than narrowly focusing on whatever problem was identified during the last regulatory inspection.

This project will build on “lessons learned” from the last decade of searching for ways to measure prevention efforts by using a mechanism (ERP) that specifically measures results. The project is likely to produce quantifiable reductions in hazardous waste

generation as well as quantifiable improvements in compliance with all four prevention programs. The goal of reducing actual spills and leaks may not be quantifiable because of the time lag between a spill or leak and its detection.

A6. Project/Task Description

Project overview.
This project will allow the VT DEC to explore whether an approach modeled upon the Environmental Results Program (ERP) can help achieve these goals, while improving regulatory cost-effectiveness. The ERP is an innovative approach to solving high-priority environmental problems in industry sectors largely comprised of small businesses. The ERP concept combines technical assistance, self-certification, inspections, and statistically based performance measurement in order to reduce environmental impacts of business.

The promise of ERP is that it can cost-effectively reduce environmental impacts of small businesses that may present a substantial cumulative environmental risk. Businesses targeted so far by ERP (in other states) include gas stations, auto salvage yards, auto body and mechanical repair shops, dry cleaners, and printers. ERP can help environmental agencies identify previously unknown facilities, measure performance, increase regulatory efficiency, and help improve overall environmental performance. ERP is in part designed to help facilities that want to comply but don't understand their requirements, and evidence suggests that ERP can motivate firms to comprehensively review their environmental performance and take needed action to come into compliance and adopt best practices.

Project summary and work schedule.
This project's major tasks and timeline are outlined in the table below.

Table 2: Schedule of Major Project Tasks

Task/Milestone	Task Description	Start Date	End Date
Stakeholder Outreach	Outreach to internal and external stakeholders (including targeted facilities) about the project.	10/15/05	05/30/06
Goals identification	Finalize the goals of this project, upon which metrics will be based	10/15/04	12/30/04
Develop Logic Model	Develop a logic model with stakeholder involvement. Logic model can assist in development of metrics and data needs.	10/15/04	1/15/05
Measures identification	Development of metrics to be tracked by this project.	12/30/04	3/30/05

Task/Milestone	Task Description	Start Date	End Date
Revise UST Regulations	Draft language for mandatory self-certification for all UST facilities (or all UST facilities in the RGS)	1/15/05	11/15/05
Formal APA Rule Revision Process	Average timeframe for selective rule revisions is 6 months	11/15/05	5/15/06
Facility identification	Determine the exact characteristics of facilities to be targeted, and compile a list of facilities from reliable sources.	10/30/04	12/30/04
Statistical methodology	Development of a statistical methodology to drive performance measurement and analytical tasks.	4/05/05	9/1/05
Data input & management	Development and implementation of an approach to cost-effectively inputting and managing ERP data, including primary and secondary data. Primary data consists of data from inspection reports and facility forms (including self-certification forms). Secondary data sources include lists of facilities from regulatory and private-sector databases.	9/15/05	6/30/06
QAPP finalization & approval	Finalize QAPP based upon results of the measures identification, statistical methodology, and data management tasks. Primary data collection will not occur before relevant parts of the QAPP are finalized and approved by EPA.	10/15/05	12/15/05
Baseline inspections	Inspections at facilities to establish a performance baseline. Facilities selected at random from the entire targeted population, based upon sample design from statistical methodology.	8/22/05	12/01/05
Workbook and Certification Form Finalization	Finalization of workbook, outreach and assistance materials, web resources, and certification forms.	10/1/05	5/1/06
Facility assistance/Outreach	Delivery of compliance/technical assistance to facilities, which is expected to take the form of workbooks, fact sheets and/or workshops.	1/1/06	5/31/06

Task/Milestone	Task Description	Start Date	End Date
Self-certification	Implementation of a mandatory facility self-certification approach. Self-certification refers to the submission of a legally binding record of a facility's compliance and beyond-compliance practices.	6/1/06	On-going
Self-Certification Deadline	Self-Certification and RTC forms due	6/15/06	N/A
Analysis of Self-Certification Data	Analysis of Self-Certification data with primary purpose of identifying opportunities for selective follow-up (next step).	6/15/06	12/15/06
Selective follow-up	Selective follow-up with self-certifying facilities, based upon analysis of self-certification data. Targeted follow-up may include phone calls, inspections and enforcement.	6/15/06	12/15/06
Post-certification inspections	Inspections at facilities to establish whether sector performance measures (and other measures) have changed since the baseline. Inspection data also used to cross-check self-certification data at inspected facilities. Facilities selected at random from the entire targeted population, based upon sample design from statistical methodology.	6/15/06	12/15/06
Data analysis	Analysis of baseline, self-certification, and post-certification data to understand change in facility performance and overall outcomes of interest. Assessment of project efficiency.	6/15/06	3/15/07
Preparation of Final Project Report	Draft and finalize final project report.	3/15/07	6/15/07
Reporting to EPA	Reporting shall include quarterly, annual and final reports.	12/30/04	9/30/06

Geographic focus.

This is a statewide project for the state of Vermont.

Resource and time constraints.

A7. Quality Objectives and Criteria

Detailed performance measures.
This project is primarily interested in the following draft performance measures. Note that one of the tasks of this project involves revisiting and reaffirming/revising these performance measures.

- Improved compliance with UST, RCRA, CAA Stage I & II, and SDWA UIC Rules
- Improved facility understanding of UST O&M requirements as measured by facility self-certification accuracy
- Delivery of at least five outreach workshops in different areas of state
- Delivery of at least 1,200 multi-media compliance guides for sector
- Development of a well-documented methodology for transfer to other sectors/states
- Reduced hazardous waste generation as measured by a reduced need to empty sumps and spill buckets, and reduced air emissions by increased compliance with vapor recovery requirements.
- Reduced incidence of petroleum product in sumps, spill buckets, interstitial space – such incidence is the equivalent of a system operating without spill and overfill protection (because they are already full or have inadequate sensor placement) or without secondary containment.

Quality objectives.

Quality objectives for these performance measures will be developed as part of the Measures Identification and Statistical Methodology tasks.

This revision to the QAPP will ensure that the quality objectives for these performance measures are appropriate for the decisions to be made based upon those measures. This determination will take into account best practices for similar projects and resources available for this project. In part, the Project Manager will rely upon EPA's *Generic Guide to Statistical Aspects of Developing and Environmental Results Program* (2003) for advice in making decisions related to the optimizing the following aspects of data quality for this project:

- Precision
- Bias
- Representation
- Completeness
- Comparability
- Sensitivity (if applicable)

A8. Special Training/Certification

The VT DEC will develop and deliver mandatory and voluntary training sessions to key parties to ensure quality data collection, to the extent practicable.

Mandatory intensive in-person training sessions will be delivered to the following individuals to ensure quality data collection:

- inspectors who will be collecting baseline and post-certification data
- data-entry personnel who will be processing data from inspections and self-certification responses
- QA/QC personnel (if any additional training is needed to familiarize them with the project)

Each session will cover proper data collection and QA procedures. Training will be augmented by debriefing personnel shortly after their tasks have begun, to correct and clarify appropriate practices.

Voluntary, intensive, in-person training sessions will be offered to the self-certifying facilities. Facilities will also be provided with clear written instructions on how to prepare and submit data.

The Project Manager is responsible for ensuring that all personnel involved with data generation (including state personnel, contractors, and partners) have the necessary QA training to successfully complete their tasks and functions. The Project Manager will document attendance at all training sessions. Attendance records for voluntary trainings may not include names, given privacy/confidentiality concerns.

The Project Manager is also responsible for ensuring the self-certification materials sent to facilities clearly document how facilities should properly prepare and submit their data.

A9. Documents and Records

Report format/information.
The format for all data reporting packages will be consistent with the requirements and procedures used for data validation and data assessment described in this QAPP.

Document/record control.
The recording media for the project will be paper, electronic, and photographic. The project will implement proper document control procedures for all. For instance, hand-recorded data records will be taken with indelible ink, and changes to such data records will be made by drawing a single line through the error with an initial by the responsible person. The Project Manager will have ultimate responsibility for any and all changes to records and documents. Similar controls will be put in place for electronic records and both digital and film-based photographic records.

The VT DEC Quality Assurance Officer shall retain all updated versions of the QAPP and be responsible for distribution of the current version of the QAPP. The VT DEC Quality Assurance Officer and the VT DEC Project Manager will approve annual updates. The Project Manager shall retain copies of all management reports, memoranda, and all correspondence between the VT DEC and all project personnel identified in A4.

Other records/documents.
Other records and documents that will be produced in conjunction with this project include:

- Inspection checklists and reports
- Self-certification forms
- Return-to-compliance forms
- Non-applicability forms
- Enforcement documentation
- Facility outreach materials, including workbook, fact sheets, brochures, etc.
- Revised QAPP
- Readiness reviews (see below)
- Data handling reports[1]
- Quarterly and annual progress reports to EPA
- Project final report (to include discussion of QA issues encountered, and how they were resolved)

Storage of project information.

Project information will be stored: (1) in paper files located at the VT DEC offices in Waterbury, VT; (2) in electronic files in various locations according to VT DEC standard operating practices; (3) audio and video tapes located at the VT DEC offices in Waterbury, VT; and (4) photographs located at the VT DEC offices in Waterbury, VT. All project records shall be retained for three years or longer as determined by agency records retention policies and procedures.

Backup of electronic files.

This section describes the specific data management process, tracing the path of the data from their generation to their final use or storage.

Many of the VT DEC data files are located on a central file server located on the Agency network, which is behind the Agency firewall. The file server houses production data for many of the Agency's programs, specifically those programs that send data to US EPA. The file server also houses program-related files.

[1] These records document protocols used in data reduction, verification, and validation. Data reduction addresses data transformation operations such as converting raw data into reportable quantities and units, use of significant figures, recording of extreme values, blank corrections, etc. Data verification ensures the accuracy of data transcription and calculations, if necessary, by checking a set of computer calculations manually. Data validation ensures that QC criteria have been met.

All ANR servers are all located in a secure, environmentally controlled server room, and attached to separate UPS devices and tape backup systems. Tapes are made, stored, and rotated on a daily, monthly, and yearly cycle, with tape storage located in a separate State facility off-site. Each server platform is equipped with RAID controllers as an additional means of fault tolerance.

Only network and database administrators and their supervisor(s) have access to the server room through a lock and key mechanism. Administrator user IDs and passwords to the servers are only know to the administrators. User IDs and passwords are assigned to all staff who require access to all applications running on the servers. No separate userid/passwords are required for the various applications on the servers since the Agency employs a single network login approach.

B DATA GENERATION AND ACQUISITION

B1. Sampling Process Design (Experimental Design)

A key task in this project will be to develop a sound statistical methodology for collecting and analyzing facility data, in order to draw inferences related to the selected performance measures. The major quality objective will be to collect representative data that truly reflect the conditions of the target population of facilities. Facility data is of three types: (1) statistical inspection data, which will be collected by trained VT DEC inspectors from randomly sampled facilities; (2) judgmental inspection data, based on inspections targeted from inconsistent responses to self-certification questions; and (3) self-certification data, which will be collected from facilities through a mail survey process. Facilities will be required to respond, so this step is similar to a census.

Based on budgetary and other constraints, the DEC expects to be able to collect data from 100 facilities in each round. The margin of error in estimating the percent of the eligible facilities that use a specific environmental business practice at the 95 percent confidence level depends on the number of eligible facilities in the sample. (A RGS is 'eligible' for a practice if that practice is relevant for the shop.) The following table gives the largest possible error for several different sample sizes assuming that all Facilities in the sample are eligible (that is, the practice being measured applies to all Facilities in the sample).

• **Sample Size**	• **Margin of Error at 95% level** • **will be less than or equal to:**
• 85	• 10.0%
• 100	• 9.2%
• 150	• 7.4%

- 200 • 6.2%

(The table above reflects the use of the so-called *score interval*, which is recommended because it is considered a more accurate estimate than the standard confidence interval, especially with smaller sample sizes or proportions that are close to zero or 100 percent.)

The DEC also wishes to compare results between the two rounds of inspections. If 100 facilities are inspected in each round, and the business practice in question is relevant for all 100 Facilities, there is at least an 80 percent probability of detecting a real difference of 18.6 percent (at a 95 percent confidence level). If 150 shops are included in each sample, there is at least an 80 percent probability of detecting a real difference of 15.0 percent (at a 95 percent confidence level). If 200 shops are in the two samples, there is at least an 80 percent probability of detecting a real difference of 12.9 percent (at a 95 percent confidence level). Smaller observed differences can also indicate a genuine change, but with less than 80 percent probability.

Please note that, as a general rule, if the number of eligible facilities for a given question is smaller than the sample size, then the effective sample size is lowered. Consequently, the margin of error and confidence interval for that question will be larger than if the question applied to all facilities. The size of the difference between the two rounds of inspections that indicates a real difference also will be larger. Also, as the observed proportion moves away from 50%, the margin of error or confidence interval associated with that proportion will get smaller.

B2. Sampling Methods

To meet the precision targets of the survey, the sample for each round of inspections will include 100 facilities. A simple random sample of facilities will be selected from our database of UST facilities. To do so, each facility will be assigned a unique random number. We will then sort the list of facilities by this random number and work down the list to obtain a list of 150 facilities. If one of the selected facilities is ineligible, it will be skipped the next station on the list will be added. Facilities may be ineligible for several reasons, including current enforcement actions that could be compromised by an inspection, the facility is not a fuel dispensing facility, or an inspection has been done recently. We will continue this process until the sample of 100 stations is completed.

Before conducting the second round of inspections, the DEC should verify the list of facilities in the state. This will ensure that the second round of inspections is representative of the facilities that are in existence at that time. If there is a significant change in the inventory of stations, we may stratify the second sample to ensure there are enough stations that existed at the start of the study as well as facilities that were added at a later date. That possibility is not considered as part of this methodology.

B3. Sample Handling and Custody

The survey instrument will not be self-administered; rather, the DEC will conduct physical inspections of each shop in the sample. Upon completion of paper checklists, inspectors will sign the checklists. Inspectors will either enter data directly to an electronic format (such as tablet PC's and PDAs), or from paper checklists into the electronic database. Facilities will either enter self-certification data into web-based forms, or mail signed forms to the VT DEC where data-entry staff will input data into the electronic database. Electronic signatures would need to be used in connection with facility self-certifications that are entered into web-based forms by the facility. This section of the QAPP will be revised upon completion of electronic data input/management strategies.

Chain of custody is not relevant to this project.

B4. Analytical Methods

This project will follow well-recognized statistical analytical methods No physical tests or chemical analyses are anticipated for this project.

B5. Quality Control

Completed questionnaires should be subjected to 100 percent editing review in preparation for data entry. Every response field should be examined to check skip patterns, clarify handwriting, and identify any potential problems.

Some of the responses may not be usable, either because the responses are illegible or the station could not respond to the question. If a response from a station on one or more questions is not usable, the station will be dropped from the analysis of those questions. This reduces the sample size available for the analysis of the practice in question. Thus, it will be harder to meet the precision target for that item. Furthermore, this may introduce some bias into the estimate for this item to the extent stations with (or without) the practice in question are more (or less) likely to skip the question.

The DEC will take a two-tracked approach for dealing with this potential problem. First, the potential for unusable data will be minimized through the use of trained state personnel for site visits. Second, items that are skipped will be clearly flagged to distinguish them from cases where the practice is not relevant. It will be noted why they were skipped (e.g., the station refused to answer, the station did not know, etc.) The results can then be analyzed to evaluate the impact of skipping the item on the overall results.

After the data are entered, several automated checks can be conducted. Questions that required continuous variables should be checked to ensure that the answers are within acceptable ranges. Consistency among answers also can be checked; e.g., if an affirmative response to one question precludes an affirmative response to another question, the automated checks can confirm the answers are consistent.

Preparation of data collection instruments.
All data collection instruments will be subject to multiple rounds of review by relevant internal and external stakeholders to help assure the collection of high-quality and representative data. Data collection instruments will be prepared in accordance with the guidance on data collection instruments provided in EPA's *Generic Guide to Statistical Aspects of Developing and Environmental Results Program* (2003). Specifically, preparation will follow the checklist for data collection instruments provided in an appendix of that guide.

Training.
As noted elsewhere in this QAPP, steps will be taken to provide appropriate QA/QC training to all implementing personnel, particularly personnel that are collecting and processing data. Facilities receiving self-certification packets will also receive instructional materials on how to complete their forms, an opportunity to attend workshops that will explain how to complete the forms, and a phone number to call to ask questions.

Crosschecking data.
Primary data collection forms will be designed in such a way to allow internal crosschecking of data by comparing answers of different questions to each other, and such crosschecking will be automatic for electronically entered data. Further, post-certification inspections will offer the opportunity to compare inspection results with self-certification results, if the facilities sampled have submitted self-certification forms.

Data anomalies.
Procedures for handling data anomalies (such as outliers and missing data) will be handled based on guidance prepared in the project-specific statistical methodology.

Data entry.
Procedures for entering hand-written data into the database will follow standard quality control procedures (e.g., 100% verification using independent double key entry). Detailed quality control procedures for data entry and acceptance will be prepared during the development and implementation of a data management strategy. The final QAPP will reflect the strategy.

B6. Instrument/Equipment Testing, Inspection and Maintenance

This section is not relevant to this project. The project will not involve such scientific instruments and equipment.

B7. Instrument/Equipment Calibration and Frequency

This section is not relevant to this project. The project will not involve such scientific instruments and equipment.

B8. Inspection/Acceptance for Supplies and Consumables

This project will use photographic film as the only supply or consumable requiring inspection and acceptance procedures. All film will be required to have an expiration date, and film that is beyond that date will not be used. Any film in damaged or otherwise corrupted packaging will not be accepted for use.

B9. Non-Direct Measurements (i.e., Secondary Data)

This project will rely upon secondary data to identify the facilities in the target population.

Table 3: Non-Direct Measurements (I.e., Secondary Data)

Data Sources	Intended Use	Rationale for Use	Acceptance Criteria
VT DEC UST program database of facilities	Identifying the target population, for the sample	Commonly accepted source of facility list	All records will be accepted unless sample response indicates facility should not be part of target population. VT DEC will crosscheck any facility that self-identifies as non-applicable to this project.
VT DEC facility file information - UST, APCD, UIC, RCRA	Identifying background conditions at facilities where such information could provide greater precision to the analysis of background or baseline conditions	Commonly accepted source of compliance information, photographs, statements by facility owners and operators	All records will be accepted unless placed in file in error. VT DEC will, on a random basis, crosscheck self-certification conditions and baseline conditions with multi-media file information.
Release Data from VT DEC Sites Management database	Identifying reduction in prevalence and severity of releases	One accepted source of release data	Since this is not representative data, this will be a project area to explore. This will be a challenge to address in the QAPP revision process
Inspection data that is not observed	A portion of the facility compliance data will be that which is supplied to inspectors by facility	More complete compliance information.	Data will be accepted unless conditions or information indicate inconsistencies. VT

	personnel, but not observed. An example would be a description of an activity that is or is not compliant, but the inspector does not observe the activity itself. Provides a more complete compliance picture.		DEC inspection personnel will use available crosschecks from observed data.
Return to compliance data from facility	Measures of facility performance	Commonly accepted form of compliance certification	Data will be accepted unless conditions or information indicate inconsistencies. VT DEC personnel will use available crosschecks from data observed on follow-up inspections.

Key resources/support facilities needed.
VT DEC will require access to the data sources mentioned above, and this information will be managed within the database created/utilized for the overall project. VT DEC does not anticipate any obstacles to this approach.

Determining limits to validity and operating conditions.
Database containing the list of targeted facilities will be designed such that the original source for all facility data is marked, and procedures will be in place such that only the Project Manager can officially remove a facility entry from the target population. In such cases, facility entry will not be deleted from the database but will be marked as non-applicable, and corrective data will be provided in fields parallel to the original data.

B10. Data Management
VT DEC and the ERP Contractor will develop a data management strategy, and revise the QAPP based upon the strategy. The Project Manager is responsible for ensuring that that strategy is developed and that the QAPP is revised to reflect that strategy. Once revised, this QAPP section on data management will provide information on the following issues:

- Data management scheme, from field to final use and storage
- Standard recordkeeping and tracking practices, and document control system (citing relevant agency documentation)
- Data handling equipment/procedures that will be used to process, compile, analyze, and transmit data reliably and accurately

- Individuals responsible for elements of the data management scheme
- Process for data archival and retrieval

C ASSESSMENT/OVERSIGHT

C1. Assessment and Response Actions

The Quality Assurance Officer will conduct a Readiness Review immediately prior to the five major data collection tasks: identifying targeted facilities, baseline inspections, self-certification, targeted follow-up, and post-certification inspections.. The QA Officer will report findings to the Project Manager, who will take corrective action (if any is necessary) before the data collection task begins. Further, the Project Manager and QA Officer will thoroughly debrief project implementation staff a short time after beginning their respective implementation tasks, to identify emerging/unanticipated problems and take corrective action, if necessary.

C2. Reports to Management

Three kinds of reports will be prepared: readiness reviews (described above), regular quarterly and annual progress reports, and project final report. Progress reports will note the status of project activities and identify whether any QA problems were encountered (and, if so, how they were handled). Project final report will analyze and interpret data, present observations, draw conclusions, identify data gaps, and describe any limitations in the way the data should be used.

Project QA Status Reports

Type of Report	Frequency	Preparer	Recipients
Revised QAPP	Once, before primary data collection begins	VT DEC Project Manager	All recipients of original QAPP
Readiness Review	Before each major data collection task	VT DEC QA Officer	VT DEC Project Manager, Project Manager Supervisor
Progress Report	Quarterly	VT DEC	U.S. EPA
Progress Report	Annually	VT DEC	U.S. EPA, stakeholders
Final Project	Once	VT DEC	U.S. EPA, stakeholders

D DATA REVIEW AND EVALUATION

D1. Data Review, Verification and Validation

The QAPP shall govern the operation of the project at all times. Each responsible party listed in Section A4 shall adhere to the procedural requirements of the QAPP and ensure that subordinate personnel do likewise.

This QAPP shall be reviewed at least annually to ensure that the project will achieve all intended purposes. All the responsible persons listed in Section A4 shall participate in the review of the QAPP. The Project Manager and the Quality Assurance Officer are responsible for determining that data are of adequate quality to support this project. The project will be modified as directed by the Project Manager. The Project Manager shall be responsible for the implementation of changes to the project and shall document the effective date of all changes made.

It is expected that from time to time ongoing and perhaps unexpected changes will need to be made to the project. The Project Manager shall authorize all changes or deviations in the operation of the project. Any significant changes will be noted in the next report to EPA, and shall be considered an amendment to the QAPP. All verification and validation methods will be noted in the analysis provided in the final project report.

D2. Verification and Validation Methods

To confirm that QA/QC steps have been handled in accordance with the QAPP, a readiness review will be conducted before key data collection/analysis steps, and data handling reports will be prepared after each step. Standard statistical tests (described below) will be used to determine the extent to which inferences can be drawn from the sample data.

D3. Evaluating Data in Terms of User Needs

This section will be written and finalized after completion of the project-specific statistical methodology. This section will present the following information:

- **Meeting and reporting needs of your project:** a description of how the results of the study will be analyzed and evaluated to determine whether the needs of the project were met and then reported.
- **Mathematical and statistical formulae**: details of formulae that will be used to calculate precision, accuracy/bias, completeness, comparability and sensitivity (if applicable) of the project data.
- **Approach to managing unusable data:** Description of what will happen if data are unusable, with particular emphasis on the impact of such unusability on data representativeness.