

# SOUTH DAKOTA TANK PATHOLOGY STUDY

## EVALUATING THE INTEGRITY OF TANK SYSTEMS IN SOUTH DAKOTA



South Dakota  
Petroleum Release  
Compensation Fund



## **About the South Dakota Petroleum Release Compensation Fund**

The South Dakota Petroleum Release Compensation Fund (PRCF) was established under the Petroleum Inspection and Release Compensation Act in 1988 to financially assist petroleum tank owners with the cleanup costs of petroleum releases and to meet the federal and state environmental financial responsibility requirements for both regulated underground and aboveground tank owners. Both state and federal law require that most owners of petroleum storage tanks be able to demonstrate financial responsibility for pollution cleanup and third-party liability. The United States Environmental Protection Agency (EPA) has approved the PRCF as an acceptable mechanism for tank owners to demonstrate financial responsibility for corrective action and third-party compensation as required by federal law.

The PRCF is a division of the South Dakota Department of Revenue and Regulation. A five-member advisory board appointed by the Governor of South Dakota makes recommendations on program policies and acts as a hearing officer in contested case hearings.

The PRCF revenues are generated by a \$0.02 per gallon tank inspection fee on petroleum products received in the state. While the fee generates roughly \$15 million per year, the PRCF currently only receives 10.65% of the fee, or about \$1.6 million per year, with the remainder going to other South Dakota funds.

The PRCF provides reimbursement of cleanup expenses and third-party liability claims up to \$990,000 (\$1,000,000 less a \$10,000 deductible). Only necessary and reasonable cleanup expenses incurred after April 1, 1988 are eligible for PRCF reimbursement. Reimbursement for third-party claims can only be made for certain petroleum releases reported after April 1, 1990. The PRCF also pays for all tank removal and cleanup costs incurred through the Abandoned Tank Removal Program, which is part of the Spruce Up South Dakota Initiative.

Since its enactment in 1988, the PRCF has provided over \$77 million for corrective action at approximately 4,000 release sites. The current estimate for future costs on known release sites is approximately \$11 million. While much of the past efforts have been to finance corrective action at these old release sites, the PRCF's mission continues to be that of providing ongoing financial assurance for tank owners so that they can demonstrate financial responsibility as required by federal law. At the same time, the PRCF continues to examine common practices in an effort to help minimize future environmental and economic impacts.

# Evaluating the Integrity Of Tank Systems In South Dakota

**SOUTH DAKOTA  
PETROLEUM RELEASE COMPENSATION FUND**

**June 15, 2005**

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## Executive Summary

In the spring and summer of 2004, the South Dakota Petroleum Release Compensation Fund (PRCF) conducted a study to evaluate and report on the actual integrity of 17 petroleum underground storage tank (UST) systems that were believed to be in compliance with both federal and state UST regulations. The product lines of the distribution system were tested in-place and then excavated along with the tanks and other components and carefully observed for leaks, defects, or installation errors. The purpose of the study was to provide some limited, but factual information on the actual condition of tank systems where leak detection methods and other information suggest that the tanks and appurtenances were structurally sound and not subject to intermittent or prolonged petroleum leaks.

The sites selected for this study were retail gas stations of various sizes and contained tank systems that were either new, replaced or upgraded subsequent to the promulgation of the US Environmental Protection Agency's UST regulations 40 CFR Part 280, but were being taken out of service for economic or other reasons. Petroleum tanks and piping were tested in-situ followed by excavation and removal of the equipment to determine its actual condition.



The study was paid for with funds from the PRCF along with a \$25,000 grant from the US Environmental Protection Agency. South Dakota Codified Law (SDCL) 34A-13-27 (6) and (7) authorizes the PRCF to conduct special studies designed to reduce releases and improve petroleum industry methods for storage.

Results of the study suggest that record keeping and equipment testing at most sites that were part of the study were not being conducted sufficiently to provide early indication of releases. All of the sites tested had small releases from either lack of proper overfill protection or from minor leaks in various components, and several sites had major releases that were not previously known. This information gathered in this study is intended to aid in the long-term risk management activities of the PRCF and help determine where preventative maintenance can be most useful in preventing future releases.

## Purpose

The purpose of this study was to evaluate the actual integrity of underground petroleum storage tank systems in South Dakota that were believed to be in compliance with both federal and state Underground Storage Tank (UST) regulations. The information gathered was intended to provide information on the actual integrity of tank systems where leak detection methods and other information suggests that the tanks and appurtenances were structurally sound and not subject to intermittent or prolonged petroleum leaks.

There were clear incentives for those willing to participate in this study. The facility owner benefited by having the tank system decommissioned and removed under State lead and at no cost to the owner. In addition, if a release that required corrective action was discovered, cleanup would be conducted following the tank study under the regular PRCF reimbursement program. Under this program, the owner is typically required to satisfy a \$10,000 deductible prior to accessing the fund. However, if a site was selected for this study and a previously undocumented release was discovered, the PRCF Board authorized a waiver of the required deductible.

## Methodologies

The selected sites for this study were grouped into five separate bid packages. The PRCF solicited bid proposals from local and regional contractors who specialized in the installation and removal of petroleum fuel systems. However, before a bid could be considered, the contractor was required to submit documentation that a petroleum equipment specialist was on-staff and had adequate training in petroleum fuel systems.

As part of the study, the PRCF requested fuel system records from the owner/ operator that are required by State and Federal Regulations. These records include those associated with the installation, operation, and maintenance of the tank system and its appurtenances, including leak detection equipment.

Concurrently, the PRCF had the product piping tested in-place using both pressure and helium testing. Once these tests were completed, the piping and associated components were carefully uncovered and examined for any material defects or problems arising from manufacturing processes, installation practices, and/or environmental impacts such as corrosion. If any suspect equipment was found, it was retained for further examination and testing.



Once the lines had been removed, the tanks were emptied, purged, uncovered and carefully removed from the subsurface. Once secured, the tanks were visually examined for corrosion or any other damage that may have occurred prior to their removal. The tanks were then decommissioned and either retained by the owner or properly disposed of.

Finally, the excavation areas were brought to grade and the property appearances restored.

The data from this study was used to accomplish the following objectives:

1. Evaluate the actual integrity of underground petroleum storage tank systems in South Dakota that were believed to be in compliance with both federal and state Underground Storage Tank (UST) regulations.
2. Evaluate owner/operator's level of compliance with the operation and maintenance of the tank system.
3. Identify problematic areas that may lead to future petroleum releases at other fueling stations.

## **Data Limitations**

Because this study included the complete removal of the tank system, there were very few limitations. However, the following limitations associated with the data were identified:

1. As part of the study, a copy of all records pertaining to the tank system was requested from the station owner/operator. This was done to help determine the owner/operator's level of compliance with respect to operations and maintenance. However, when these records were not available, it was difficult to determine if the operator was actually conducting the required operational and maintenance activities.
2. When conducting helium testing on double-wall product lines, it was difficult to determine the exact location of the leak, especially in those where the helium was able to travel through the interstitial space and then exit the line.
3. At several sites there had been a previous release that required corrective action. While corrective action had been completed, a certain amount of residual contamination often remained on site. In some cases, it was difficult to determine if the small amount of contamination discovered during the course of the study was associated with the previous release or that of a more recent, undocumented release.
4. Because an internal inspection of the tanks was not completed prior to their removal, it was difficult to determine the condition of the tank liners, if applicable, prior to system removal.

## **Bid Packages**

The 17 individual project locations grouped into five separate bid packages. Bid Group #1 included 3 sites located in Sioux Falls, SD. Bid Group #2 included five sites in the northeast part of the state. Bid Group #3 included five sites in the southeastern South Dakota. Bid Group #4 included three sites in the western part of the state. Finally, Bid Group #5 comprised of one large site located in western South Dakota that included two separate fueling systems.

### **Bid Group #1**

Project Location #1 - Country Corner, 1700 Sycamore, Sioux Falls SD

Project Location #2 - Bill's Texaco, 101 S. Splitrock Blvd., Brandon SD

Project Location #3 - Convenient Liquor and Gas (R&M), 1329 Main Street, Sioux Falls SD

### **Bid Group #2**

Project Location #4 - Elkton Farmer's Union, 100 Elk Street, Elkton, SD

Project Location #5 - Bozied Texaco, 1441 6<sup>th</sup> Street, Brookings, SD

Project Location #6 - Wayne's Amoco, 604 3<sup>rd</sup> Avenue South, Clear Lake, SD

Project Location #7 - Stone's Truck Stop, 3800 9<sup>th</sup> Avenue, Watertown, SD

Project Location #8 - Sioux Valley Coop/Ampride, 1 1<sup>st</sup> Avenue NE, Watertown, SD

### **Bid Group #3**

Project Location #9 - Madison Coastal Mart, 202 N.W. 2<sup>nd</sup>, Madison, SD

Project Location #10 - Northview Bait & Tackle, 5402 W. 60<sup>th</sup> Street N., Sioux Falls, SD

Project Location #11 - 12<sup>th</sup> Street Sinclair, 1417 W. 12<sup>th</sup> Street, Sioux Falls, SD

Project Location #12 - Westside Convenience, 1900 Summit Street, Yankton, SD

Project Location #13 - Broadway Texaco, 1101 Broadway Avenue, Yankton, SD

### **Bid Group #4**

Project Location #14 - Big D Oil #1, 2221 Lazelle, Sturgis, SD

Project Location #15 - Big D #7, 305 W. Jackson, Spearfish, SD

Project Location #16 - Big D #15, Villa Ranchero, Ellsworth AFB, Box Elder, SD

### **Bid Group #5**

Project Location #17 - Flying J Truck Plaza, 117 N. Ellsworth Road, Box Elder, SD

In addition to the above project locations, the PRCF gave all other owners of petroleum sites in South Dakota whom are eligible for funding under the PRCF, the opportunity to participate in the study. Any site that conducted UST removals during the time period of this study, and gave advance notice to the PRCF prior to their removal, could participate in this study. As an incentive, the PRCF would waive the normal \$10,000 deductible should a previously undocumented release be discovered and active cleanup required by the DENR. As a result, one additional site was added to the study, although the contractor was hired by the individual site and not by the PRCF.

## Additional Project Location Added to Study

Project Location #18 - Casey's General Store, Lennox, SD

The PRCF solicited bid proposals from local and regional contractors who specialized in the installation / removal of petroleum fuel systems. In addition, the bidding contractors must have a petroleum equipment specialist on staff with a minimum of five (5) years experience with the installation of petroleum equipment and was licensed or certified to conduct petroleum equipment installations in at least one of the following states: Iowa, Minnesota, Montana, or Nebraska. The petroleum equipment specialist was required to be on the project sites during all testing and construction activities.

Bids were received for the purposes of contracting for the following activities:

1. Testing petroleum product lines using both hydrostatic and helium gas testing;
2. Excavating petroleum product lines and tank systems for research purposes;
3. Removing, inerting, decommissioning and disposing of tank system components;
4. Removal of petroleum contaminated soils, if present;
5. Backfilling and compacting the tank system excavation areas; and
6. Assisting the PRCF with the identification and evaluation of the tank system components.

The technical specifications for each site are included in Appendix A of this report.

The following list of contractors submitted sealed bids for at least one bid group:

B&H Petroleum Equipment Co. – Mankato, MN  
Dockendorf Equipment – Sioux Falls, SD  
Grimm's Pump Industrial and Supply – Rapid City, SD  
O'Day Equipment, Inc. – Sioux Falls, SD  
R&R Petroleum Equipment Sales – Fargo, ND  
Sioux Equipment, Inc. – Sioux Falls, SD

<b>Table 1 – Bid Group #1</b>					
<b>Company Name</b>	<b>Bid Security</b>	<b>TPSS #1 Country Corner</b>	<b>TPSS #2 Bill's Texaco</b>	<b>TPSS #3 Convenience Liquor and Gas</b>	<b>Base Bid Total</b>
Dockendorf Equip. Co	10% of Total Bid	\$37,812.94	\$19,646.01	\$14,806.30	\$72,153.02
O'Day Equip, Inc.	\$3,805.00	\$39,637.84	\$21,455.73	\$15,000.43	\$76,094.00
R&R Petroleum Sales, Inc.	\$3,963.20	\$39,570.00	\$21,500.00	\$18,194.00	\$79,264.00
Sioux Equip. Co	10% of Total Bid	\$44,086.36	\$24,530.80	\$18,103.45	\$86,720.61
B&H Petroleum Equip.	\$4,575.00	\$43,252.00	\$23,814.00	\$24,419.00	\$91,485.00

Bid Group #1 was awarded to Dockendorf Equipment Company of Sioux Falls, SD.

**Table 2 – Bid Group #2**

Company Name	Bid Security	TPSS #4 Elkton Farmer's Union	TPSS #5 Bozied Texaco	TPSS #6 Wayne's Amoco	TPSS #7 Wayne's Amoco	TPSS #8 Wayne's Amoco	Base Bid Total
O'Day Equip., Inc.	\$8,640.72	\$11,018.77	\$29,094.21	\$17,292.50	\$75,853.56	\$39,466.44	\$172,725.48

Bid Group #2 was awarded to O'Day Equipment, Inc. of Sioux Falls, SD.

**Table 3 – Bid Group #3**

Company Name	Bid Security	TPSS #9 Madison Coastal Mart	TPSS #10 Northview Bait & Tackle	TPSS #11 12 <sup>th</sup> St. Sinclair	TPSS #12 Westside Conven.	TPSS #13 Broadway Texaco	Base Bid Total
B&H Petroleum Equip., Inc.	\$5,736.00	\$20,658.00	\$20,428.00	\$25,308.70	\$26,458.00	\$21,864.00	\$114,716.70
O'Day Equip., Inc.	\$6,317.66	\$19,629.81	\$22,093.54	\$26,339.25	\$30,956.15	\$23,655.82	\$122,674.57

Bid Group #3 was awarded to B&H Petroleum Equipment, Inc. of Mankato, MN.

**Table 4 – Bid Group #4**

Company Name	Bid Security	TPSS #14 Big D #1	TPSS #15 Big D #7	TPSS #16 Big D #15	Base Bid Total
O'Day Equipment, Inc.	\$8,794.60	\$60,048.56	\$68,325.64	\$47,494.60	\$175,868.80
Grimm's Industrial Pump and Supply	\$5,307.00	\$35,555.00	\$45,283.00	\$25,292.25	\$106,130.25

Bid Group #4 was awarded to Grimm's Industrial Pump and Supply of Rapid City, SD.

**Table 5 – Bid Group #5**

Company Name	Bid Security	TPSS #14 Big D #1	Base Bid Total
O'Day Equipment, Inc.	\$5,200.00	\$103,986.75	\$103,986.75
Grimm's Industrial Pump and Supply.	\$4,110.00	\$82,195.70	\$82,195.70
B&H Petroleum Equipment	10% Bid Bond	\$69,271.00	\$69,271.00

Bid Group #5 was awarded to B&H Petroleum Equipment, Inc. of Mankato, MN.

As previously stated, Project Location #18 (Casey's General Store) was not bid out by the PRCF. Rather, the activities at this site were performed under a contract between Casey's General Stores and their contractor. However, because the PRCF was given the opportunity to conduct a records review and participate in the scheduled tank removal, the PRCF was able to obtain valuable information to include with this study.

Unfortunately, the PRCF was unable to visit the site until complete removal of the tank systems. Therefore, only the data obtain from the records review and post-system removal observations are included in this report.

## Pre-Removal Observations

### Records Retention

Pursuant to both State and Federal UST regulations, owners and operators of underground storage tank systems in South Dakota must maintain the following records:

- 1) A corrosion expert's analysis of site corrosion potential if corrosion protection equipment is not used;
- 2) The results of the cathodic protection testing and system checks, as well as the results of the last 2 inspections performed by a qualified cathodic protection tester; or the results of the last 3 system checks documenting the operation of any impressed current system;
- 3) Documentation of all UST system repairs. UST system owners and operators must maintain records of each repair for the remaining operating life of the UST system
- 4) Compliance with release detection requirements, which include:
  - a) All written performance claims pertaining to any release detection system used, and the manner in which these claims have been justified or tested by the equipment manufacturer or installer, must be maintained for 5 years from the date of installation;
  - b) The results of any sampling, testing, or monitoring must be maintained for at least 1 year except that the results of tank tightness testing must be retained until the next test is conducted; and
  - c) Written documentation of all calibration, maintenance, and repair of release detection equipment permanently located on-site must be maintained for at least one year after the servicing work is completed. Any schedules of required calibration and maintenance provided by the manufacturer of the release detection equipment must be retained for 5 years from the date of installation.

Owners and operators must keep the records required at the UST site and immediately available for inspection by the South Dakota Department of Environment and Natural Resources (DENR); or at a readily available alternative site within the state of South Dakota and be provided for inspection by the DENR within 24 hours of the request.

In the case of permanent closure, owners and operators must maintain the previously aforementioned records and the results of any excavation area assessment. The assessment records must be retained for a period of 3 years by the owner who took the system out of service or by the current owner and operator of the tank system. An additional alternative of mailing closure records to the DENR is available if they cannot be kept at the site or an alternative site as indicated above.

Despite State and Federal Regulations regarding records retention, the results of this study conclude that owners and operators at majority of the site evaluated did not retain the required documents to prove that their systems were in compliance with State and Federal rules. Figure 1 summarizes the results associated with records retention. The average records retention compliance rate for the sites included in this study was 11%. Due to the lack of records retention, it cannot be determined if the owners and operators of these properties were conducting required system checks to ensure a release was not or had not occurred.

## Leak Detection

Prior to system removal, components of the system were verified to determine if the required leak detection equipment was installed. Of the 17 sites evaluated, all but one of the sites had the appropriate leak detection equipment. However, because of the absence of records retained by most of the site owners/operators, it was not possible to conclude whether or not the required testing of the leak detection equipment or the system components which they monitor had been performed.

## Other Pre-Removal Visual Observations

Many of the sites contained spill buckets that were damaged, which could result in a release to the environment during filling operations. The damages consisted of deteriorated or missing surface seals, cracked containment sumps, or the absence of the spill bucket all together.



In addition, many sites included installation errors/system modifications that could have hindered the discovery of a petroleum release within the system. For example, test boots that reside within a sump that does not contain a sensor must be connected. This ensures that any product within the interstitial space can migrate to a sump that contains a sensor, thus alerting the site operator of a potential release.

## Age Distribution

Figure 2 summarizes the age distribution of the tank systems included in this study. The study included tank systems that were relatively new (less than 5 years), and older systems (>30 years old), with majority of the tank systems averaging about 17 years of age. A release was identified at nearly all tank systems that were 12 years of age or older (8 systems). It was determined that majority of the releases were not the result of the structural integrity of the tanks or lines, but rather the appurtenances, such as the fill pipes. However, the releases at two of those sites are believed to have originated from a previous tank system, and were not the result of a failure in the most recent tank system.

## Tank Construction

Of the 17 sites evaluated, the most common type of tank construction found included unprotected steel and steel wrapped with composite materials such as fiberglass. However, there were other steel tanks found that were covered with a protective coating. Majority of the tanks removed appeared to be in fair to excellent condition. Figure 3 depicts the different materials and the frequency of each material encountered.

## Product Line Construction

Throughout the course of the study, there were 3 different types of piping found. Rigid fiberglass piping was the most common, followed by steel. Most often, the steel lines were protected with a covering to reduce corrosion and other damage. In some instances, different types of piping materials were combined together to form a single piping run. In these cases, the more predominate types of piping used in the system are listed. Finally, piping at two of the sites

comprised of flexible synthetic piping. Although the integrity of this type of piping has been a controversial over the last few years, there were no problems found during the study with this type of piping.



**Type of Petroleum Stored and Dispensed**

This study involved the removal of 60 individual underground storage tanks and associated piping and dispensing equipment. Only 15 of the 60 tanks stored diesel fuel, while the remaining 45 were used predominately to store gasoline of various grades.

Table 6 - Type and Number of Petroleum Tanks																		
Project Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	TOTAL
Diesel Tanks	1	2	0	0	0	0	3	3	0	0	0	0	1	1	0	0	4	15
Gasoline Tanks	3	0	2	3	3	3	2	3	3	2	3	3	2	3	4	3	3	45

**System Equipment**

Majority of the sites evaluated had some type of overfill protection, which included spill containment buckets and overfill prevention valves. However, many of the spill containment buckets were either cracked, full of water, or the surface seals were damaged or missing. In some instances, it appeared the lack of maintaining this component resulted in a release to the tank basin.



**Line Testing**

Prior to the removal of the product lines, two different types of line testing were conducted. First, each line was capped and hydrostatically tested to determine if any portion of the product lines were prone to leaks. This test was designed to detect a .1 gallon per hour leak rate using one and a half times the operating pressure of the lines.



Following the pressure test, holes were drilled through the surfacing along the piping trenches. The product lines were then purged, and again tested using helium gas. A specific instrument was then used to detect any trace amounts of helium venting from the holes in the surfacing. This method of leak detection attempts to pinpoint the exact location of a line leak. However, because the potential exists that the interior pipe in a double wall pipe has failed, and the outer piping remains tight, helium gases have the ability to travel

through the interstitial space and present itself some distance away from the actual failure. Therefore, it was concluded that pinpointing a leak in a product line using this type of method may not be most appropriate for double-wall piping.



Pressure Testing



Helium Testing

### Removal Observations

Once testing was completed on the product lines, the surface above the tanks and lines were carefully removed and each component inspected. The purpose of this examination was to identify any material defects, incompatibilities, installation errors, etc. Overall, the installation of the tank system at most project locations was considered satisfactory. However, a few minor errors were identified. For example, at one location, the manufacturer wrapping on a sacrificial anode had not been removed, as was instructed on the wrapping itself, prior to tank installation. Although the tank did not appear to be grossly corroded, this oversight could have led to aggressive material decomposition in the future.



In other instances, material incompatibilities were discovered. For example, the piping at one of the sites included both A.O. Smith elbows installed with Ameron fiberglass piping. Excessive microbial growth was found on much of the piping system, indicating that a small release may have occurred within the piping galleries.



Through the course of investigation, many times it was apparent that further examination of system components was necessary. In these cases, the components were either tested on-site, or retained for future examinations by an independent testing group. To date, none of the components retained have been sent to a laboratory for further analysis.

### Sources of Discharge

Soil contamination was identified at 10 of the sites included in this study, resulting in a need for additional assessment / corrective action at 7 of those sites. Figure 4 summarizes the different sources of discharge discovered during the evaluation.

There were a total of 5 different sources from which contamination is believed to have originated. Majority of the releases are believed to have originated in part from the fill pipe or from a previous tank system. As previously mentioned the surface seals above the fill pipes were often damaged, or the spill containment bucket was cracked or missing.

### Causes of Discharge

Of the 7 different areas where a release was found, a total of 16 different causes for the release were identified. Figure 5 summarizes the causes of discharge found during the evaluation. The causes found included loose components, material failures, surface spills, overfills, and physical and/or mechanical damage. However, there were installation errors, excessive corrosion, or material incompatibilities found, but none of these are believed to have resulted in a release of product from the fueling system.



**Table 7 – Sources and Causes of Discharge**

		Causes of Release								Total Sources
		Loose Component	Material Failure	Surface Spill	Overflow	Physical / Mech Damage	Unknown	Material Incompatibility	Corrosion	
Sources of Release	UST						1		1	2
	Piping	1	1				2	1		5
	Fill Pipe	3	1	4	4	3				15
	Dispenser			1						1
	Previous System						4			4
	<b>Total Causes</b>	<b>4</b>	<b>2</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>7</b>	<b>1</b>	<b>1</b>	<b>27</b>

## **Summaries of Results**

The following pages summarize the results of the study at each project location. It lists the key observations and any potential problems discovered at the sites during the course of the evaluation. As previously stated, all tank systems at the sites selected for this study were believed to be in compliance with state and federal UST rules and structurally sound and not subject to intermittent or prolonged petroleum leaks at the time of the study.

**Project Location #1  
Country Corner  
Sioux Falls, SD**

Release Identified at Site? (Yes/No)	No
Source(s) of Release (N/A if no release)	N/A
Assessment beyond backfill required? (Yes/No)	No
Number of Tanks	3; 1-20,000; 1-12,000; 1-compartmented (8,000&4,000)
Type of Tanks	Fiberglass wrapped steel with interstitial monitoring
Type of Piping	Flexible double wall polymer
Total Length of Piping	740'
Number of Dispensers	18
Type(s) of Dispensers (Pressure/Suction)	Pressure
Fill pipe Spill Bucket (Yes/No)/Condition	Yes / Good
Dispenser Sump (Yes/No)/Condition	Yes / Good
Overfill Protection (Yes/No)/Type	Yes / Caged ball
Line Pressure Test (Pass/Fail)	Pass
System Documentation Adequate? (Yes/No)	No
Leak Detection Records Adequate? (Yes/No)	No

- This location has operated as a retail service station since 1985. A state-of-the-art UST system was installed in mid-2000. The station ceased operation in early 2004 to be razed and replaced by another commercial retail business.
- Some installation discrepancies were noted but none had yet contributed to a release. The interstitial spaces of the double wall piping were not connected in the dispenser sumps and there were no sensors in the sumps to detect any loss from the interstitial spaces.
- Although the system was less than four years of age, little documentation (i.e., site diagrams, as-built component configuration, component maintenance manuals, operation manuals) was available.
- Records received from the site indicate checks performed during the short life of the system were spotty, inconsistent, and often incorrectly performed. Although the system had an automatic tank gauging (ATG) and checking capability, the operator continued intermittent recording of SIR information. The operator utilized the ATG to perform an inventory function.

**Project Location #1  
Country Corner  
Sioux Falls, SD**



**Project Location #2  
Bill's Texaco  
Brandon, SD**

Release Identified at Site? (Yes/No)	No
Source(s) of Release (N/A if no release)	N/A
Assessment beyond backfill required? (Yes/No)	No
Number of Tanks	2
Type of Tanks	StiP3, Single wall, coated steel with anode
Type of Piping	Single wall rigid fiberglass (Ameron)
Total Length of Piping	73'
Number of Dispensers	2
Type(s) of Dispensers (Pressure/Suction)	Suction
Fill pipe Spill Bucket (Yes/No)/Condition	Yes / Good
Dispenser Sump (Yes/No)/Condition	No
Overfill Protection (Yes/No)/Type	Yes /Caged ball
Line Pressure Test (Pass/Fail)	Pass
System Documentation Adequate? (Yes/No)	No
Leak Detection Records Adequate? (Yes/No)	No

- This neat appearing location had two separate-second generation, UST systems; one gasoline and one diesel. The system studied was installed in 1992 and was a suction fed, diesel system.
- Some installation discrepancies were noted but none had yet contributed to a release. Shipping cover protectors were not removed from a few tank anodes prior to burial.
- No documentation (i.e., component installation, maintenance, operation manuals) was available.
- No as-built drawings, installation proposals, leak detection, inspection, or maintenance records were available.

**Project Location #2**  
**Bill's Texaco**  
**Brandon, SD**



**Project Location #3  
R&M Convenience  
Sioux Falls, SD**

Release Identified at Site? (Yes/No)	Yes
Source(s) of Release (N/A if no release)	Earlier UST systems at this location
Assessment beyond backfill required? (Yes/No)	Yes
Number of Tanks	2 – 6,000 gallon
Type of Tanks	Single wall, asphalt coated steel with sacrificial anodes added post manufacture
Type of Piping	Coated steel with sacrificial anodes added post manufacture
Total Length of Piping	108'
Number of Dispensers	2
Type(s) of Dispensers (Pressure/Suction)	Pressure
Fill pipe Spill Bucket (Yes/No)/Condition	Yes / not tight
Dispenser Sump (Yes/No)/Condition	None
Overfill Protection (Yes/No)/Type	Yes/ Caged ball
Line Pressure Test (Pass/Fail)	Pass
System Documentation Adequate? (Yes/No)	No
Leak Detection Records Adequate? (Yes/No)	No

- This location, exhibiting an aged appearance, had a second generation, single-product gasoline UST system. The system was installed in 1982 and consisted of two 6,000 gallon, asphalt-coated steel USTs bedded in quartzite dust. The steel piping was also bedded in quartzite dust. Overfill valves, spill containment, electronic line leak detectors and cathodic protection were added seven years earlier to meet federal upgrade requirements.
- Installation discrepancies noted included the failure to anchor fire/shear valves to the island beneath the dispensers and underground vent lines that were unconnected.
- No documentation (i.e., as-built drawings, component installation, maintenance, operation manuals) was available.
- Consistent leak detection, inspection, or maintenance records were unavailable for the site.
- Upon removal of the USTs it was determined that a release had apparently occurred from a previously system installed at this location and that the current USTs were installed without remediating the previous release. Additional corrective action is required to assess the site and determine an appropriate corrective action for the earlier release.

**Project Location #3**  
**R&M Convenience**  
**Sioux Falls, SD**



**Project Location #4  
Farmer's Union  
Elkton, SD**

Release Identified at Site? (Yes/No)	No
Source(s) of Release (N/A if no release)	N/A
Assessment beyond backfill required? (Yes/No)	No
Number of Tanks	3
Type of Tanks	StiP3 single wall steel tanks
Type of Piping	Fiberglass
Total Length of Piping	45'
Number of Dispensers	2
Type(s) of Dispensers (Pressure/Suction)	Suction
Fill pipe Spill Bucket (Yes/No)/Condition	Yes – 1 bucket ring missing – all 3 valves clogged with debris
Dispenser Sump (Yes/No)/Condition	No
Overfill Protection (Yes/No)/Type	Yes – ball check
Line Pressure Test (Pass/Fail)	Pass
System Documentation Adequate? (Yes/No)	No – only original installation plans available
Leak Detection Records Adequate? (Yes/No)	Marginal – copy of a line test and DENR inspection records available – no monthly leak detection records provided

Generally the system was in good shape. One dispenser was found to have a double check valve installed and the screen in the valve was clogged with debris. The only system documentation available was the original installation plans which included photos. Leak detection records included DENR inspections and a line tightness test. No monthly release detection or reconciliation records were available. No release was identified during the system removal.

**Project Location #4  
Farmer's Union  
Elkton, SD**

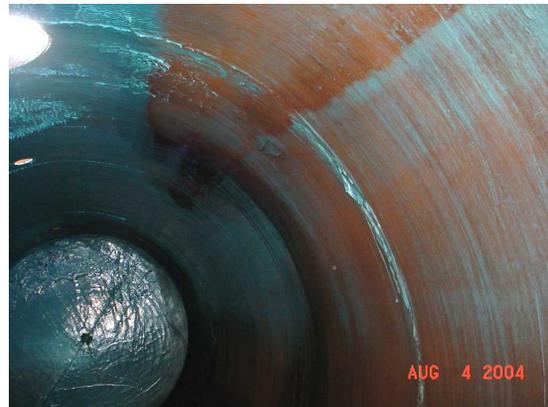


**Project Location #5  
Bozied Texaco  
Brookings, SD**

Release Identified at Site? (Yes/No)	Yes
Source(s) of Release (N/A if no release)	Spill buckets / dispensers
Assessment beyond backfill required? (Yes/No)	Yes
Number of Tanks	3
Type of Tanks	Steel tanks that had been lined
Type of Piping	Wrapped steel
Total Length of Piping	110'
Number of Dispensers	3 (previously removed)
Type(s) of Dispensers (Pressure/Suction)	Pressure
Fill pipe Spill Bucket (Yes/No)/Condition	Yes – trip wires missing
Dispenser Sump (Yes/No)/Condition	No
Overfill Protection (Yes/No)/Type	Yes – Flow shut off
Line Pressure Test (Pass/Fail)	Fail – one line ( premium) did not pass
System Documentation Adequate? (Yes/No)	No
Leak Detection Records Adequate? (Yes/No)	No

The original tank system was installed in 1969. In 1991 the tanks were upgraded by applying internal lining, adding spill / overfill protection, replacing the product lines, and adding cathodic protection to the tank system. The tank system was found to be in generally good condition. No visible holes were found in the tanks. The cause of the tightness test failure in the premium line was not able to be identified when the lines were removed. Leak detection records were not available. The site had been closed for approximately one year and the records were not retained. A set of blueprints from the 1969 installation were available. No other records of tightness tests or DENR inspections were available. A release was reported as the result of the system removal. Contamination was noted in the tank basin and near the dispenser island. The tank basin contamination is likely the result of historic spills / overfills and the island contamination may have resulted from dispenser maintenance or leaks. No piping leaks were identified during the course of the evaluation. The visibly contaminated soil was removed from the site. DENR has required that site assessment be done to determine if there are any potential pathways and impacted receptors.

**Project Location #5  
Bozied Texaco  
Brookings, SD**



**Project Location #6  
Wayne's Amoco  
Clear Lake, SD**

Release Identified at Site? (Yes/No)	No
Source(s) of Release (N/A if no release)	N/A
Assessment beyond backfill required? (Yes/No)	No
Number of Tanks	3
Type of Tanks	StiP3 Single wall steel
Type of Piping	Fiberglass
Total Length of Piping	60'
Number of Dispensers	2
Type(s) of Dispensers (Pressure/Suction)	Pressure
Fill pipe Spill Bucket (Yes/No)/Condition	Yes – Good condition – 1 bucket valve plugged
Dispenser Sump (Yes/No)/Condition	No
Overfill Protection (Yes/No)/Type	Yes Ball check valve
Line Pressure Test (Pass/Fail)	Pass
System Documentation Adequate? (Yes/No)	No- Only records available were for initial system installation
Leak Detection Records Adequate? (Yes/No)	No – no records available for line tests or monthly leak detection

The system was installed in 1993. It was found to be in generally good shape. One spill bucket had a damaged lid and the release valve was stuck. Documentation for the station was not available. The station was closed for nearly a year before the system removal, and the records were not retained. Leak detection and inspection records also were not retained. No release was identified during the system removal. Two other tanks were subsequently removed under the South Dakota Abandoned Tank Program and the contaminated soils associated with these tanks were removed and properly disposed.

**Project Location #6  
Wayne's Amoco  
Clear Lake, SD**



**Project Location #7  
Stone's Truck Stop  
Watertown, SD**

Release Identified at Site? (Yes/No)	Yes
Source(s) of Release (N/A if no release)	Spill Buckets, Dispenser Islands
Assessment beyond backfill required? (Yes/No)	Yes – Tier Two & Receptors
Number of Tanks	5
Type of Tanks	StiP3 Single Wall Steel
Type of Piping	Combination of fiberglass and steel
Total Length of Piping	195' Gasoline 165' Diesel
Number of Dispensers	4 Gasoline (present) 6 Diesel (removed)
Type(s) of Dispensers (Pressure/Suction)	Pressure
Fill pipe Spill Bucket (Yes/No)/Condition	Yes - Some were damaged, leaking, nonfunctional
Dispenser Sump (Yes/No)/Condition	No
Overfill Protection (Yes/No)/Type	Yes – Ball Check Valve
Line Pressure Test (Pass/Fail)	Pass
System Documentation Adequate? (Yes/No)	Yes
Leak Detection Records Adequate? (Yes/No)	Yes

This system consisted of StiP3 single wall steel tanks and a combination of fiberglass and steel piping. The entire system was originally steel pipe. Sections of fiberglass pipe were installed when the location of the diesel islands was changed and an addition to the station building was constructed.

Monthly release detection records were available as well as DENR inspection records and a line tightness test done in May 2001.

The condition of the system was generally good. The lines all passed the precision tightness test and the helium test. Contamination was found near the former location of the diesel islands and in the tank basin. The island contamination is believed to be the result of dispenser maintenance and/or dispenser leaks. The tank basin contamination is believed to result from spill buckets that were missing, not functioning properly or had leaked. The spill / overfill protection was added in 1994. The tanks were installed in 1985, so some of the release may have occurred before the protection was added.

DENR has required that site assessment be done to determine if there are any potential pathways and impacted receptors.

**Project Location #7  
Stone's Truck Stop  
Watertown, SD**



**Project Location #8  
Sioux Valley Coop  
Watertown, SD**

Release Identified at Site? (Yes/No)	Yes
Source(s) of Release (N/A if no release)	Spill Bucket
Assessment beyond backfill required? (Yes/No)	No
Number of Tanks	6
Type of Tanks	StiP3 steel single wall
Type of Piping	Fiberglass
Total Length of Piping	150'
Number of Dispensers	7
Type(s) of Dispensers (Pressure/Suction)	6 pressure, 1 suction
Fill pipe Spill Bucket (Yes/No)/Condition	Yes, 1 malfunctioned / leaked
Dispenser Sump (Yes/No)/Condition	No
Overfill Protection (Yes/No)/Type	Yes, flow shutoff poppet style
Line Pressure Test (Pass/Fail)	Pass
System Documentation Adequate? (Yes/No)	Yes
Leak Detection Records Adequate? (Yes/No)	Yes

The tank system was installed in 1988 and consisted of StiP3 single walled steel tanks and fiberglass piping. The tank system was in good condition with the exception of one spill bucket that had malfunctioned / leaked. The system contained tanks for kerosene and E-85 (85% ethanol), as well as diesel, 10% ethanol blend, and regular unleaded.

The system operation was well documented. Copies of the original installation plans and manufacturer's specifications & literature were available as well as DENR inspection records, monthly line leak detection records, and tightness testing records.

The contamination from the leaking spill bucket was confined to the tank basin. A relatively small amount of contaminated soil was disposed and DENR is not requiring further work or assessment at the site.

**Project Location #8  
Sioux Valley Coop  
Watertown, SD**



**Project Location #9  
Coastal Mart  
Madison, SD**

Release Identified at Site? (Yes/No)	Yes
Source(s) of Release (N/A if no release)	Piping
Assessment beyond backfill required? (Yes/No)	Yes
Number of Tanks	3
Type of Tanks	Galvanized Steel with internal lining
Type of Piping	Single wall rigid fiberglass (Ameron)
Total Length of Piping	450
Number of Dispensers	2
Type(s) of Dispensers (Pressure/Suction)	Pressure
Fill pipe Spill Bucket (Yes/No)/Condition	Yes / damaged
Dispenser Sump (Yes/No)/Condition	None
Overfill Protection (Yes/No)/Type	Yes/Flow shutoff
Line Pressure Test (Pass/Fail)	Pass
System Documentation Adequate? (Yes/No)	No
Leak Detection Records Adequate? (Yes/No)	No

- This location had a three-product gasoline UST system. The system was installed in 1961 and the USTs had been lined in 1992.
- A single installation discrepancy was noted. A potential greater problem was found when the UST's were excavated. In discrete areas, the steel tanks had
- No documentation (i.e., component installation, maintenance, operation manuals) was available.
- Consistent leak detection, inspection, or maintenance records were unavailable for the site.
- While removing the USTs it was determined that a release had apparently occurred. Additional assessment has been performed and no contamination above state standards was found.

**Project Location #9  
Madison Coastal Mart  
Madison, SD**



**Project Location #10  
Northview Bait & Tackle  
Sioux Falls, SD**

Release Identified at Site? (Yes/No)	No
Source(s) of Release (N/A if no release)	N/A
Assessment beyond backfill required? (Yes/No)	No
Number of Tanks	2 (10,000 and 6,000)
Type of Tanks	Double wall fiberglass
Type of Piping	Double wall flexible synthetic
Total Length of Piping	100'
Number of Dispensers	2
Type(s) of Dispensers (Pressure/Suction)	Pressure
Fill pipe Spill Bucket (Yes/No)/Condition	Yes
Dispenser Sump (Yes/No)/Condition	Yes
Overfill Protection (Yes/No)/Type	Yes/Flow shutoff
Line Pressure Test (Pass/Fail)	Pass
System Documentation Adequate? (Yes/No)	No
Leak Detection Records Adequate? (Yes/No)	No

- This location had been a gas station prior to 1979. Contamination was found when the previous system was removed in 1999 and replaced with a two-product gasoline UST system in 1999. The station was closed in 2002 when purchased by the owner of surrounding property.
- No installation discrepancies were noted.
- No documentation (i.e., as-built drawings, maintenance, operation manuals) was available.
- Leak detection, inspection, or maintenance records were not available for the site.

**Project Location #10  
Northview Bait & Tackle  
Sioux Falls, SD**



**Project Location #11  
12<sup>th</sup> Street Sinclair  
Sioux Falls, SD**

Release Identified at Site? (Yes/No)	Yes
Source(s) of Release (N/A if no release)	Tank fills and secondary piping
Assessment beyond backfill required? (Yes/No)	Yes
Number of Tanks	3
Type of Tanks	StiP3, Double wall steel
Type of Piping	Double wall fiberglass
Total Length of Piping	360'
Number of Dispensers	7
Type(s) of Dispensers (Pressure/Suction)	Pressure
Fill pipe Spill Bucket (Yes/No)/Condition	Yes / damaged
Dispenser Sump (Yes/No)/Condition	No
Overfill Protection (Yes/No)/Type	Yes / caged ball
Line Pressure Test (Pass/Fail)	Fail
System Documentation Adequate? (Yes/No)	No
Leak Detection Records Adequate? (Yes/No)	No

- This site had been a retail gas station since approximately 1954. The current system of three 8,000 gallon tanks was installed in 1992.
- Discrepancies noted include the mixing of piping components from different manufacturers, failure to follow recommended installation practices by component manufacturers, the use of rubber sleeves in locations where gasoline product was contained, and using inadequate slope in product return piping to containment sumps.
- No documentation (i.e., as-built drawings, maintenance, operation manuals) was available.
- Product inventory records were available but leak detection, inspection, or maintenance records were not available for the site.
- Piping for two products failed tightness testing. DENR has required that site assessment be done to determine if there are any potential pathways and impacted receptors..

**Project Location #11  
12<sup>th</sup> Street Sinclair  
Sioux Falls, SD**

**Page 1**



**Project Location #11  
12<sup>th</sup> Street Sinclair  
Sioux Falls, SD**

**Page 2**



**Project Location #12  
Westside Convenience  
Yankton, SD**

Release Identified at Site? (Yes/No)	No
Source(s) of Release (N/A if no release)	N/A
Assessment beyond backfill required? (Yes/No)	No
Number of Tanks	3 (2-10,000 & one-4,000 gal.)
Type of Tanks	Single wall fiberglass
Type of Piping	Single wall fiberglass
Total Length of Piping	160'
Number of Dispensers	2
Type(s) of Dispensers (Pressure/Suction)	Pressure
Fill pipe Spill Bucket (Yes/No)/Condition	Yes / Good
Dispenser Sump (Yes/No)/Condition	No
Overfill Protection (Yes/No)/Type	Yes / Caged ball
Line Pressure Test (Pass/Fail)	Pass
System Documentation Adequate? (Yes/No)	Yes
Leak Detection Records Adequate? (Yes/No)	No

- This location had a first generation, three-product gasoline/diesel UST system. The system was installed in 1995.
- No installation discrepancies were noted.
- Documentation, including component installation diagrams, maintenance, and operation manuals was available.
- Product inventory records were not available, nor were leak detection, inspection, or maintenance records.

**Project Location #12  
Westside Convenience  
Yankton, SD**



**Project Location #13  
Broadway Texaco  
Yankton, SD**

Release Identified at Site? (Yes/No)	No
Source(s) of Release (N/A if no release)	N/A
Assessment beyond backfill required? (Yes/No)	No
Number of Tanks	2 (one compartmented)
Type of Tanks	Double wall – steel with fiberglass secondary
Type of Piping	Double wall polymer
Total Length of Piping	153'
Number of Dispensers	2
Type(s) of Dispensers (Pressure/Suction)	Pressure
Fill pipe Spill Bucket (Yes/No)/Condition	Yes / Good
Dispenser Sump (Yes/No)/Condition	Yes / Good
Overfill Protection (Yes/No)/Type	Yes / Flow shutoff
Line Pressure Test (Pass/Fail)	Pass
System Documentation Adequate? (Yes/No)	No
Leak Detection Records Adequate? (Yes/No)	No

- This location had a second or third generation, three-product gasoline UST system. The system was installed in 1995.
- Some installation discrepancies were noted. For instance, the interstitial spaces for two of the product lines were properly routed to the tank sumps, which contained fluid sensors. However, the interstitial space for the third product line was routed to an island sump that did not contain a fluid sensor.
- No documentation (i.e., component installation, maintenance, operation manuals) was available.
- No product inventory records were available, nor were leak detection, inspection, or maintenance records.

**Project Location #13  
Broadway Texaco  
Yankton, SD**



**Project Location #14  
Big D Oil  
Sturgis, SD**

Release Identified at Site? (Yes/No)	No
Source(s) of Release (N/A if no release)	N/A
Assessment beyond backfill required? (Yes/No)	No
Number of Tanks	4
Type of Tanks	Coated, cathodically protected single wall steel
Type of Piping	Coated steel
Total Length of Piping	70'
Number of Dispensers	4
Type(s) of Dispensers (Pressure/Suction)	Pressure
Fill pipe Spill Bucket (Yes/No)/Condition	Yes (shop made – no drains) good condition
Dispenser Sump (Yes/No)/Condition	N/A
Overfill Protection (Yes/No)/Type	Yes – ball check valve
Line Pressure Test (Pass/Fail)	Pass
System Documentation Adequate? (Yes/No)	Yes
Leak Detection Records Adequate? (Yes/No)	Yes

The tank system was in generally good condition. The station was originally constructed in mid-1960. New tanks were installed in 1994. The product lines from the original tank system were still in place and contained product. Approximately five gallons was recovered. Installation plans from the 1994 installation were available. No other tanks documents provided. Monthly leak detection records and a cathodic protection / tightness test from 4-18-02 were provided. No release was identified as a result of the tank system removal.

**Project Location #14**  
**Big D Oil**  
**Sturgis, SD**



**Project Location #15  
Big D Oil  
Spearfish, SD**

Release Identified at Site? (Yes/No)	Yes
Source(s) of Release (N/A if no release)	Historic spills / overfills & dispensers
Assessment beyond backfill required? (Yes/No)	Yes
Number of Tanks	4
Type of Tanks	Steel single wall with impressed current protection
Type of Piping	Coated steel
Total Length of Piping	145'
Number of Dispensers	3
Type(s) of Dispensers (Pressure/Suction)	Pressure
Fill pipe Spill Bucket (Yes/No)/Condition	Yes – good condition
Dispenser Sump (Yes/No)/Condition	No
Overfill Protection (Yes/No)/Type	Yes – Flow shut off
Line Pressure Test (Pass/Fail)	Pass
System Documentation Adequate? (Yes/No)	No
Leak Detection Records Adequate? (Yes/No)	Yes

The tank system was installed in 1968. In 1988, new coated steel piping was installed. In 1995 the tanks were lined and a spill / overfill protection system as well as an impressed current system were installed. Upon removal, the tank system appeared to be in generally good condition. No plans or documentation were available for the original installation or for the 1988 & 1995 upgrades. Monthly leak detection records and cathodic and precision test records were provided. The contamination may have been the result of historic spill / overfills or dispenser maintenance/leaks. Contaminated soil has been removed & disposed. DENR has required that site assessment be done to determine if there are any potential pathways and impacted receptors.

**Project Location #15**  
**Big D Oil**  
**Spearfish, SD**



**Project Location #16  
Big D Oil  
Box Elder, SD**

Release Identified at Site? (Yes/No)	Yes
Source(s) of Release (N/A if no release)	Previous UST systems
Assessment beyond backfill required? (Yes/No)	Yes
Number of Tanks	3
Type of Tanks	StiP3
Type of Piping	Mixture of steel – some cathodically protected, others externally coated
Total Length of Piping	450
Number of Dispensers	4
Type(s) of Dispensers (Pressure/Suction)	Pressure
Fill pipe Spill Bucket (Yes/No)/Condition	Yes / Good
Dispenser Sump (Yes/No)/Condition	No
Overfill Protection (Yes/No)/Type	Yes/Flow shutoff
Line Pressure Test (Pass/Fail)	Pass
System Documentation Adequate? (Yes/No)	No
Leak Detection Records Adequate? (Yes/No)	No

- This location had a second generation, three-product gasoline UST system. The system was installed in 1985.
- Some installation discrepancies were noted. For instance, a few shipping protectors had not been removed from the UST anodes and the protective coating on some piping had been damage by the jaws of a pipe wrench.
- Upon removal of the UST's, it was found that the protective coating had delaminated from the steel. The space behind the coating had been infiltrated by groundwater on the tank ends and by product below the tank fills.
- Product inventory records, leak detection, and inspection records were available but maintenance records were not available for the site.
- As the system was being removed, some of the backfill soils were found to be discolored. This visible contaminated soil, apparently from overfills, was removed. Significant additional contamination, apparently from a previous UST system, was found below the backfill and consequently removed. DENR has required that site assessment be done to determine if there are any potential pathways and impacted receptors.

**Project Location #16**  
**Big D Oil**  
**Box Elder, SD**



**Project Location #17  
Flying J Truck Stop  
Box Elder, SD**

Release Identified at Site? (Yes/No)	Yes
Source(s) of Release (N/A if no release)	Piping on truck side of site.
Assessment beyond backfill required? (Yes/No)	
Number of Tanks	7
Type of Tanks	Single wall fiberglass
Type of Piping	Single wall fiberglass
Total Length of Piping	880'
Number of Dispensers	12
Type(s) of Dispensers (Pressure/Suction)	Pressure
Fill pipe Spill Bucket (Yes/No)/Condition	Yes / Good
Dispenser Sump (Yes/No)/Condition	No
Overfill Protection (Yes/No)/Type	Yes / Ball check valve
Line Pressure Test (Pass/Fail)	Pass
System Documentation Adequate? (Yes/No)	No
Leak Detection Records Adequate? (Yes/No)	No

- This location had two first generation UST systems. The first system served the truck terminal side of the site. The second served the automobile traffic side of the site. Both systems had been installed in 1990.
- Configuration discrepancies were noted. For instance, three product lines had tape wrapped, stainless steel flexible connectors installed in straight, underground piping runs.
- No documentation (i.e., component installation, maintenance, operation manuals) was available.
- Product inventory records and leak detection records were available. Inspection and maintenance records were not.
- Groundwater sampling associated with an adjacent property found contamination on the automobile side in 1992. However, the source of the contamination was not determined. Soil sampling under truck side piping confirmed contamination during the study. DENR has required that site assessment be done to determine if there are any potential pathways and impacted receptors.

**Project Location #17**  
**Flying J Truck Stop**  
**Box Elder, SD**



**Project Location #18  
Casey's General Store  
Lennox, SD**

Release Identified at Site? (Yes/No)	Yes – previous to UST removal
Source(s) of Release (N/A if no release)	Loose component = dielectric bushing
Assessment beyond backfill required? (Yes/No)	No
Number of Tanks	2; 1-10,000; 1-6,000
Type of Tanks	Steel tanks with impressed current
Type of Piping	Fiberglass
Total Length of Piping	?
Number of Dispensers	3
Type(s) of Dispensers (Pressure/Suction)	Pressure
Fill pipe Spill Bucket (Yes/No)/Condition	Yes / Good
Dispenser Sump (Yes/No)/Condition	No
Overfill Protection (Yes/No)/Type	Yes / Caged ball
Line Pressure Test (Pass/Fail)	Not conducted
System Documentation Adequate? (Yes/No)	Yes
Leak Detection Records Adequate? (Yes/No)	Yes

- This location has operated as a retail service station since at least 1984 when installation of this system was documented. In 1993-1994, an impressed current protection system was added and fiberglass piping was installed. A release was reported in early 1997 and active remediation discontinued in 1998. The station ceased operation days before the UST removal. The site was razed in order to install a new/relocated building and tank system.
- Although the system was one of the older sites studied, there was adequate documentation available that provided an accurate record of compliance with state and federal mandates. Component operation and maintenance manuals were on site, as were records for routine and unplanned maintenance. Documents were available to show compliance with inventory and leak detection requirements.

## Conclusions

Based on the finding of this evaluation, it was determined that the overall integrity of underground petroleum storage tank systems in South Dakota are structurally sound and are not prone to intermittent or prolonged leaks. However, it is noted that a release was identified at every site where the tank system was installed prior to 1992. Majority of these releases (55%) were attributed to problems associated with the fill pipe. In contrast, a very small amount of contamination was identified at sites where the tank system was installed after 1992.

In addition, many small problematic areas were discovered that are believed to have contributed to leaks from the most recent tank systems, or may have potentially hindered the discovery of larger releases. For example, many of the surface seals around the UST fills were damaged or missing. In at least one case this led to a large amount of contaminated backfill in the UST basin. At another site, there was no evidence to suggest sump sensors had been installed in the sumps where the interstitial space of the lines was not connected. If these sumps are not checked regularly, the potential for a leak to continue for a lengthy period of time without being discovered may occur.

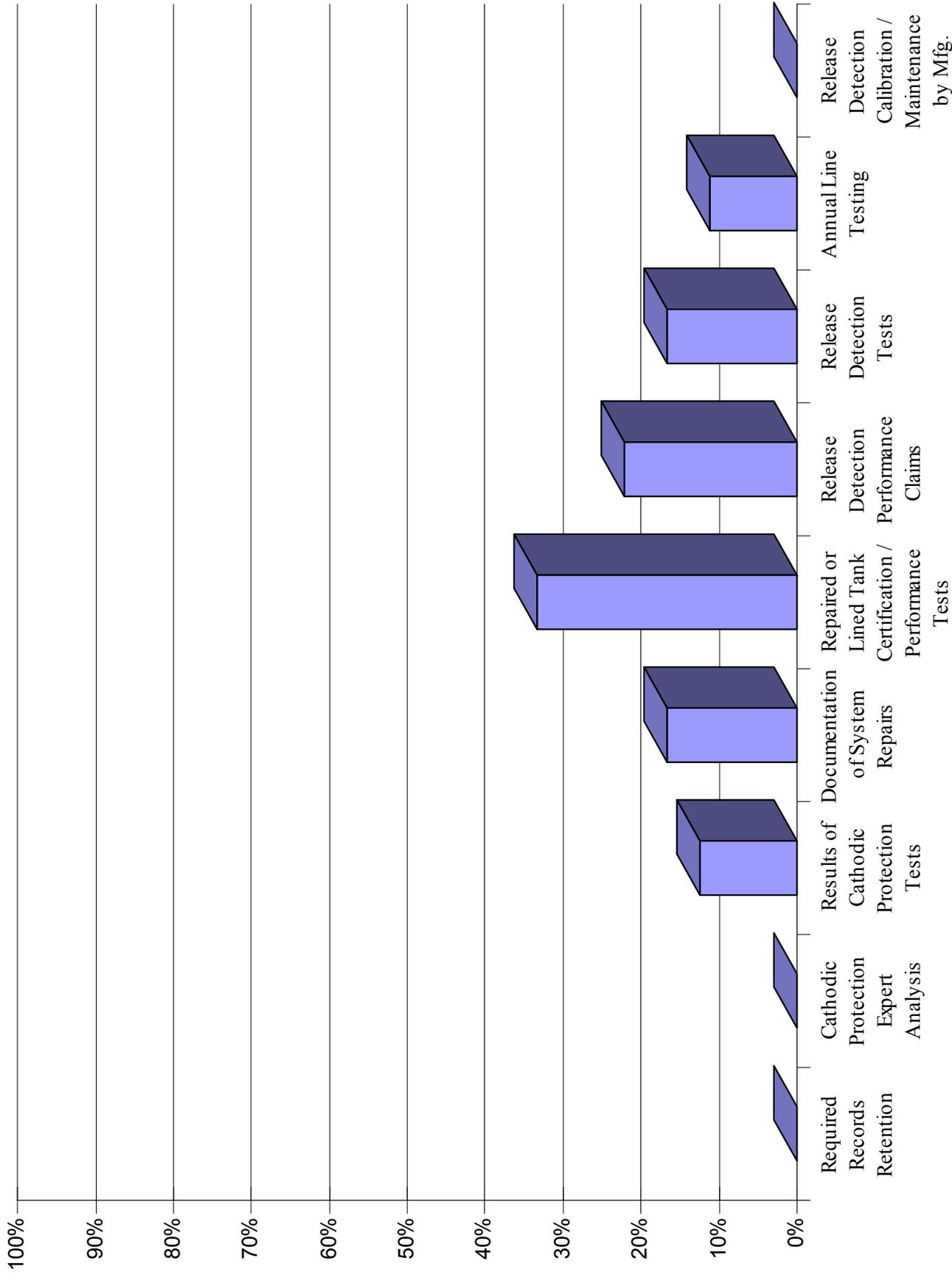
The owner/operator's level of compliance with the operation and maintenance of the tank systems was questionable. Despite state and federal regulations regarding the retention of certain records and equipment checks, it is not possible to determine if the required maintenance activities were actually being performed. In addition, most owners/operators did not have construction plans of their tank systems, or did not know the type of components that were installed on their systems. This could lead to difficulties in understanding the results of any component tests (i.e. leak detection) and solutions to correct any problems that may arise.

The lack of records retention was overwhelmingly the most significant problematic area identified. The overall compliance rate for records retention was just shy of 11%. Although this problematic area would not directly be the cause of any release, it must be assumed that the lack of equipment maintenance documentation implies that the equipment maintenance activities are not being performed. Basically, if it was not documented, it was not performed. This is extremely disturbing when you consider a 0.2 gallon per hour leak rate equals 1,728 gallons per year.

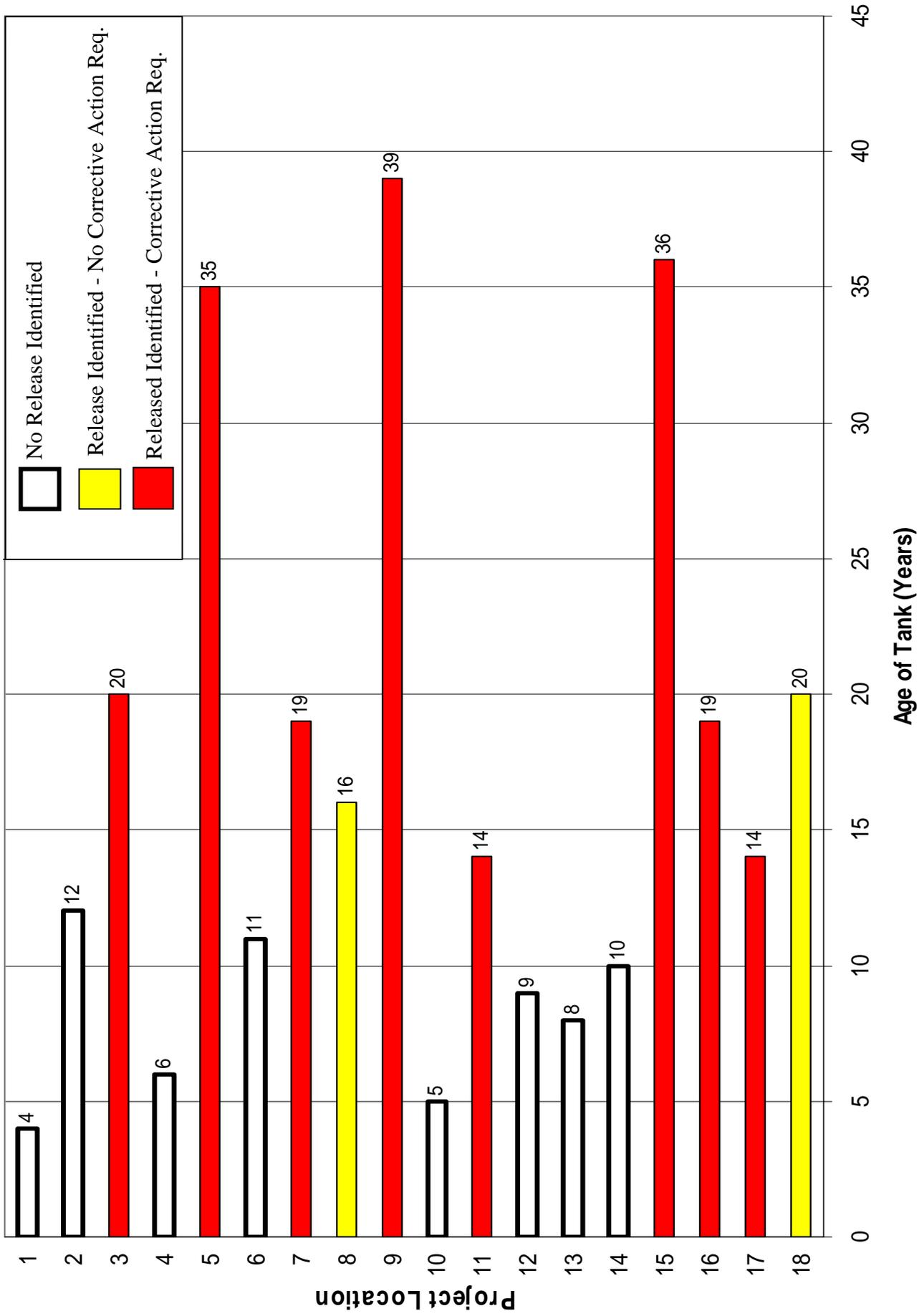
In addition, tank owners/operators who have built their systems, or have upgraded their tank systems, generally have a better knowledge of their tank systems than those that purchase the property and continue to operate it as a retail station. Often times without the proper records retention and other documentation related to the tank system, the new owners are unaware of the system capabilities or operational procedures. For example, one site owner was sure that his lines were constructed of coated steel, and as proof, had documentation of a cathodic protection test that had recently been conducted on his lines, which happened to show that they were well protected. Upon exposure of his tank system, it was learned that the lines were actually constructed of fiberglass.

Tank owners/operators must be educated as to the importance of performing equipment maintenance activities and what actions must be taken if problems are discovered during those activities. Currently, the Petroleum Equipment Institute is working on an on-line course to educate tank owners/operators on basic tank system components such as Automatic Tank Gauges.

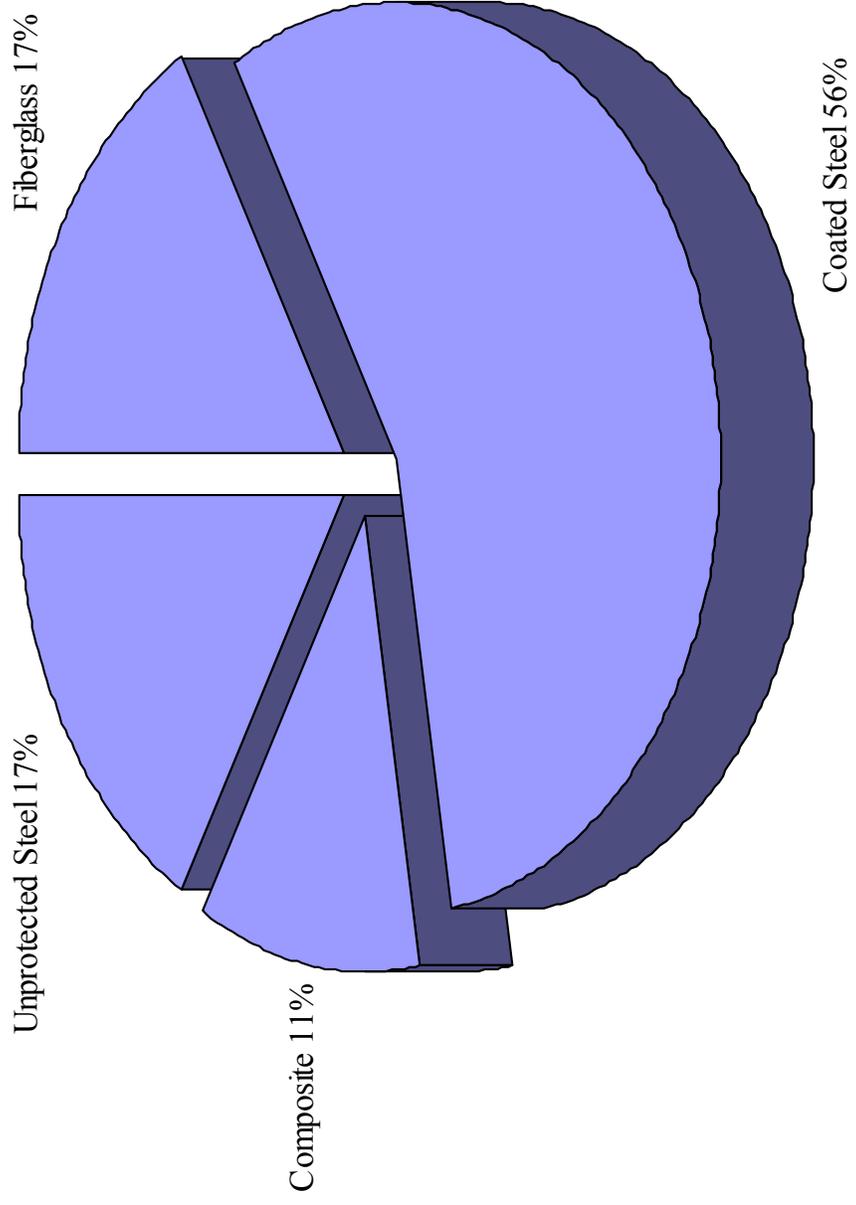
**Figure 1**  
**RECORDS RETENTION**  
**South Dakota PRCF Tank Pathology Study**



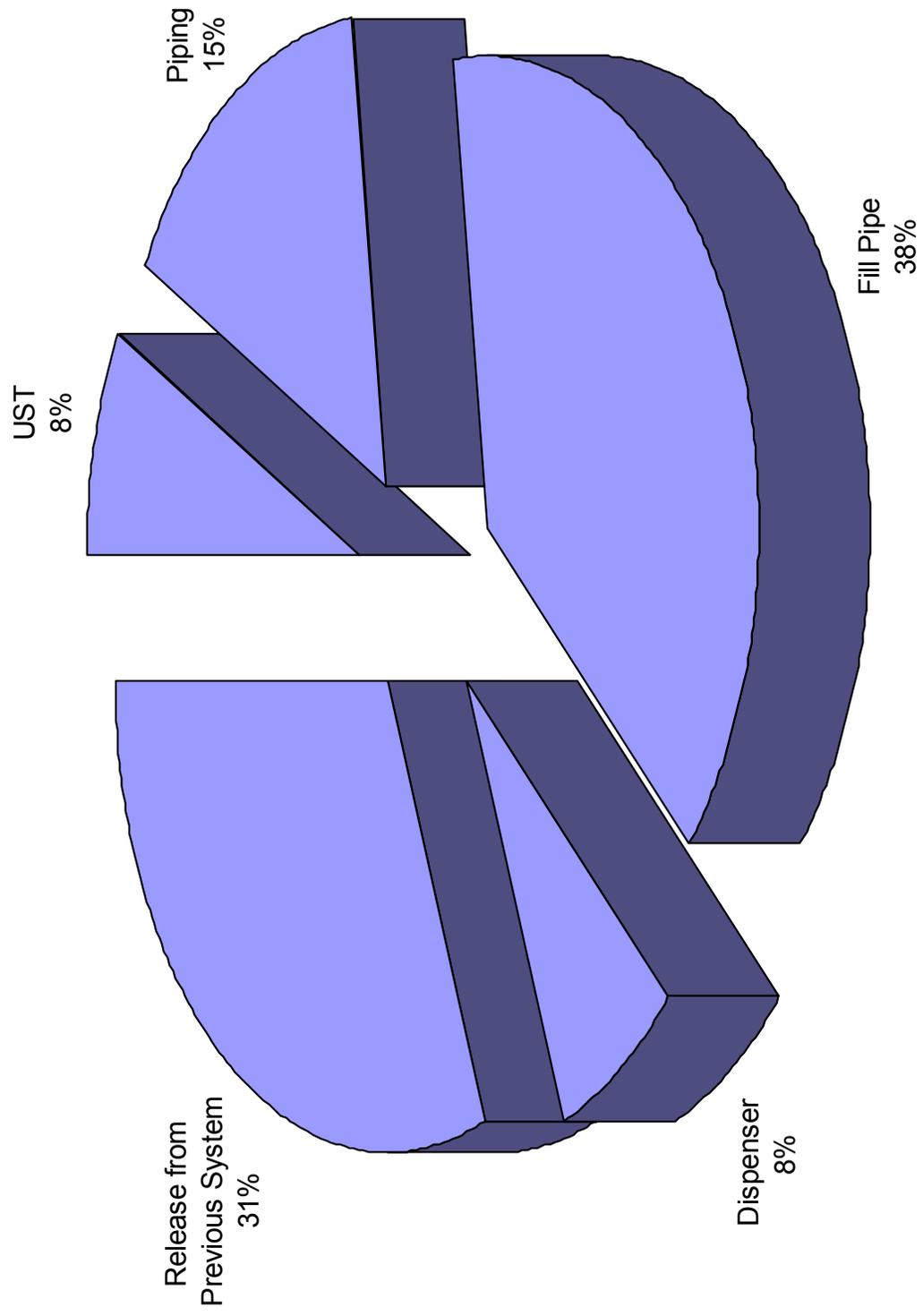
**Figure 5**  
**AGE DISTRIBUTION vs RELEASE DATA**  
 South Dakota PRCF Tank Pathology Study



**Figure 2**  
**TANK CONSTRUCTION**  
**South Dakota PRCF Tank Pathology Study**



**Figure 3**  
**SOURCE OF DISCHARGE**  
South Dakota PRCF Tank Pathology Study



**Figure 4**  
**CAUSE OF DISCHARGE**  
South Dakota PRCF Tank Pathology Study

