

# Data Dictionary & Variable Construction Reference

## Repo A: PA UST Combined Datasets

Analytical Engine

January 9, 2026

This document serves as the definitive technical reference for the raw datasets in Repo A (Facility/Tank Master Database). It characterizes the distributions of key variables—including tank status, substance types, and component attributes—and identifies specific data quality issues such as default installation dates. The frequency tables presented herein are intended to guide the “hotcoding” of binary variables and the treatment of missing data for downstream econometric analysis.

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# 1 Facility & Tank Characteristics

This section details the primary grouping variables derived from the harmonized Active (PADEP) and Inactive (SSRS) datasets.

## 1.1 Tank Status

[Description: Explanation of how Active vs. Inactive status is defined.]

Table 1

Table 2 Tank Status Distribution

STATUS_CODE	Tank_Status_Meaning	N	Pct
W	Closed	45557	44.8%
R	Removed	24173	23.8%
C	Currently In Use	20579	20.2%
E	Exempt From State Law	7339	7.2%
UR	Unregulated Removed	1641	1.6%
T	Temporarily Out of Use	1269	1.2%
P	Permanently Closed in Place	899	0.9%
TRANS	Transferred	142	0.1%
DC	2004 Data/Fee Cleanup	80	0.1%
UC	Unsubstantiated Claim	22	0.0%

[Table Note: Verify if ‘Temporarily Out of Use’ tanks should be treated as active for auction eligibility.]

## 1.2 Substance Profile

[Description: Breakdown of fuel types stored in the tanks, mapped from raw substance codes to boolean flags.]

Table 3

Table 4Fuel Types

Fuel	N
Gasoline	51104
Diesel	20170
Other_Substance	30427

[Table Note: These counts are based on the mapping of raw substance codes (e.g., “GAS”, “DIESL”) to consolidated categories.]

### 1.3 Installation Date Diagnostics

[Description: Assessment of data quality for DATE\_INSTALLED.]

Table 5

Table 6 Top 10 Most Frequent Installation Dates

DATE_INSTALLED	N
1974-01-01	587
1981-12-01	580
1985-12-01	572
1979-12-01	565
1980-01-01	564
1980-12-01	541
1970-01-01	531
1987-12-01	529
1983-12-01	526
1978-12-01	515

[Table Note: The dates listed above are likely system defaults (e.g., 01/01/1900) and should be treated as missing values.]

### 1.3.1 KNN Date Imputation Diagnostics

[Description: Comparison of reported installation dates vs. KNN-imputed dates for records with suspect default values. KNN regression ( $k=5$ ) uses capacity, substance type, and region as features.]

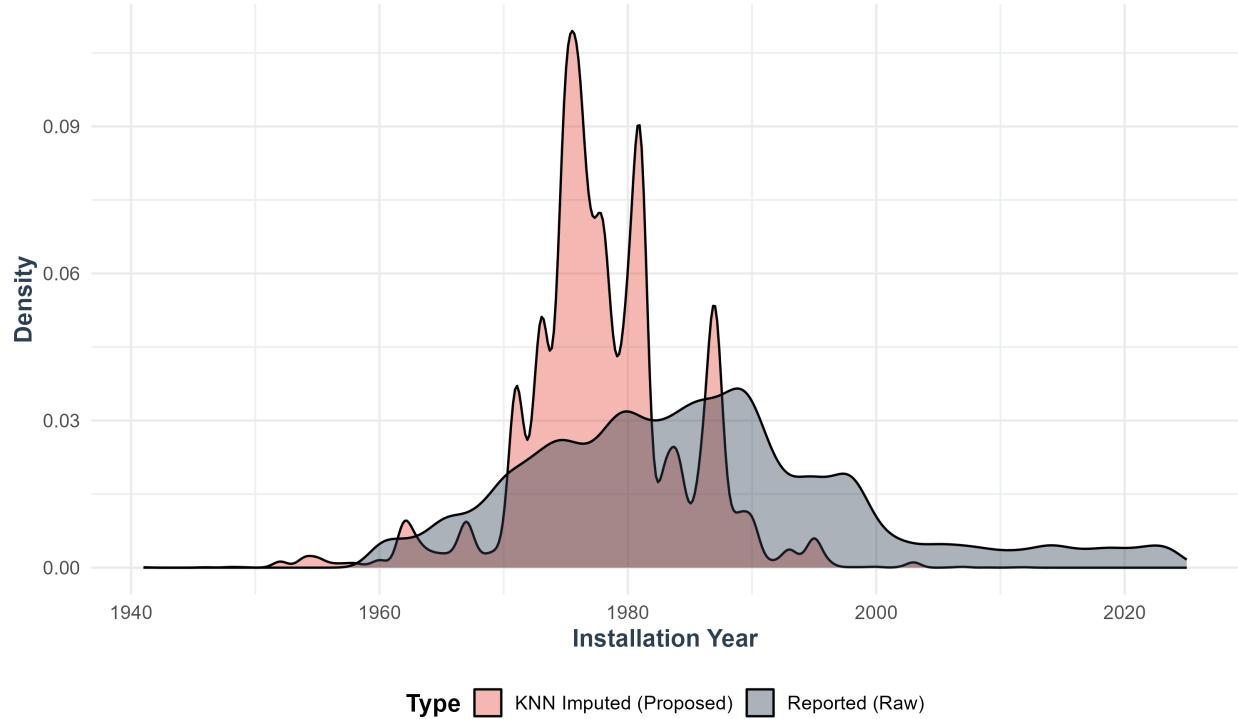


Figure 1: KNN Date Imputation Diagnostics: Reported vs. Imputed Installation Years

[Figure Note: Density comparison showing distributional plausibility of KNN-imputed dates relative to observed installation years. Imputed values should align with historical installation patterns.]

## 2 Component Universe

This section details the raw attributes available in the ‘Compounds’ table. Use these tables to determine which specific attributes to ‘hotcode’ into binary variables.

### 2.1 Tank Specifics

#### 2.1.1 Release Detection

Table 7

Table 8Component Universe: TANK RELEASE DETECTION METHOD

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
1299	OTHER	8
12A	MONTHLY INVENTORY CONTROL	3611
12B	ANNUAL TANK TIGHTNESS TESTING	2985
12C	TANK TIGHTNESS TESTING (EVERY 5 YEARS)	535
12D	STATISTICAL INVENTORY RECONCILIATION	4683
12E	AUTOMATIC TANK GAUGING	17834
12F	MANUAL TANK GAUGING (36 HRS)	407
12G	MANUAL TANK GAUGING (44 OR 58 HRS)	383
12H	INTERSTITIAL MONITORING (2 WALLS)	13753
12I	INTERSTITIAL MONITORING (LINER)	9
12J	GROUNDWATER MONITORING	79
12K	VAPOR MONITORING	58
12L	GROOVES MADE IN THE IMPERMEABLE PAD	2
12M	SLOTTED PIPE ABOVE THE IMPERMEABLE PAD	4
12N	NONE	2833
12O	EXEMPT	953

[Table Note: Identify primary detection methods.]

## 2.1.2 Tank Construction

Table 9

Table 10 Component Universe: TANK CONSTRUCTION

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE
188	OTHER (COMPLIANT)
199	OTHER
1A	UNPROTECTED STEEL (SINGLE WALL)
1B	CATHODICALLY PROTECTED STEEL (GALVANIC)
1C	CATHODICALLY PROTECTED STEEL (IMPRESSED CURRENT)
1D	UNPROTECTED STEEL (DOUBLE WALL)
1E	FIBERGLASS (SINGLE WALL)
1F	FIBERGLASS (DOUBLE WALL)
1G	STEEL W/PLASTIC OR FIBERGLASS JACKET (DOUBLE WALL)
1H	STEEL W/FRP COATING (ACT 100 OR EQUIVALENT) (SINGLE WALL)
1I	STEEL W/LINED INTERIOR
1J	CONCRETE
1K	BOTTOM MODIFICATION
1N	UNKNOWN
1O	CATHODICALLY PROTECTED DOUBLE WALL STEEL (GALVANIC)
1P	CATHODICALLY PROTECTED STEEL WITH LINER
1V	STEEL W/PLASTIC OR FRP JACKET W/ ANODES (DOUBLE WALL)
1W	STEEL W/FRP COATING W/ ANODES (SINGLE WALL)

[Table Note: Distinguish between Steel, Fiberglass, and Composite.]

## 2.2 Piping Infrastructure

### 2.2.1 Underground Piping Construction

Table 11

Table 12 Component Universe: UG PIPING CONSTRUCTION

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
288	OTHER (COMPLIANT)	31
299	OTHER	39
2A	BARE STEEL	5870
2B	CATHODICALLY PROTECTED, METALLIC	2137
2C	COPPER	213
2D	FIBERGLASS	6331
2E	FLEXIBLE NON-METALLIC	488
2F	UNKNOWN	218
2G	NONE	793
2H	MODIFICATION OF PIPING	15
2I	Double wall, metallic primary	490
2J	Double wall, rigid (FRP) primary	1623
2K	Double wall, flexible primary	2756
2L	TRENCH LINER	16
2M	JACKETED	15

[Table Note: Key variable for leak risk (e.g., Single Wall vs Double Wall, Galvanized vs Fiberglass).]

## 2.2.2 Underground Piping: Single Inner Wall

Table 13

Table 14 Component Universe: UG SINGLE / INNER WALL PIPING

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
2899	OTHER	34
28A	BARE STEEL	465
28B	CP PROTECTED	712
28C	COPPER	167
28D	FRP	8859
28E	FLEX	12507
28F	UNKNOWN	10
28G	NO DISPENSING PIPING	373
28I	STAINLESS STEEL	47

[Table Note: [Placeholder: Description of single inner wall piping characteristics.]]

### 2.2.3 Underground Piping: Outer Wall

Table 15

Table 16 Component Universe: UG OUTER WALL PIPING

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
2999	OTHER, OUTER	263
29A	BARE STEEL, OUTER	204
29B	CP PROTECTED, OUTER	51
29D	FRP, OUTER	3985
29E	FLEX, OUTER	12227
29F	UNKNOWN, OUTER	14
29I	POLY-ENCASED STAINLESS STEEL, OUTER	19
29N	NONE	6295

[Table Note: [Placeholder: Description of outer wall piping characteristics.]]

## 2.2.4 Aboveground Piping: Corrosion Protection

Table 17

Table 18 Component Universe: AG PIPING CONSTRUCTION and CORROSION PROTECTION

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
388	OTHER (COMPLIANT)	156
399	OTHER	21
3A	CARBON STEEL	615
3B	CATHODICALLY PROTECTED, METALLIC	72
3C	COPPER	30
3D	FIBERGLASS	40
3E	FLEXIBLE NON-METALLIC	29
3F	PVC	10
3G	NONE	448
3H	PIPING MODIFICATION	5
3I	DOUBLE WALL METALLIC PRIMARY	19
3J	DOUBLE WALL RIGID (FRP) PRIMARY	11
3K	DOUBLE WALL FLEXIBLE PRIMARY	8
3L	STAINLESS STEEL	9

[Table Note: [Placeholder: Description of aboveground piping corrosion protection methods.]]

## 2.2.5 Piping Release Detection

Table 19

Table 20 Component Universe: PIPE RELEASE DETECTION METHOD

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE
5A	AUTOMATIC LINE LEAK DETECTOR
5B	ANNUAL LINE TIGHTNESS TESTING (PRESSURE)
5C	LINE TIGHTNESS TEST - 3 YEARS (SUCTION)
5D	INTERSTITIAL MONITORING
5E	GROUNDWATER MONITORING
5F	VAPOR MONITORING
5G	VISUAL INSPECTION
5H	NONE
5I	EXEMPT
5J	STATISTICAL INVENTORY RECONCILIATION
5K	ELECTRONIC LINE LEAK DETECTOR
5L	INTERSTITIAL MONITORING W/CONTINUOUS ALARM/SHUT

[Table Note: [Placeholder: Description of piping release detection methods.]]

## 2.2.6 Line Leak Detectors

Table 21

Table 22 Component Universe: LINE LEAK DETECTOR SHUTS OFF PUMP

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
23N	NO	17043
23Y	YES	10425

[Table Note: [Placeholder: Description of line leak detector functionality.]]

## **2.2.7 Secondary Containment**

Table 23

Table 24 Component Universe: UST TOTAL SECONDARILY CONTAINED

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
18N	NO	20287
18Y	YES	12244

[Table Note: [Placeholder: Description of secondary containment systems.]]

## **3 Regulatory & Compliance**

### 3.1 Certificates & Permits

Table 25

Table 26 Component Universe: REGISTRATION CERTIFICATE

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
8N	NO	1397
8Y	YES	11677

[Table Note: [Placeholder: Description of registration certificate requirements.]]

Table 27

Table 28 Component Universe: FIRE MARSHAL PERMIT

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
9A	ISSUED PRIOR TO AUGUST 5, 1989	3316
9B	ISSUED ON OR AFTER AUGUST 5, 1989	1288
9C	NO PERMIT OBTAINED	3709
9D	TANKS NOT REGULATED BY FIRE MARSHAL	268

[Table Note: [Placeholder: Description of fire marshal permit requirements.]]

### 3.2 Prevention Systems (Spill & Overfill)

Table 29

Table 30 Component Universe: SPILL PREVENTION

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
6D	DOUBLE WALL SPILL PREV	2564
6E	EXEMPT	512
6N	NO	5543
6S	SINGLE WALL SPILL PREV	4680
6Y	YES	29689

[Table Note: [Placeholder: Description of spill prevention systems.]]

Table 31

Table 32 Component Universe: OVERFILL PREVENTION

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
7A	OVERFILL ALARM	9490
7B	BALL FLOAT VALVE	2598
7E	EXEMPT	885
7N	NO	6183
7S	DROP TUBE SHUTOFF DEVICE	24814
7Y	YES	3550

[Table Note: Presence of these systems often correlates with lower premiums.]

### 3.3 Vapor Recovery Systems

Table 33

Table 34 Component Universe: VAPOR RECOVERY

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
11A	STAGE I INSTALLED	3693
11B	STAGE II INSTALLED	89
11C	STAGE I AND STAGE II INSTALLED	774
11D	NONE	4494

[Table Note: [Placeholder: Description of vapor recovery systems.]]

Table 35

Table 36 Component Universe: STAGE I VAPOR RECOVERY

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
19A	COAX	8099
19B	2 POINT	13101
19N	NONE OR INCOMPLETE	12382
2I	Double wall, metallic primary	1

[Table Note: [Placeholder: Description of Stage I vapor recovery.]]

Table 37

Table 38 Component Universe: STAGE II VAPOR RECOVERY

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
20A	COMPLETE BALANCE SYSTEM	623
20B	COMPLETE ASSIST SYSTEM	2256
20C	UG PIPING ONLY	6248
20D	DECOMMISSIONED	2359
20N	NONE	21258

[Table Note: Stage II recovery is largely phased out; check if this indicates older infrastructure.]

### 3.4 Containment & Sumps

Table 39

Table 40 Component Universe: TANK-TOP CONTAINMENT SUMPS

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
21A	AT ALL PENETRATIONS	18857
21N	NONE	7554
21S	AT SOME PENETRATIONS	1127

[Table Note: [Placeholder: Description of tank top containment sumps.]]

Table 41

Table 42 Component Universe: UNDER-DISPENSER CONTAINMENT

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
22A	AT ALL DISPENSERS	18566
22N	NONE	8667
22S	AT SOME DISPENSERS	253

[Table Note: ‘UDC’ (Under Dispenser Containment) is a critical modern safety feature.]

## 4 Miscellaneous Components

### 4.1 Flexible Connectors

Table 43

Table 44 Component Universe: Piping Flexible Connectors

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
88	Other (Compliant)	22
99	Other (Noncompliant)	
PFLXA	Unprotected Metallic Components (incl wrapped or coated)	47
PFLXB	Cathodically Protected, Metallic	246
PFLXC	Flexible Coupling w/ Protected Metallic Ends	5
PFLXD	Completely Inside Containment Sump, Secondary Pipe or Liner	481
PFLXE	Completely Jacketed w/ Sealed Boot	159
PFLXF	Not in Contact w/ Ground	97
PFLXX	None	19
UNK	Unknown	33

[Table Note: [Placeholder: Description of flexible connector types.]]

Table 45

Table 46 Component Universe: FLEX - TANK END

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE
2699	OTHER
26A	UNPROTECTED METALLIC COMPONENTS (INCL WRAPPED OR COATED)
26B	CATHODICALLY PROTECTED, METALLIC
26F	UNKNOWN
26I	COMPLETELY INSIDE CONTAINMENT SUMP, SECONDARY PIPE OR LINER
26M	COMPLETELY JACKETED W/ SEALED BOOT
26N	NOT IN CONTACT W/ GROUND
26X	NONE

[Table Note: [Placeholder: Description of flexible connectors at tank end.]]

Table 47

Table 48 Component Universe: FLEX - DISPENSER END

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE
2799	OTHER
27A	UNPROTECTED METALLIC COMPONENTS (INCL WRAPPED C
27B	CATHODICALLY PROTECTED, METALLIC
27F	UNKNOWN
27I	COMPLETELY INSIDE CONTAINMENT SUMP, SECONDARY PI
27M	COMPLETELY JACKETED W/ SEALED BOOT
27N	NOT IN CONTACT W/ GROUND
27X	NONE

[Table Note: [Placeholder: Description of flexible connectors at dispenser end.]]

## 4.2 Other Hardware

Table 49

Table 50Component Universe: PUMP/DELIVERY SYSTEM

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
4A	SUCTION: CHECK VALVE AT PUMP	11641
4B	SUCTION: CHECK VALVE AT TANK	3899
4C	PRESSURE	25845
4D	GRAVITY FED	201
4E	NONE	1110

[Table Note: [Placeholder: Description of pump delivery system types.]]

Table 51

Table 52Component Universe: EMERGENCY GENERATOR

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N
25N	NO - EMER GEN	21543
25Y	YES - EMER GEN	678

[Table Note: [Placeholder: Description of emergency generator installations.]]

#### **4.3 Unclassified / Other**

Table 53

Table 54 Component Universe: NA

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE	N

[Table Note: [Placeholder: Description of unclassified or N/A component entries.]]

Table 55

Table 56 Component Universe: TANK UPGRADE

COMPONENT_ATTRIBUTE_CODE	COMPONENT_TYPE
10A	TANK WAS RETROFITTED WITH CATHODIC PROTECTION
10B	TANK WAS RETROFITTED WITH LINING
10C	TANK WAS RETROFITTED WITH RIGID BLADDER (EX. PHOF)

[Table Note: [Placeholder: Description of tank upgrade activities.]]

## 5 Owner & Business Intelligence

This section characterizes facility ownership structure, business model classification, and market segmentation derived from the harmonized facility linkage table.

### 5.1 Business Model Distribution

[Description: Classification of facilities by business category based on owner sector and facility count logic.]

Table 57

Table 58 Facility Counts by Business Category

business_category	N
Unknown/Unclassified	58226
Private Firm - Non-motor fuel seller	10646
Retail Gas (Branded Commercial)	10223
Retail Gas - Single Proprietor	9258
Retail Gas - Multi-property Not Branded	6746
Non-Retail: Fleet Fuel Facility	3341
Publicly Owned	3261

[Table Note: Business categories derived from owner name pattern matching and facility count thresholds. “Publicly Owned” includes government and municipal entities; “Retail Gas (Branded Commercial)” includes major chains.]

## 5.2 Owner Fleet Size Distribution

[Description: Distribution of facilities and tanks across owner size classes.]

Table 59

Table 60Distribution by Owner Fleet Size

Owner_Size_Class	Facilities	Tanks	Pct_Tanks
Unknown/Unlinked	22863	58226	57.3%
Single-Site Owner (Mom & Pop)	3799	18631	18.3%
Large Fleet/Corporate (50+)	2049	10746	10.6%
Small Fleet (2-9)	1510	7913	7.8%
Medium Fleet (10-49)	1114	6185	6.1%

[Table Note: Owner size classification based on facility count per owner: Single-Site (1), Small Fleet (2-9), Medium Fleet (10-49), Large Fleet/Corporate (50+).]

### 5.3 Owner Sector Breakdown

[Description: Top 25 owner sectors by tank count, derived from owner name pattern classification.]

Table 61

Table 62 Top 25 Owner Sectors by Tank Count

final_owner_sector	Facilities	Tanks
Unknown	22863	58226
Private Commercial/Other	3098	16004
Real Estate/Property Mgmt	1703	9437
Major Chain (Sheetz)	313	2126
Major Chain (7-Eleven)	182	1377
Local Govt/Muni	395	1324
State Govt/Agency	189	1011
Major Chain (Sunoco)	153	969
Utility/Energy	179	869
Major Chain (Wawa)	184	843
Major Chain (Speedway)	90	838
Major Chain (Turkey Hill/EG)	215	831
Education/School	168	809
Trucking/Logistics	171	806
Major Chain (United Refining)	140	802
Major Chain (GetGo/Giant)	199	695
Auto Dealership/Repair	128	694
Construction/Development	140	630
Major Chain (Rutters)	81	518
Major Chain (Other Fuel Brand)	81	467
Recreation/Hospitality	89	360
Agriculture	89	360
Utility/Telecom	166	342
Healthcare	58	262
Major Chain (Country Fair)	53	230

[Table Note: Sector classification uses regex pattern matching on owner names to identify major chains, government entities, utilities, and commercial sectors.]

## 5.4 Facility Operational Status

[Description: Aggregate facility-level operational status based on tank closure patterns.]

Table 63

Table 64 Facility Operational Status

facility_status	N	Pct
Fully Closed	24428	78.0%
Mixed Status	4057	12.9%
Fully Active	2850	9.1%

[Table Note: “Fully Active” = all tanks in use; “Fully Closed” = all tanks closed; “Mixed Status” = some active/some closed.]

## 5.5 Owner Size vs Business Model Cross-Tabulation

[Description: Cross-tabulation of owner fleet size against business category to identify structural patterns.]

Table 65

Table 66 Facility Counts: Owner Size vs Business Model

Owner_Size_Class	Non-Retail: Fleet Fuel Facility	Private Firm - Non-motor fuel seller	Publ
Large Fleet/Corporate (50+)	156		3
Medium Fleet (10-49)	151		403
Single-Site Owner (Mom & Pop)	303		1166
Small Fleet (2-9)	174		412
Unknown/Unlinked	0		0

[Table Note: Cell values represent unique facility counts. Useful for identifying which business models are dominated by small vs. large operators.]

## 5.6 Closure Rates by Business Category

[Description: Tank closure rates stratified by business category to identify differential attrition patterns.]

Table 67

Table 68 Tank Closure Rates by Business Category

business_category	Total_Tanks	Closed_Tanks	Active_Tanks	Closure_Rate
Unknown/Unclassified	58226	58226	0	100.0%
Private Firm - Non-motor fuel seller	10646	5152	5494	48.4%
Retail Gas (Branded Commercial)	10223	3372	6851	33.0%
Retail Gas - Single Proprietor	9258	5155	4103	55.7%
Retail Gas - Multi-property Not Branded	6746	3573	3173	53.0%
Non-Retail: Fleet Fuel Facility	3341	2127	1214	63.7%
Publicly Owned	3261	2248	1013	68.9%

[Table Note: Higher closure rates may indicate market exit, consolidation, or infrastructure modernization patterns specific to certain business types.]

## 6 Temporal Evolution & Trends

This section presents visualizations of how tank characteristics, fuel types, and facility attributes have evolved over time. These temporal patterns inform understanding of regulatory compliance trends and infrastructure modernization.

### 6.1 Capacity Distribution

[Description: Overall distribution of tank capacities across the fleet.]

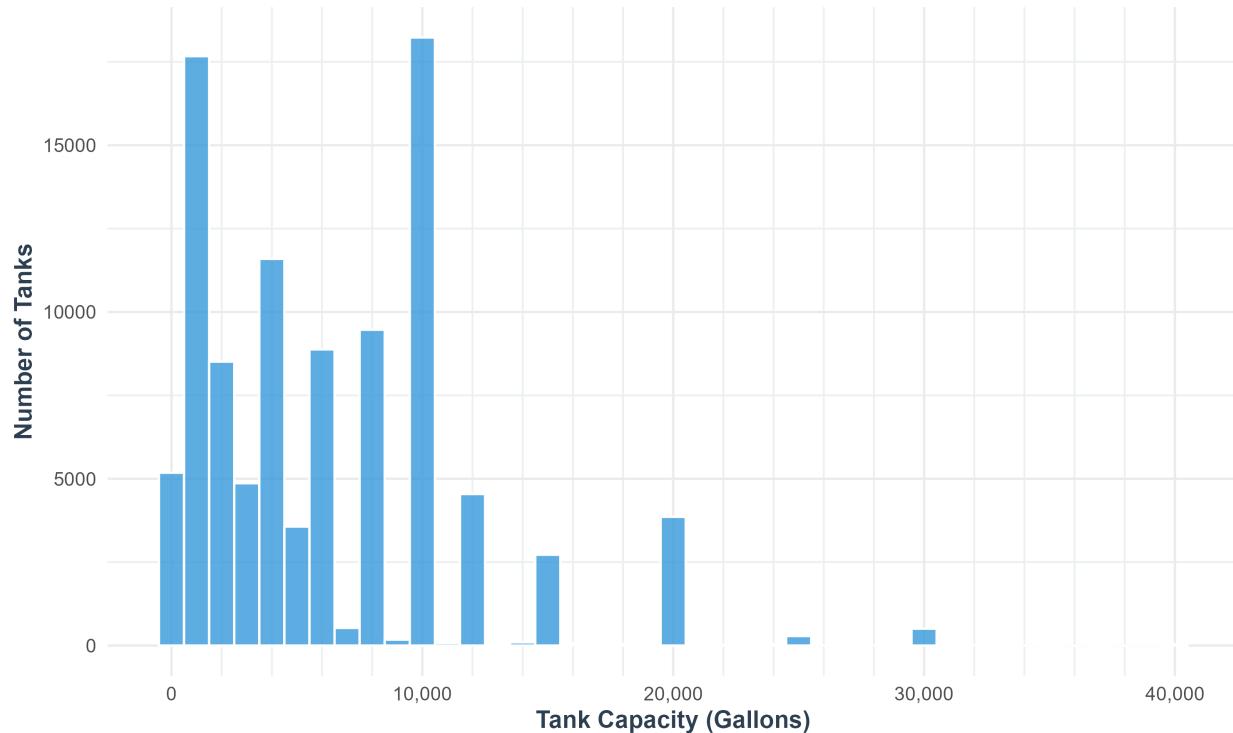


Figure 2: Distribution of Tank Capacities (Gallons)

[Figure Note: Modal peaks at standard capacities (e.g., 10,000, 12,000, 15,000 gallons) indicate industry standardization. Long right tail represents commercial/industrial facilities.]

## 6.2 Capacity Evolution by Decade

[Description: Distribution of tank capacities across installation decades, showing trends in tank sizing over time.]

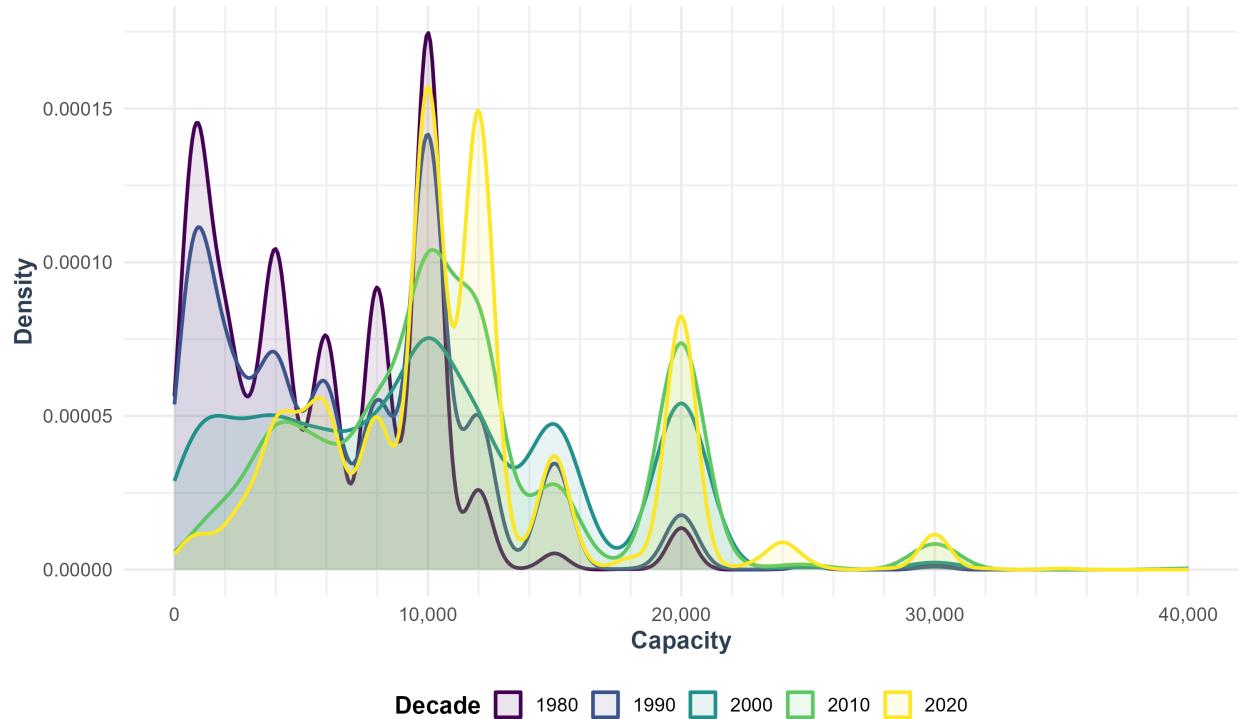


Figure 3: Evolution of Tank Capacity Distribution by Installation Decade

[Figure Note: [Placeholder: Interpretation of capacity trends—have tanks gotten larger over time? Implications for replacement costs and risk assessment.]]

### 6.3 Fuel Mix Evolution

[Description: Temporal shift in the proportion of gasoline, diesel, and other fuel types in new tank installations.]

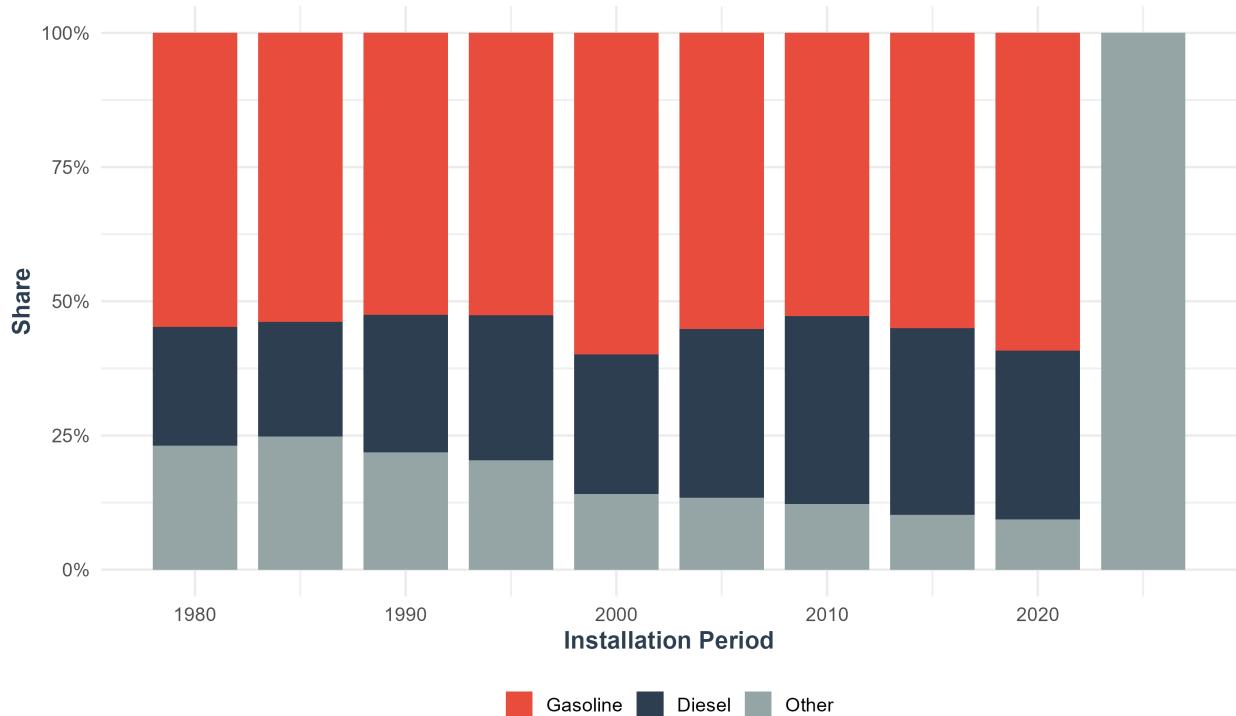


Figure 4: Evolution of Fuel Type Mix in New Installations (5-Year Periods)

[Figure Note: [Placeholder: Analysis of fuel mix shifts—decline in gasoline share? Growth in diesel? Implications for risk profiles and insurance premiums.]]

## 6.4 Tank Lifespan Distribution

[Description: Distribution of tank ages at closure, showing typical service life and identifying outliers.]

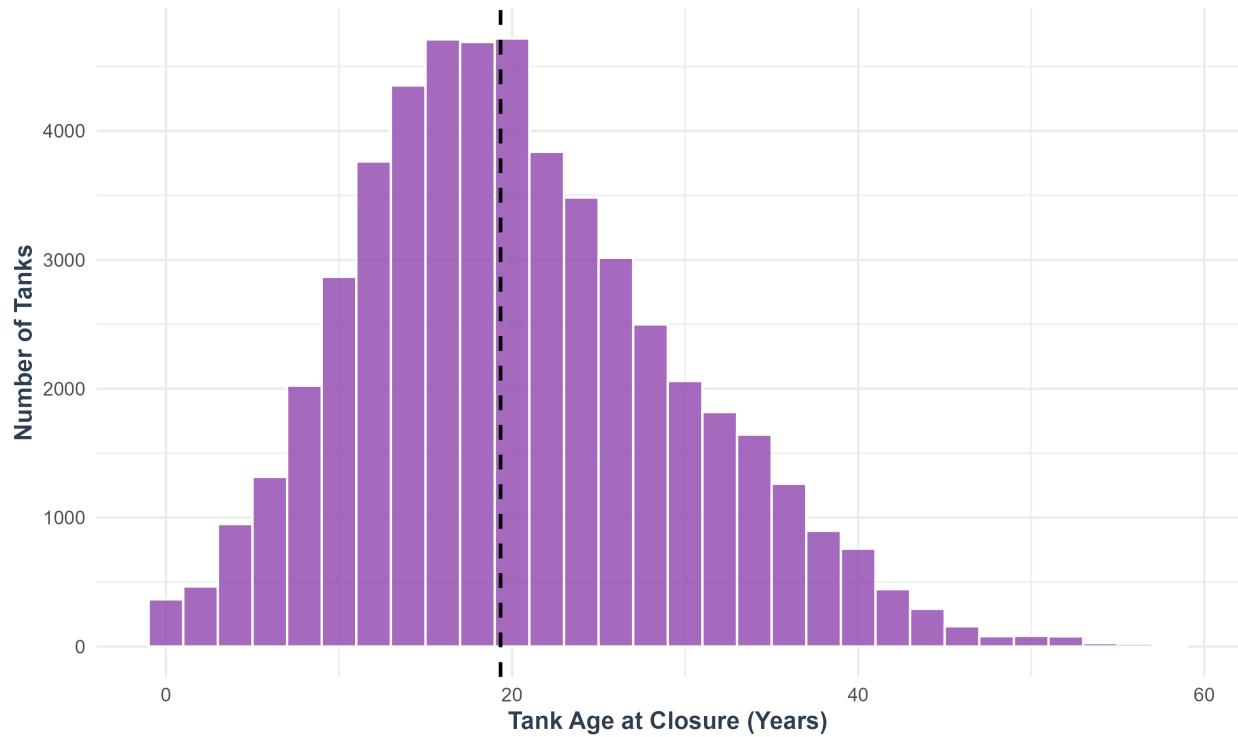


Figure 5: Distribution of Tank Age at Closure

[Figure Note: [Placeholder: Interpretation of lifespan patterns—median age, typical range, and implications for remaining useful life of active tanks.]]

## 7 Facility-Level Intelligence

This section examines facility-level aggregations, including size distributions, survival patterns, and relationships between facility age and complexity.

### 7.1 Facility Size Evolution by Decade

[Description: Distribution of facility sizes (number of tanks per facility) across facility vintage decades.]

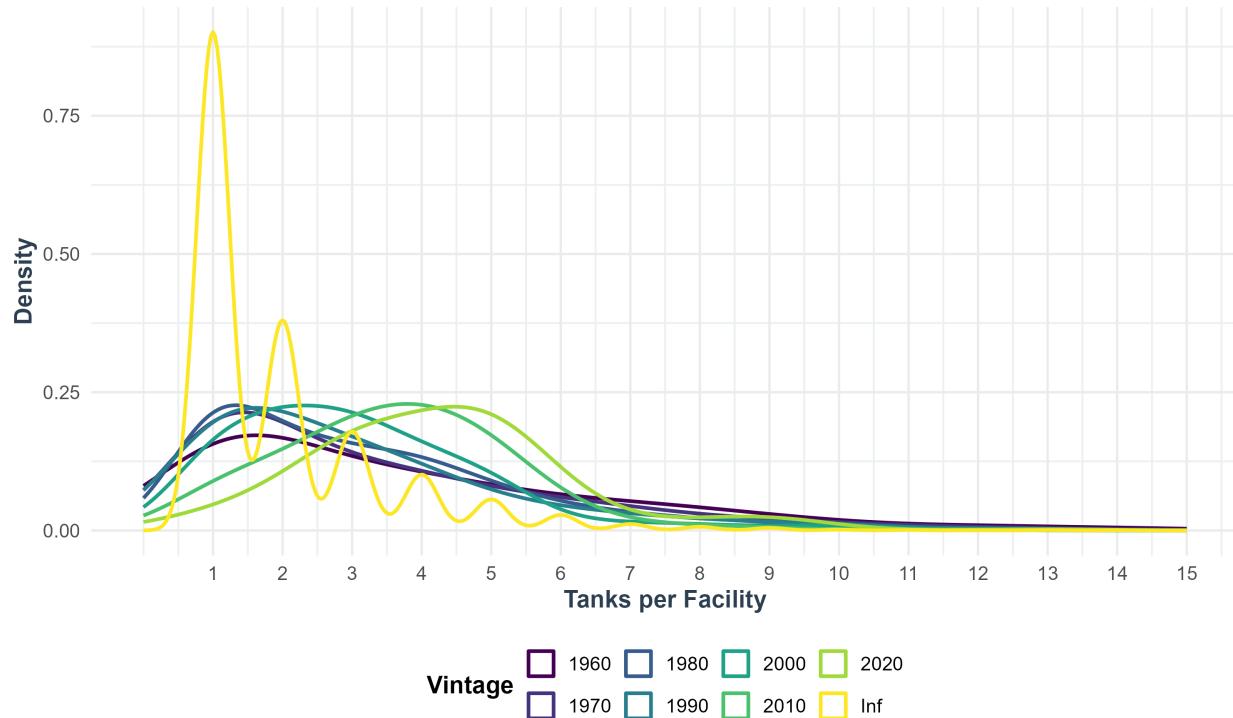


Figure 6: Evolution of Facility Size Distribution by Vintage Decade

[Figure Note: [Placeholder: Interpretation of facility size trends—are newer facilities larger or smaller? Implications for operational complexity and risk concentration.]]

## 7.2 Facility Status by Vintage

[Description: Proportion of facilities in different status categories (Fully Active, Fully Closed, Mixed Status) by vintage decade.]

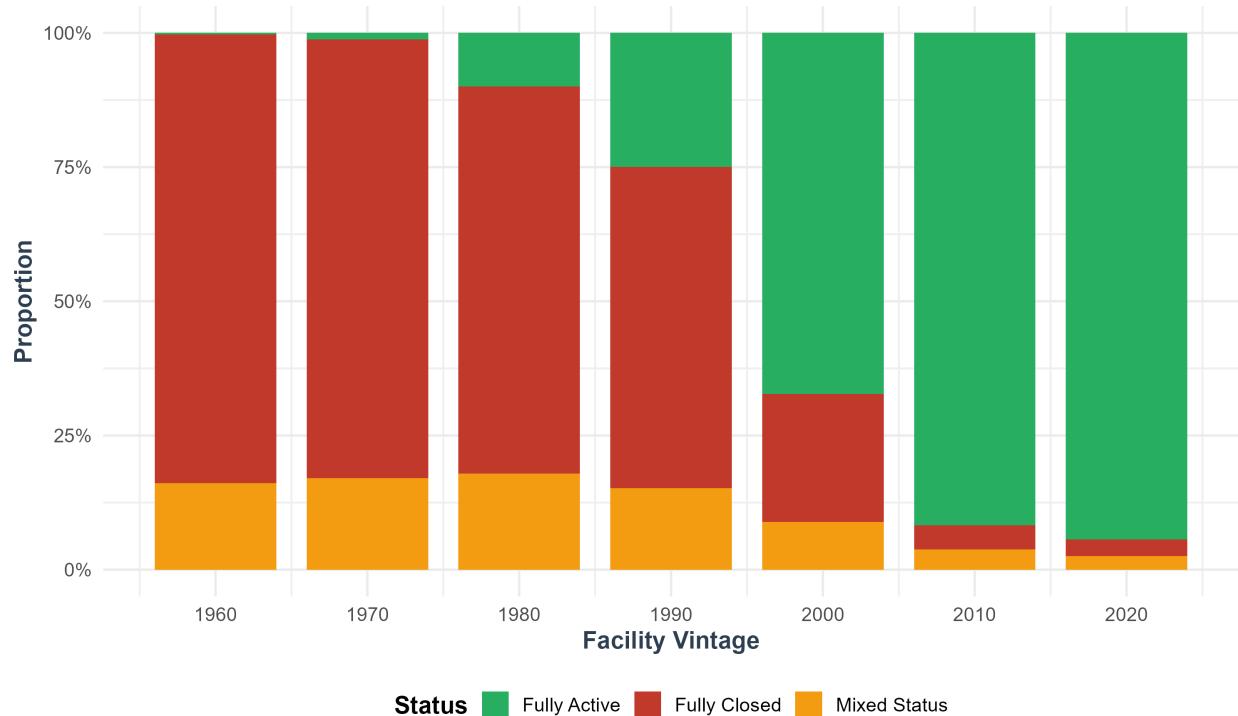


Figure 7: Facility Survival Status by Vintage Decade

[Figure Note: [Placeholder: Analysis of facility survival patterns—do older facilities show higher closure rates? Implications for portfolio risk assessment.]]

### 7.3 Facility Age vs. Size Relationship

[Description: Scatter plot examining the relationship between facility age and number of tanks, with smoothed trend line.]

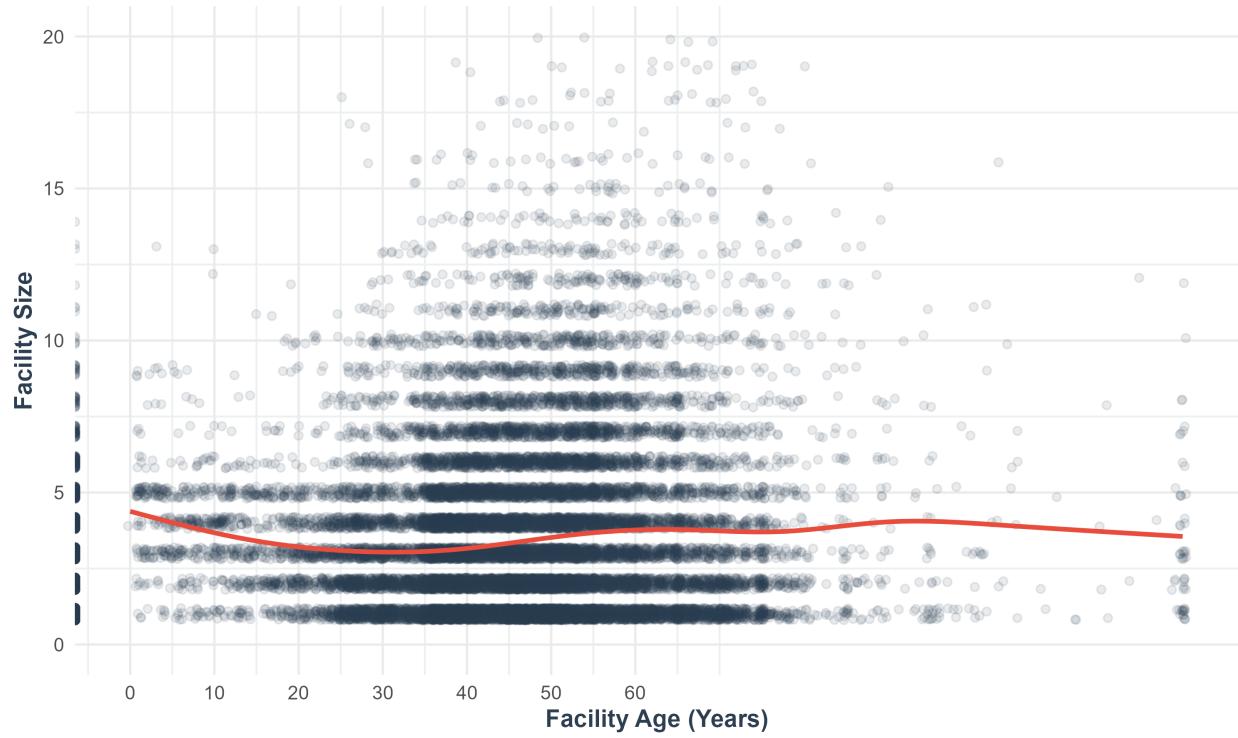


Figure 8: Relationship Between Facility Age and Size

[Figure Note: [Placeholder: Interpretation of age-size relationship—do older facilities tend to be larger? Implications for modernization costs and operational risk.]]

## 8 Fleet Risk & Infrastructure Analytics

This section examines construction-based risk tiers and capacity standardization trends to characterize infrastructure modernization patterns.

### 8.1 Fleet Risk Tier Transition

[Description: Temporal evolution of tank construction risk tiers based on wall construction (single vs. double) and material type.]

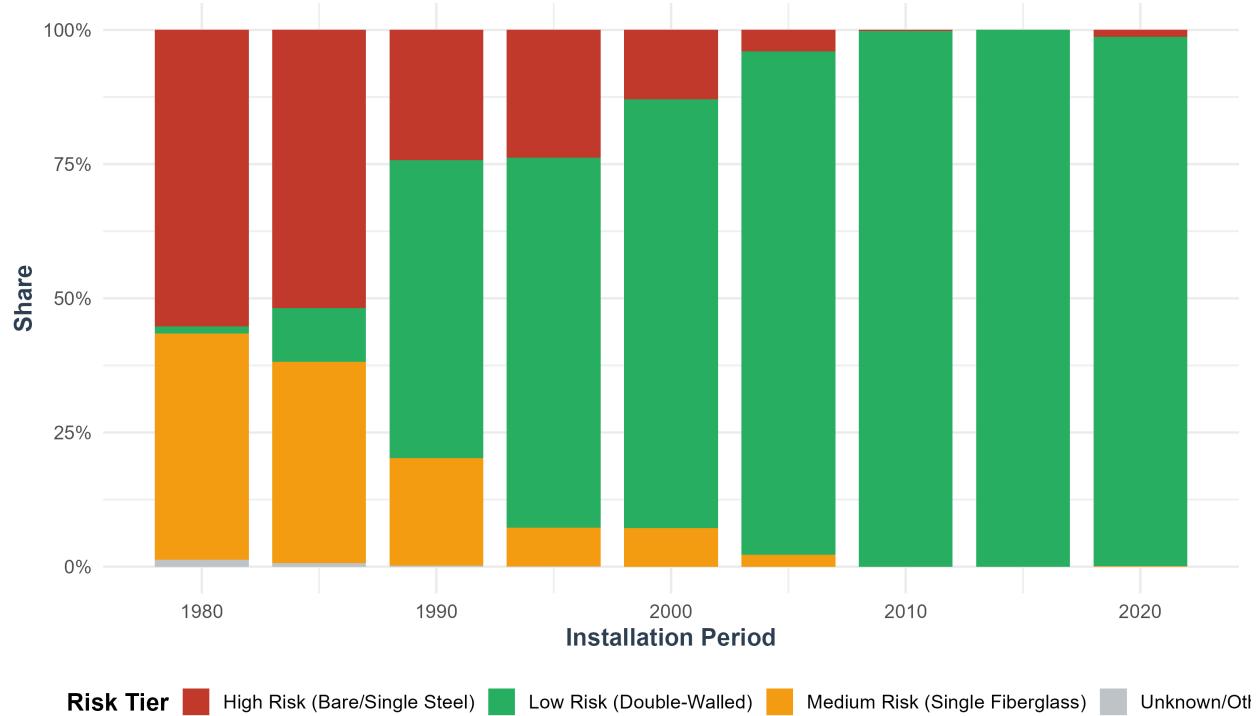


Figure 9: Fleet Risk Tier Transition by Installation Period

[Figure Note: Risk tiers derived from TANK CONSTRUCTION component: “High Risk” = bare/single-wall steel; “Medium Risk” = single-wall fiberglass; “Low Risk” = double-walled or jacketed tanks. Transition toward lower-risk construction reflects regulatory evolution (e.g., 1998 EPA deadline).]

## 8.2 Capacity Standardization Trends

[Description: Installation frequency of standard tank capacities over time, showing market convergence on common sizes.]

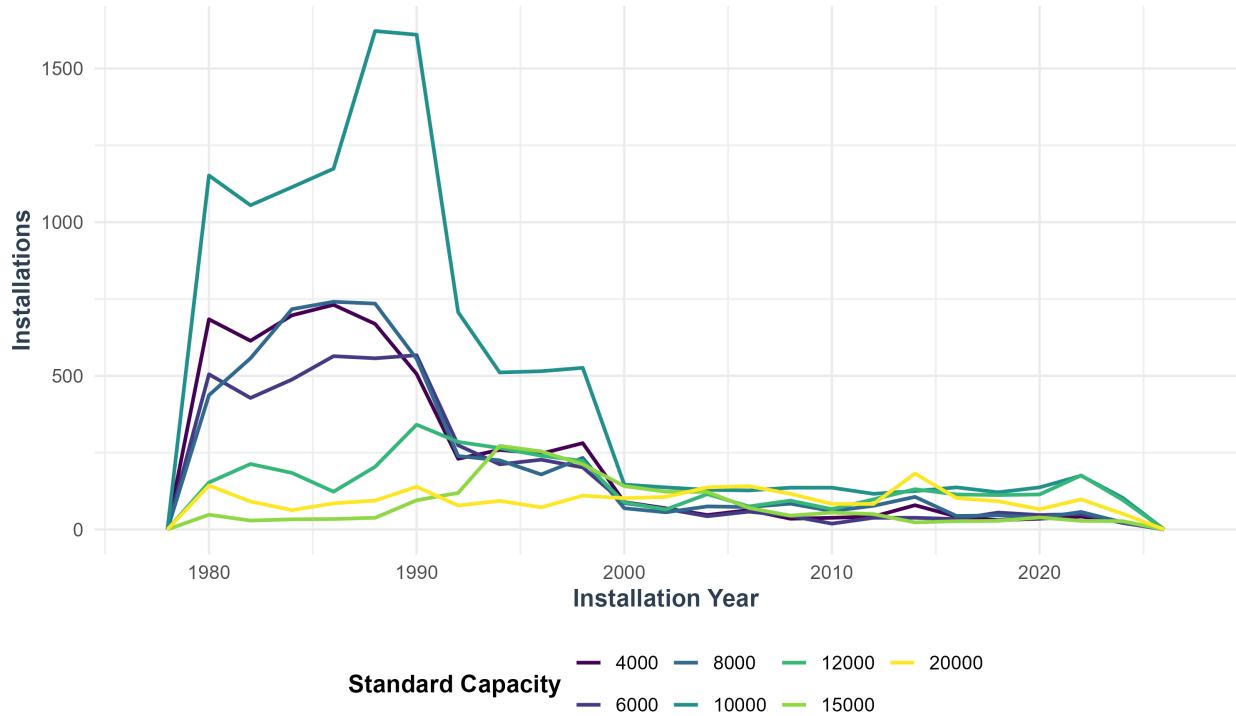


Figure 10: Installation Trends for Standard Tank Capacities (1980+)

[Figure Note: Standard capacities (4000, 6000, 8000, 10000, 12000, 15000, 20000 gallons) shown. Trends indicate market preferences and potential cost efficiencies from standardization.]

## 9 Owner & Market Structure Analytics

This section presents visualizations of ownership patterns, market concentration, and temporal evolution of business categories.

### 9.1 Owner Size Distribution

[Description: Distribution of tank counts across owner size classes.]

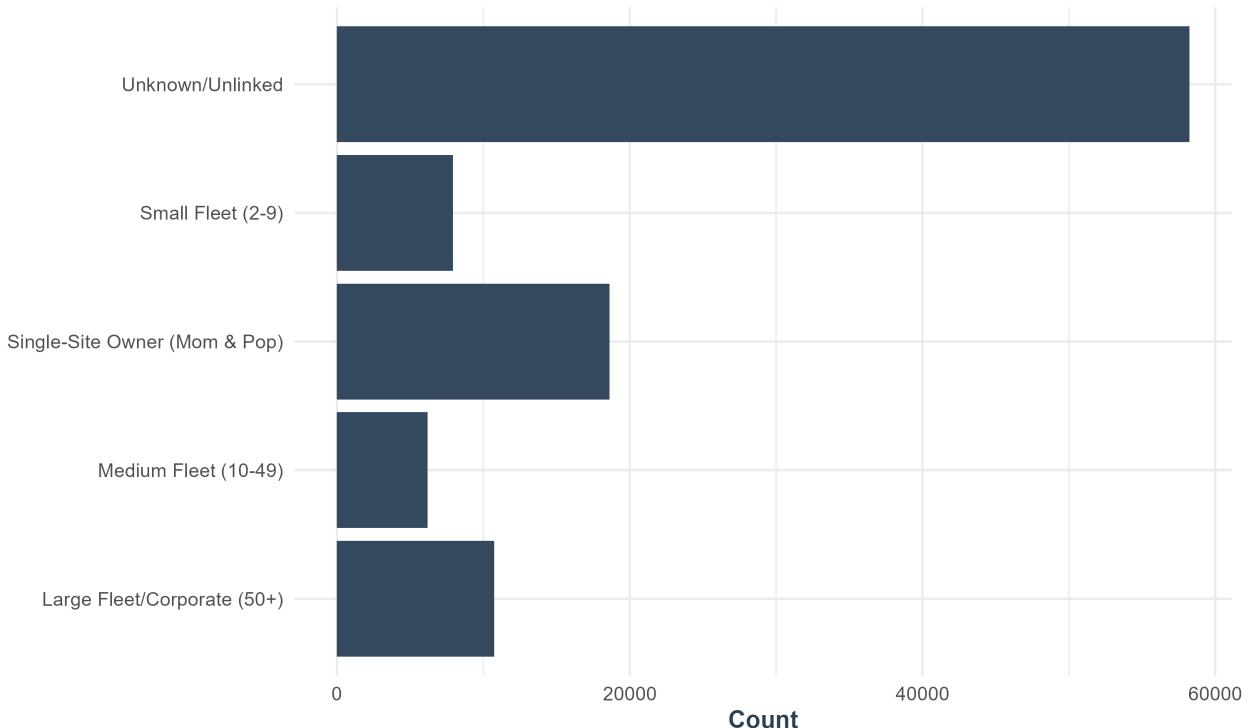


Figure 11: Tank Count Distribution by Owner Size Class

[Figure Note: Horizontal bar chart showing relative market share by owner fleet size. Single-site operators vs. corporate fleet concentration.]

## 9.2 Mom & Pop Sector Breakdown

[Description: Sector distribution within single-site (“Mom & Pop”) owners, showing business type diversity.]

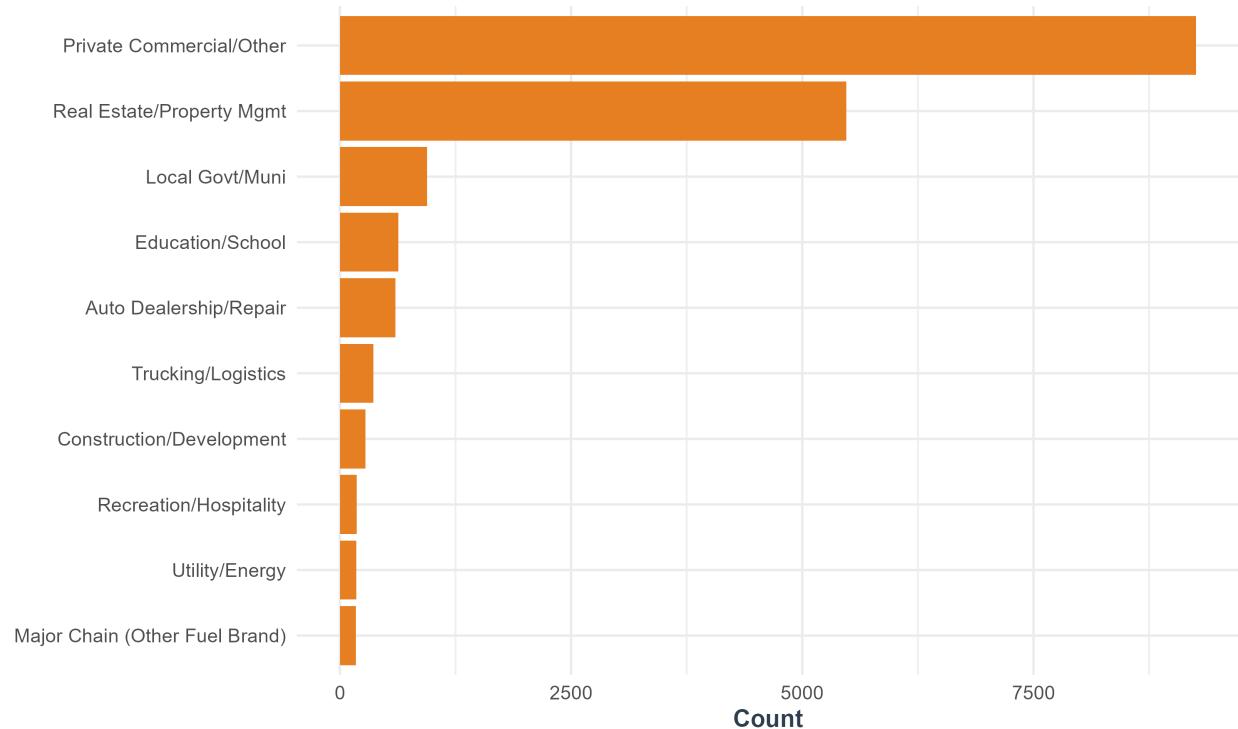


Figure 12: Top 10 Sectors Among Single-Site Owners

[Figure Note: Identifies which business sectors dominate the single-site owner segment—critical for understanding small operator vulnerability to remediation costs.]

### 9.3 Major Chains Market Share

[Description: Tank counts for major retail chains operating in Pennsylvania.]

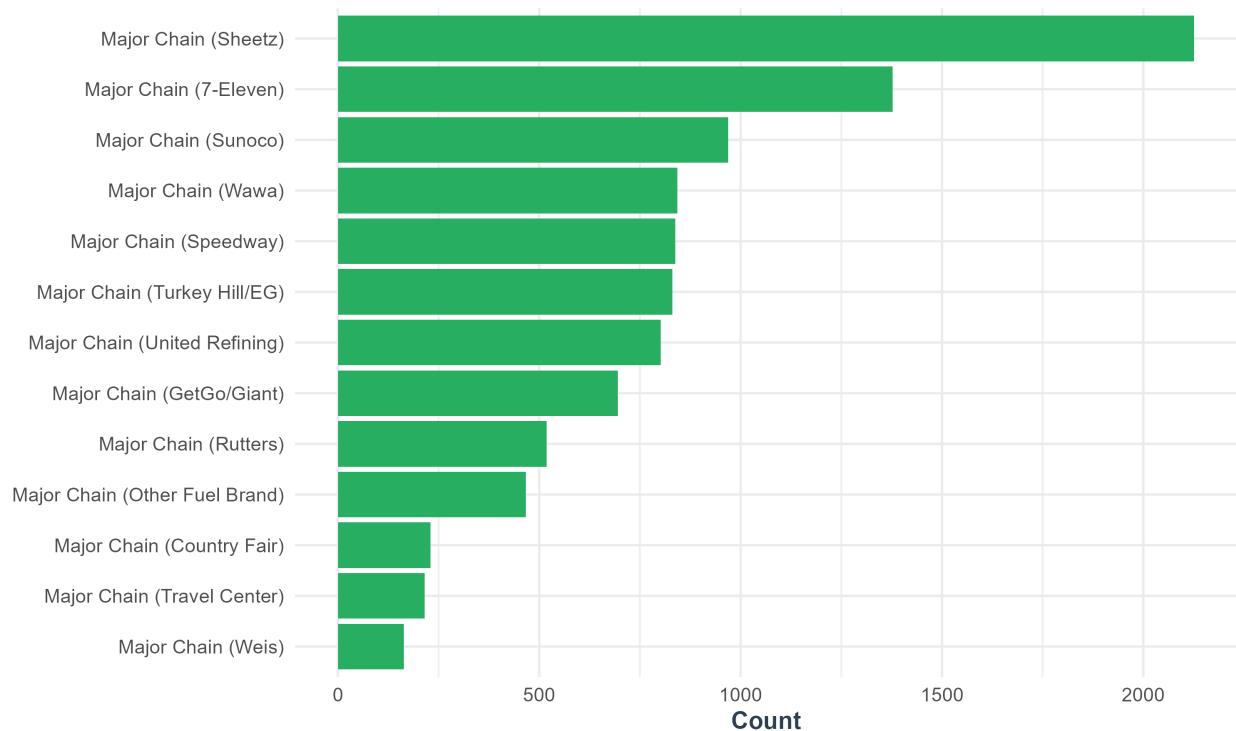


Figure 13: Major Chains Market Share by Tank Count

[Figure Note: Identifies dominant retail fuel chains (Sheetz, Wawa, GetGo, etc.) and their relative infrastructure footprints in Pennsylvania.]

## 9.4 Owner Size Evolution

[Description: Temporal evolution of installation share by owner size class.]

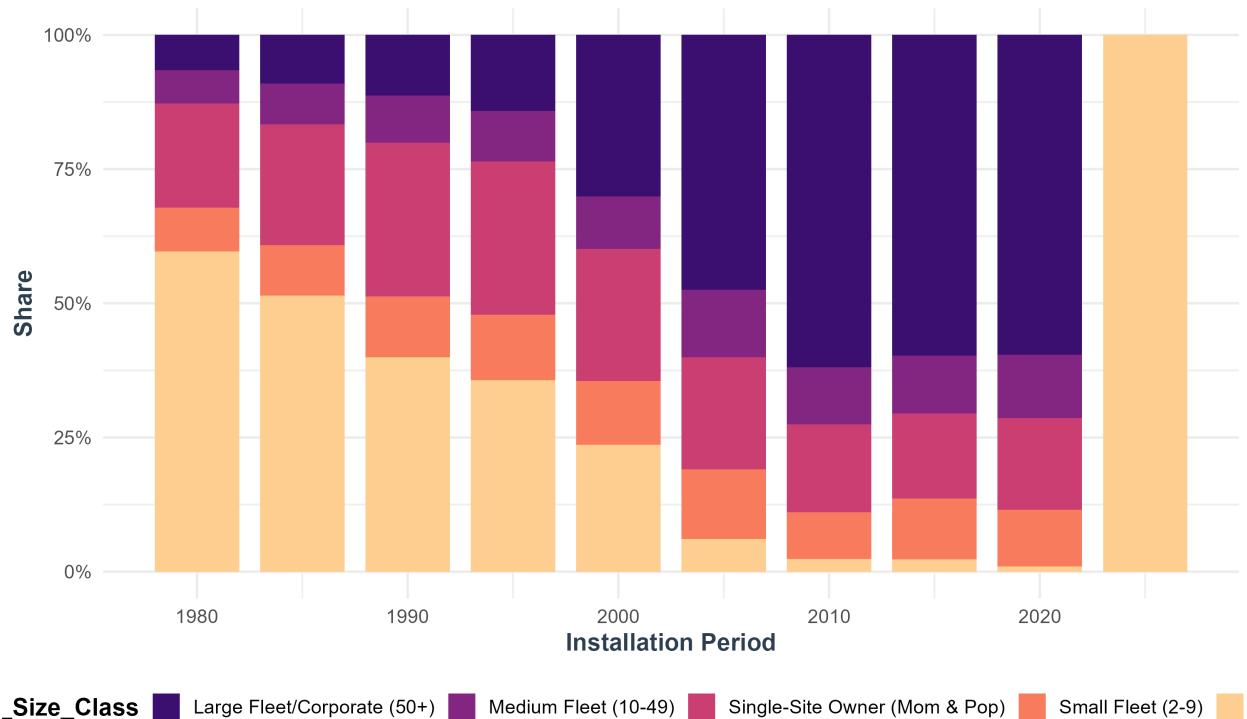


Figure 14: Evolution of Tank Installations by Owner Size Class (5-Year Periods)

[Figure Note: Stacked area showing market consolidation trends—increasing corporate share vs. declining single-site operator share over time.]

## 9.5 Business Category Evolution

[Description: Temporal evolution of installation share by business category classification.]

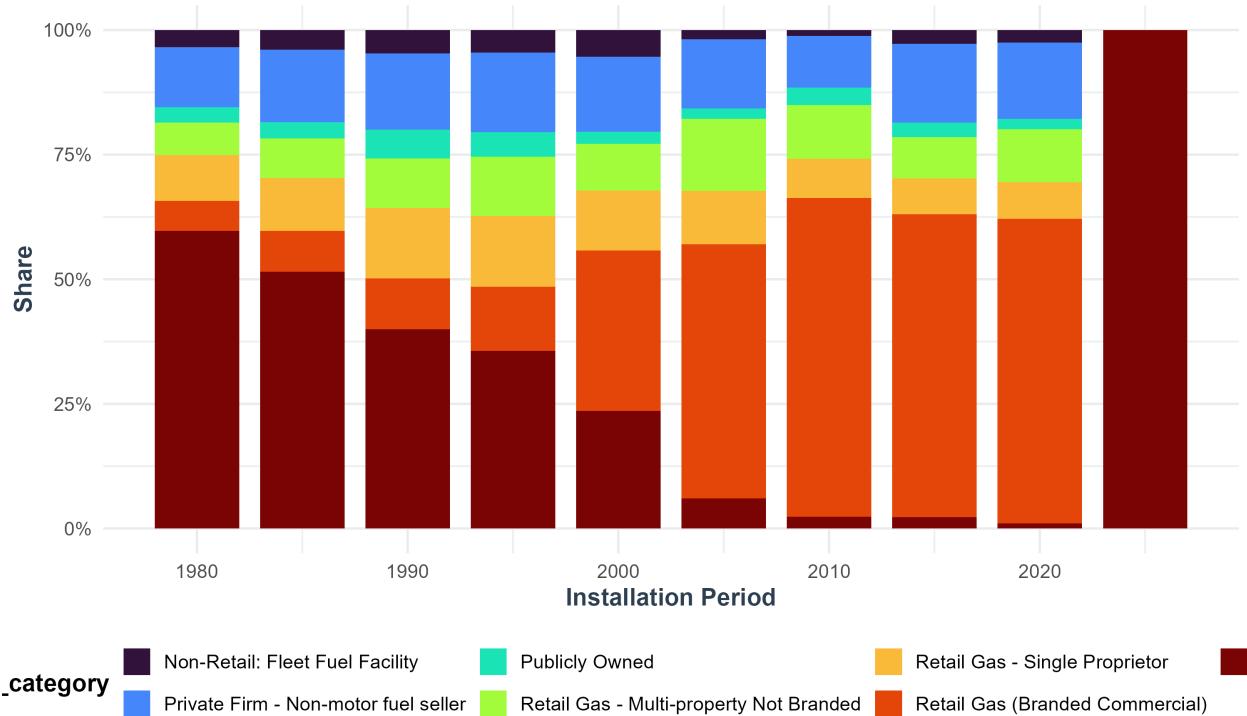


Figure 15: Evolution of Tank Installations by Business Category (5-Year Periods)

[Figure Note: Shows structural shifts in who is installing tanks—retail gas, fleet operations, public sector, etc. Useful for understanding changing composition of USTIF portfolio.]

## 10 Closure Dynamics

This section examines tank closure patterns over time, stratified by facility type.

### 10.1 Tank Closures by Facility Type Timeline

[Description: Annual tank closures by business category, showing differential exit/modernization patterns.]

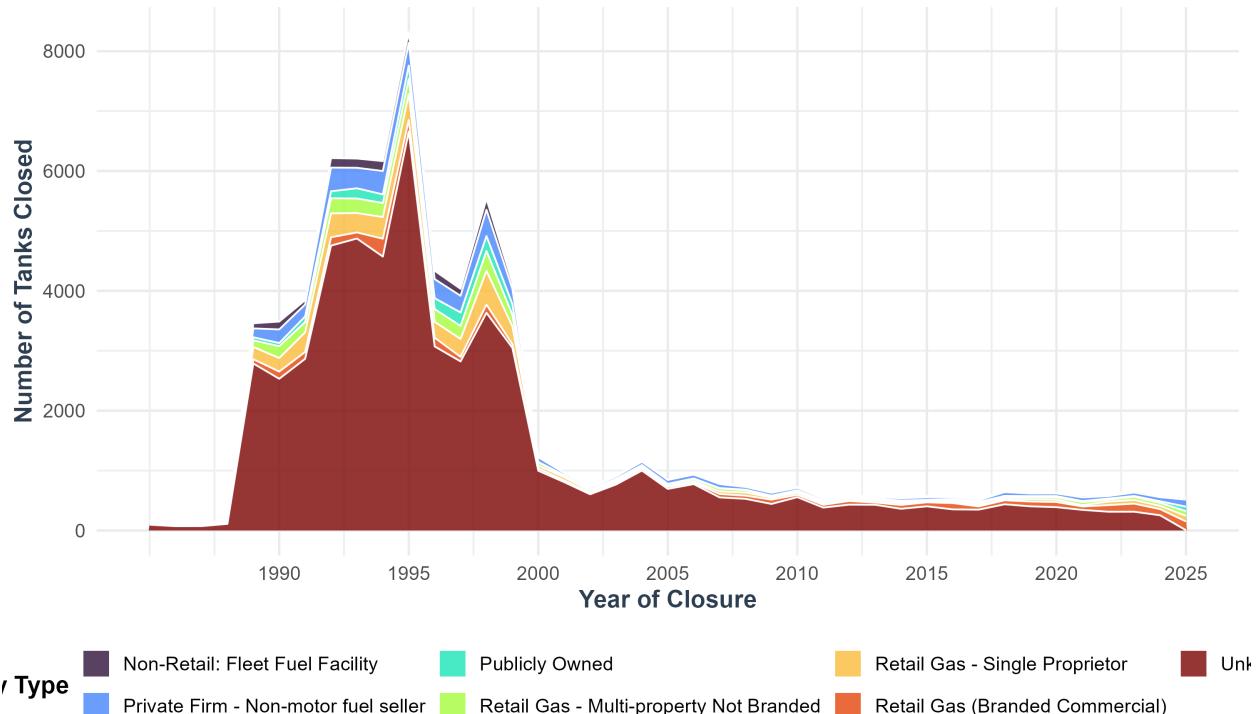


Figure 16: Tank Closures by Facility Type (1985-2025)

[Figure Note: Stacked area chart showing closure volume by business category over time. Peaks may correspond to regulatory deadlines (e.g., 1998 EPA compliance), market consolidation waves, or economic shocks. Useful for understanding historical claim volume drivers.]