

Appendix A

EPA Forms for the Pneumercator TMS 2000 and TMS 3000 Automatic Tank Gauging System

Results of U.S. EPA Standard Evaluation Automatic Tank Gauging System (ATGS)

This form tells whether the automatic tank gauging system (ATGS) described below complies with the performance requirements of the federal underground storage tank regulation. The evaluation was conducted by the equipment manufacturer or a consultant to the manufacturer according to the U.S. EPA's "Standard Test Procedure for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems." The full evaluation report also includes a form describing the method and a form summarizing the test data.

Tank owners using this leak detection system should keep this form on file to provide compliance with the federal regulations. Tank owners should check with State and local agencies to make sure this form satisfies their requirements.

ATGS Description

Name Pneumercator Company Automatic Tank Gauging System

Version number TMS 2000 and TMS 3000

Vendor Pneumercator Company, Inc.

120 Finn Court

(street address)

Farmingdale,

(city)

NY

(state)

11735

(zip)

(516) 293-8450

(phone)

Evaluation Results

This ATGS which declares tank to be leaking when the measured leak rate exceeds the threshold of 0.10 gallon per hour, has a probability of false alarms [P_{FA}] of See Results Attachment %.

The corresponding probability of detection [P_D] of a 0.20 gallon per hour leak is See Results Attachment %.

The minimum water level (threshold) in the tank that the ATGS can detect is 0.488 inches.

The minimum change in water level that can be detected by the ATGS is 0.124 inches (provided that the water level is above the threshold).

Therefore, this ATGS (**X**) does () does not meet the **federal** performance standards established by the U.S. Environmental Protection Agency (0.20 gallon per hour at P_D of 95% and P_{FA} of 5%), and this ATGS (**X**) does () does not meet the **federal** performance standard of measuring water in the bottom of the tank to the nearest 1/8 inch.

Test Conditions During Evaluation

The evaluation testing was conducted in a 13,500 gallon () steel (X) fiberglass tank that was 120 inches in diameter and 323.25 inches in length.

The temperature difference between product added to fill the tank and product already in the tank ranged from -5.5 deg F to +6.6 deg F, with a standard deviation of 5.1 deg F.

The tests were conducted with the tank product levels 50 to 95 % full.

The product used in the evaluation was diesel.

Limitations on the Results

The performance estimates above are only valid when:

- The method has not been substantially changed.
- The vendor's instructions for installing and operating the ATGS are followed.
- The tank contains a product identified on the method description form.
- The tank is no larger than 20,000 gallons.
- The tank is at least 24 inches full.*
- The waiting time after adding any substantial amount of product to the tank is 8 hours.
- The temperature of the added product does not differ more than 7.6 degrees Fahrenheit from that already in the tank.
- The total data collection time for the test is at least See Results Attachment hours.
- Other limitations specified by the vendor or determined during testing:

none

> **Safety disclaimer: This test procedure only addresses the issue of the ATG system's ability to detect leaks. It does not test the equipment for safety hazards.**

Certification of Results

I certify that the ATGS was installed and operated according to the vendor's instructions and that the results presented on this form are those obtained during the evaluation. I also certify that the evaluation was performed according to one of the following:

- standard EPA test procedure for ATGS
 alternative EPA test procedure for ATGS

H. Kendall Wilcox, President
(printed name)

(signature)

July 15, 1997
(date)

Ken Wilcox Associates, Inc.
(organization performing evaluation)

Grain Valley, MO 64029
(city, state, zip)

(816) 795-7997
(phone number)

- The Pneumercator ATGS is capable of measuring temperature compensated volume to a minimum product level equal to the probe length (L) divided by 6 plus 4 inches $[(L/6)+4]$. In the evaluation, a 120 inch probe was used in a 120 inch diameter tank. The corresponding minimum product level is 24 inches. The procedures for determining the minimum product level limitation are specified in a letter from the Automatic Tank Gauge and Volumetric Tank Tightness Testing Committees of the NWGLDE to Gauge Vendors and other interested parties, April 28, 1997.

Results Attachment

Automatic Tank Gauging System (ATGS)

Name and Version of ATGS: Pneumercator TMS 2000 and TMS 3000 ATGS

Date of Evaluation: August 5, 1997 Evaluation

The Pneumercator TMS 2000 and TMS 3000 can be programmed to report results at various time intervals. For this evaluation, the ATGS collected data for 8 hours and reported results for each of the 8 hours. The probability of detection P_D and the probability of false alarm P_{FA} for Monthly Monitoring for 2, 4, and 8 hour tests have been calculated and the results have been reported below in Table 1.

Table 1. Results for the Pneumercator TMS 2000 and TMS 3000 for 2, 4, and 8 hours.

Threshold 0.10 gal/hr
Post Delivery Time 8 hours
Maximum Tank Size 20,000 gallons

<u>Test Time</u>	<u>Probability of Detection (P_D)</u>	<u>Probability of False Alarm (P_{FA})</u>
2 hours	95.0 %	5.0 %
4 hours	99.8 %	0.2 %
8 hours	99.9 %	0.1 %

The P_D and P_{FA} for the 2, 4, and 8 hour tests exceed the EPA requirements for Monthly Monitoring.

Reporting Form for Leak Rate Data Automatic Tank Gauging System (ATGS)

ATGS Name and Version: Pneumercator Company ATGS Models TMS 2000 and TMS 3000

Evaluation Period: from 17-Jun-97 to 04-July-97 (Dates)

Test No.	Date at Completion of Last Fill (d-m-y)	Time at Completion of Last Fill (military)	Date Test Began (d-m-y)	Time Test Began (military)	Time Test Ended (military)	Product Temperature Differential (deg F)	Nominal Leak Rate (gal/h)	Induced Leak Rate (gal/h)	Measured Leak Rate (gal/h)	Meas.-Ind. Leak Rate (gal/h)
1	17-Jun-97	18:10	18-Jun-97	02:10	04:15	-5.5	0	0	0.025	0.025
2	17-Jun-97	18:10	18-Jun-97	11:00	13:05	-5.5	-0.1	-0.148	-0.385	-0.237
3	18-Jun-97	21:30	19-Jun-97	07:45	09:49	-5.5	-0.2	-0.168	-0.208	-0.040
4	18-Jun-97	21:30	19-Jun-97	17:10	19:13	-5.5	-0.3	-0.261	-0.281	-0.020
5	20-Jun-97	08:40	20-Jun-97	16:40	18:44	6.6	0	0	-0.018	-0.018
6	20-Jun-97	08:40	21-Jun-97	01:00	03:05	6.6	-0.2	-0.198	-0.160	0.038
7	21-Jun-97	10:05	21-Jun-97	18:05	20:09	6.6	-0.1	-0.083	-0.034	0.049
8	21-Jun-97	10:05	22-Jun-97	03:00	05:05	6.6	-0.3	-0.322	-0.289	0.033
9	24-Jun-97	13:15	24-Jun-97	21:15	23:20	-0.3	-0.2	-0.191	-0.172	0.019
10	24-Jun-97	13:15	25-Jun-97	09:00	11:05	-0.3	0	0	-0.060	-0.060
11	25-Jun-97	17:20	26-Jun-97	20:00	22:03	-0.3	-0.2	-0.292	-0.317	-0.025
12	25-Jun-97	17:20	27-Jun-97	05:00	07:04	-0.3	-0.2	-0.198	-0.166	0.032
13	27-Jun-97	15:50	27-Jun-97	23:50	01:55	5.2	-0.1	-0.103	-0.112	-0.009
14	27-Jun-97	15:50	28-Jun-97	18:30	20:35	5.2	-0.3	-0.313	-0.283	0.030
15	29-Jun-97	06:40	29-Jun-97	15:25	17:29	5.2	-0.2	-0.19	-0.215	-0.025
16	29-Jun-97	06:40	30-Jun-97	08:55	10:59	5.2	0	0	0.000	0.000
17	30-Jun-97	17:56	01-Jul-97	01:56	04:01	0.9	0	0	-0.005	-0.005
18	30-Jun-97	17:56	01-Jul-97	19:00	21:05	0.9	-0.3	-0.285	-0.253	0.032
19	02-Jul-97	09:26	02-Jul-97	13:26	15:30	0.9	-0.1	-0.084	-0.090	-0.006
20	02-Jul-97	09:26	02-Jul-97	22:00	00:04	0.9	-0.1	-0.115	-0.058	0.057
21	03-Jul-97	10:32	03-Jul-97	18:32	20:37	-5.3	-0.3	-0.314	-0.306	0.008
22	03-Jul-97	10:32	04-Jul-97	05:00	07:05	-5.3	-0.1	-0.0995	-0.129	-0.0295
23	04-Jul-97	14:00	04-Jul-97	21:00	23:04	-5.3	-0.2	-0.21	-0.164	0.046
24	04-Jul-97	14:00	05-Jul-97	08:00	10:04	-5.3	0	0	0.014	0.014

Reporting Form for Leak Rate Data Automatic Tank Gauging System (ATGS)

ATGS Name and Version: Pneumercator Company ATGS Models TMS 2000 and TMS 3000

Evaluation Period: from 17-Jun-97 to 04-July-97 (Dates)

Test No.	Date at Completion of Last Fill (d-m-y)	Time at Completion of Last Fill (military)	Date Test Began (d-m-y)	Time Test Began (military)	Time Test Ended (military)	Product Temperature Differential (deg F)	Nominal Leak Rate (gal/h)	Induced Leak Rate (gal/h)	Measured Leak Rate (gal/h)	Meas.-Ind. Leak Rate (gal/h)
1	17-Jun-97	18:10	18-Jun-97	02:10	06:15	-5.5	0	0	0.007	0.007
2	17-Jun-97	18:10	18-Jun-97	11:00	15:05	-5.5	-0.1	-0.148	-0.164	-0.016
3	18-Jun-97	21:30	19-Jun-97	07:45	11:49	-5.5	-0.2	-0.168	-0.185	-0.017
4	18-Jun-97	21:30	19-Jun-97	17:10	21:13	-5.5	-0.3	-0.261	-0.308	-0.047
5	20-Jun-97	08:40	20-Jun-97	16:40	20:44	6.6	0	0	0.000	0.000
6	20-Jun-97	08:40	21-Jun-97	01:00	05:05	6.6	-0.2	-0.198	-0.163	0.035
7	21-Jun-97	10:05	21-Jun-97	18:05	22:09	6.6	-0.1	-0.083	-0.039	0.044
8	21-Jun-97	10:05	22-Jun-97	03:00	07:05	6.6	-0.3	-0.322	-0.301	0.021
9	24-Jun-97	13:15	24-Jun-97	21:15	01:20	-0.3	-0.2	-0.191	-0.209	-0.018
10	24-Jun-97	13:15	25-Jun-97	09:00	13:05	-0.3	0	0	-0.067	-0.067
11	25-Jun-97	17:20	26-Jun-97	20:00	00:03	-0.3	-0.2	-0.292	-0.330	-0.038
12	25-Jun-97	17:20	27-Jun-97	05:00	09:04	-0.3	-0.2	-0.198	-0.176	0.022
13	27-Jun-97	15:50	27-Jun-97	23:50	03:55	5.2	-0.1	-0.103	-0.119	-0.016
14	27-Jun-97	15:50	28-Jun-97	18:30	22:35	5.2	-0.3	-0.313	-0.281	0.032
15	29-Jun-97	06:40	29-Jun-97	15:25	19:29	5.2	-0.2	-0.19	-0.204	-0.014
16	29-Jun-97	06:40	30-Jun-97	08:55	12:59	5.2	0	0	0.001	0.001
17	30-Jun-97	17:56	01-Jul-97	01:56	06:01	0.9	0	0	-0.009	-0.009
18	30-Jun-97	17:56	01-Jul-97	19:00	23:05	0.9	-0.3	-0.285	-0.266	0.019
19	02-Jul-97	09:26	02-Jul-97	13:26	17:30	0.9	-0.1	-0.084	-0.103	-0.019
20	02-Jul-97	09:26	02-Jul-97	22:00	02:04	0.9	-0.1	-0.115	-0.060	0.055
21	03-Jul-97	10:32	03-Jul-97	18:32	22:37	-5.3	-0.3	-0.314	-0.299	0.015
22	03-Jul-97	10:32	04-Jul-97	05:00	09:05	-5.3	-0.1	-0.0995	-0.128	-0.0285
23	04-Jul-97	14:00	04-Jul-97	21:00	01:04	-5.3	-0.2	-0.21	-0.171	0.039
24	04-Jul-97	14:00	05-Jul-97	08:00	12:04	-5.3	0	0	0.016	0.016

Reporting Form for Leak Rate Data Automatic Tank Gauging System (ATGS)

ATGS Name and Version: Pneumercator Company ATGS Models TMS 2000 and TMS 3000

Evaluation Period: from 17-Jun-97 to 04-July-97 (Dates)

Test No.	Date at Completion of Last Fill (d-m-y)	Time at Completion of Last Fill (military)	Date Test Began (d-m-y)	Time Test Began (military)	Time Test Ended (military)	Product Temperature Differential (deg F)	Nominal Leak Rate (gal/h)	Induced Leak Rate (gal/h)	Measured Leak Rate (gal/h)	Meas.-Ind. Leak Rate (gal/h)
1	17-Jun-97	18:10	18-Jun-97	02:10	10:15	-5.5	0	0	-0.023	-0.023
2	17-Jun-97	18:10	18-Jun-97	11:00	19:05	-5.5	-0.1	-0.148	-0.129	0.019
3	18-Jun-97	21:30	19-Jun-97	07:45	15:49	-5.5	-0.2	-0.168	-0.193	-0.025
4	18-Jun-97	21:30	19-Jun-97	17:10	01:13	-5.5	-0.3	-0.261	-0.318	-0.057
5	20-Jun-97	08:40	20-Jun-97	16:40	00:44	6.6	0	0	0.007	0.007
6	20-Jun-97	08:40	21-Jun-97	01:00	09:05	6.6	-0.2	-0.198	-0.191	0.007
7	21-Jun-97	10:05	21-Jun-97	18:05	02:09	6.6	-0.1	-0.083	-0.049	0.034
8	21-Jun-97	10:05	22-Jun-97	03:00	11:05	6.6	-0.3	-0.322	-0.316	0.006
9	24-Jun-97	13:15	24-Jun-97	21:15	05:20	-0.3	-0.2	-0.191	-0.215	-0.024
10	24-Jun-97	13:15	25-Jun-97	09:00	17:05	-0.3	0	0	-0.055	-0.055
11	25-Jun-97	17:20	26-Jun-97	20:00	04:03	-0.3	-0.2	-0.292	-0.299	-0.007
12	25-Jun-97	17:20	27-Jun-97	05:00	13:04	-0.3	-0.2	-0.198	-0.203	-0.005
13	27-Jun-97	15:50	27-Jun-97	23:50	07:55	5.2	-0.1	-0.103	-0.128	-0.025
14	27-Jun-97	15:50	28-Jun-97	18:30	02:35	5.2	-0.3	-0.313	-0.295	0.018
15	29-Jun-97	06:40	29-Jun-97	15:25	23:29	5.2	-0.2	-0.19	-0.201	-0.011
16	29-Jun-97	06:40	30-Jun-97	08:55	16:59	5.2	0	0	-0.028	-0.028
17	30-Jun-97	17:56	01-Jul-97	01:56	10:01	0.9	0	0	-0.023	-0.023
18	30-Jun-97	17:56	01-Jul-97	19:00	03:05	0.9	-0.3	-0.285	-0.302	-0.017
19	02-Jul-97	09:26	02-Jul-97	13:26	21:30	0.9	-0.1	-0.084	-0.111	-0.027
20	02-Jul-97	09:26	02-Jul-97	22:00	06:04	0.9	-0.1	-0.115	-0.074	0.041
21	03-Jul-97	10:32	03-Jul-97	18:32	02:37	-5.3	-0.3	-0.314	-0.314	0
22	03-Jul-97	10:32	04-Jul-97	05:00	13:05	-5.3	-0.1	-0.0995	-0.139	-0.0395
23	04-Jul-97	14:00	04-Jul-97	21:00	05:04	-5.3	-0.2	-0.21	-0.174	0.036
24	04-Jul-97	14:00	05-Jul-97	08:00	16:04	-5.3	0	0	0.003	0.003

**Results of U.S. EPA Standard Evaluation
Automatic Tank Gauging System (ATGS)
for Annual Tank Tightness Testing (0.1 gal/hr leak detection)**

This form tells whether the automatic tank gauging system (ATGS) described below complies with the performance requirements of the federal underground storage tank regulation. The evaluation was conducted by the equipment manufacturer or a consultant to the manufacturer according to the U.S. EPA's "Standard Test Procedure for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems." The full evaluation report also includes a form describing the method and a form summarizing the test data.

Tank owners using this leak detection system should keep this form on file to provide compliance with the federal regulations. Tank owners should check with State and local agencies to make sure this form satisfies their requirements.

ATGS Description

Name Pneumercator Company Automatic Tank Gauging System

Version number TMS 2000 and TMS 3000

Vendor Pneumercator Company, Inc.

120 Finn Court
(street address)

Farmingdale, NY 11735 (516) 293-8450
(city) (state) (zip) (phone)

Evaluation Results

This ATGS which declares tank to be leaking when the measured leak rate exceeds the threshold of 0.05 gallon per hour, has a probability of false alarms [P_{FA}] of See Results Attachment %.

The corresponding probability of detection [P_D] of a 0.20 gallon per hour leak is See Results Attachment %.

The minimum water level (threshold) in the tank that the ATGS can detect is 0.488 inches.

The minimum change in water level that can be detected by the ATGS is 0.124 inches (provided that the water level is above the threshold).

Therefore, this ATGS (**X**) does () does not meet the **federal** performance standards established by the U.S. Environmental Protection Agency (0.20 gallon per hour at P_D of 95% and P_{FA} of 5%), and this ATGS (**X**) does () does not meet the **federal** performance standard of measuring water in the bottom of the tank to the nearest 1/8 inch.

Test Conditions During Evaluation

The evaluation testing was conducted in a 13,500 gallon () steel (X) fiberglass tank that was 120 inches in diameter and 323.25 inches deep.

The temperature difference between product added to fill the tank and product already in the tank ranged from -5.5 deg F to +6.6 deg F, with a standard deviation of 5.1 deg F.

The tests were conducted with the tank product levels 50 to 95 % full.

The product used in the evaluation was diesel.

Limitations on the Results

The performance estimates above are only valid when:

- The method has not been substantially changed.
- The vendor's instructions for installing and operating the ATGS are followed.
- The tank contains a product identified on the method description form.
- The tank is no larger than 20,000 gallons.
- The tank is at least 24 inches full.*
- The waiting time after adding any substantial amount of product to the tank is 8 hours.
- The temperature of the added product does not differ more than 7.6 degrees Fahrenheit from that already in the tank.
- The total data collection time for the test is at least See Results Attachment hours.
- Other limitations specified by the vendor or determined during testing:

none

> **Safety disclaimer: This test procedure only addresses the issue of the ATG system's ability to detect leaks. It does not test the equipment for safety hazards.**

Certification of Results

I certify that the ATGS was installed and operated according to the vendor's instructions and that the results presented on this form are those obtained during the evaluation. I also certify that the evaluation was performed according to one of the following:

- standard EPA test procedure for ATGS
 alternative EPA test procedure for ATGS

H. Kendall Wilcox, President
(printed name)

(signature)

August 5, 1997
(date)

Ken Wilcox Associates, Inc.
(organization performing evaluation)

Grain Valley, MO 64029
(city, state, zip)

(816) 795-7997
(phone number)

- The Pneumercator ATGS is capable of measuring temperature compensated volume to a minimum product level equal to the probe length (L) divided by 6 plus 4 inches $[(L/6)+4]$. In the evaluation, a 120 inch probe was used in a 120 inch diameter tank. The corresponding minimum product level is 24 inches. The procedures for determining the minimum product level limitation are specified in a letter from the Automatic Tank Gauge and Volumetric Tank Tightness Testing Committees of the NWGLDE to Gauge Vendors and other interested parties, April 28, 1997.

Results Attachment
Automatic Tank Gauging System (ATGS)
for Annual Tank Tightness Testing (0.1 gal/hr leak detection)

Name and Version of ATGS: Pneumercator TMS 2000 and TMS 3000 ATGS

Date of Evaluation: August 5, 1997 Evaluation

The Pneumercator TMS 2000 and TMS 3000 can be programmed to report results at various time intervals. For this evaluation, the ATGS collected data for 8 hours and reported results for each of the 8 hours. The probability of detection P_D and the probability of false alarm P_{FA} for Annual Tank Tightness Testing for 7 hour and 8 hour tests have been calculated and the results have been reported below in Table 1.

Table 1. Results for the Pneumercator TMS 2000 and TMS 3000 for 7 and 8 hour tests.

Threshold 0.05 gal/hr
Post Delivery Time 8 hours
Maximum Tank Size 20,000 gallons

<u>Test Time</u>	<u>Probability of Detection (P_D)</u>	<u>Probability of False Alarm (P_{FA})</u>
7 hours	95.3 %	4.7 %
8 hours	95.8 %	4.2 %

The P_D and P_{FA} for the 7 and 8 hour tests exceeds the National Work Group on Leak Detection requirements for ATGS's capable of detecting a 0.1 gal/h leak.¹

¹ The National Work Group for Leak Detection Evaluations consists of a group of State and Federal Regulators that review leak detection evaluations, new evaluation protocols, and other issues affecting the leak detection and underground storage tank industry.

**Reporting Form for Leak Rate Data
Automatic Tank Gauging System (ATGS)
for Annual Tank Tightness Testing (0.1 gal/hr leak detection)**

ATGS Name and Version: Pneumercator Company ATGS Models TMS 2000 and TMS 3000

Evaluation Period: from 17-Jun-97 to 11-July-97 (Dates)

Test No.	Date at Completion of Last Fill (d-m-y)	Time at Completion of Last Fill (military)	Date Test Began (d-m-y)	Time Test Began (military)	Time Test Ended (military)	Product Temperature Differential (deg F)	Nominal Leak Rate (gal/h)	Induced Leak Rate (gal/h)	Measured Leak Rate (gal/h)	Meas.-Ind. Leak Rate (gal/h)
1	17-Jun-97	18:10	18-Jun-97	02:10	09:15	-5.5	0	0	-0.018	-0.018
2	17-Jun-97	18:10	18-Jun-97	11:00	18:05	-5.5	-0.1	-0.148	-0.130	0.018
3	18-Jun-97	21:30	19-Jun-97	07:45	14:49	-5.5	-0.2	-0.168	-0.178	-0.010
4	18-Jun-97	21:30	19-Jun-97	17:10	00:13	-5.5	-0.3	-0.261	-0.316	-0.055
5	20-Jun-97	08:40	20-Jun-97	16:40	23:44	6.6	0	0	0.005	0.005
6	20-Jun-97	08:40	21-Jun-97	01:00	08:05	6.6	-0.2	-0.198	-0.184	0.014
7	21-Jun-97	10:05	21-Jun-97	18:05	01:09	6.6	-0.1	-0.083	-0.048	0.035
8	21-Jun-97	10:05	22-Jun-97	03:00	10:05	6.6	-0.3	-0.322	-0.315	0.007
9	24-Jun-97	13:15	24-Jun-97	21:15	04:20	-0.3	-0.2	-0.191	-0.211	-0.020
10	24-Jun-97	13:15	25-Jun-97	09:00	16:05	-0.3	0	0	-0.065	-0.065
11	25-Jun-97	17:20	26-Jun-97	20:00	03:03	-0.3	-0.2	-0.292	-0.298	-0.006
12	25-Jun-97	17:20	27-Jun-97	05:00	12:04	-0.3	-0.2	-0.198	-0.201	-0.003
13	27-Jun-97	15:50	27-Jun-97	23:50	06:55	5.2	-0.1	-0.103	-0.125	-0.022
14	27-Jun-97	15:50	28-Jun-97	18:30	01:35	5.2	-0.3	-0.313	-0.290	0.023
15	29-Jun-97	06:40	29-Jun-97	15:25	22:29	5.2	-0.2	-0.19	-0.196	-0.006
16	29-Jun-97	06:40	30-Jun-97	08:55	15:59	5.2	0	0	-0.024	-0.024
17	30-Jun-97	17:56	01-Jul-97	01:56	09:01	0.9	0	0	-0.019	-0.019
18	30-Jun-97	17:56	01-Jul-97	19:00	02:05	0.9	-0.3	-0.285	-0.297	-0.012
19	02-Jul-97	09:26	02-Jul-97	13:26	20:30	0.9	-0.1	-0.084	-0.098	-0.014
20	02-Jul-97	09:26	02-Jul-97	22:00	05:04	0.9	-0.1	-0.115	-0.068	0.047
21	03-Jul-97	10:32	03-Jul-97	18:32	01:37	-5.3	-0.3	-0.314	-0.311	0.003
22	03-Jul-97	10:32	04-Jul-97	05:00	12:05	-5.3	-0.1	-0.0995	-0.138	-0.0385
23	04-Jul-97	14:00	04-Jul-97	21:00	04:04	-5.3	-0.2	-0.21	-0.171	0.039
24	04-Jul-97	14:00	05-Jul-97	08:00	15:04	-5.3	0	0	0.005	0.005

**Reporting Form for Leak Rate Data
Automatic Tank Gauging System (ATGS)
for Annual Tank Tightness Testing (0.1 gal/hr leak detection)**

ATGS Name and Version: Pneumercator Company ATGS Models TMS 2000 and TMS 3000

Evaluation Period: from 17-Jun-97 to 11-July-97 (Dates)

Test No.	Date at Completion of Last Fill (d-m-y)	Time at Completion of Last Fill (military)	Date Test Began (d-m-y)	Time Test Began (military)	Time Test Ended (military)	Product Temperature Differential (deg F)	Nominal Leak Rate (gal/h)	Induced Leak Rate (gal/h)	Measured Leak Rate (gal/h)	Meas.-Ind. Leak Rate (gal/h)
25	07-Jul-97	15:34	07-Jul-97	23:34	06:39	-5.2	-0.05	-0.053	-0.034	0.019
26	08-Jul-97	19:07	08-Jul-97	23:07	06:10	-5.2	-0.05	-0.052	-0.011	0.041
27	08-Jul-97	19:07	09-Jul-97	09:20	16:24	-5.2	-0.05	-0.052	-0.042	0.01
28	09-Jul-97	20:10	10-Jul-97	04:10	11:15	5.4	-0.05	-0.046	-0.079	-0.033
29	09-Jul-97	20:10	10-Jul-97	12:50	19:55	5.4	-0.05	-0.045	-0.073	-0.028
30	11-Jul-97	10:40	11-Jul-97	06:40	13:39	5.4	-0.05	-0.056	-0.003	0.053

**Reporting Form for Leak Rate Data
Automatic Tank Gauging System (ATGS)
for Annual Tank Tightness Testing (0.1 gal/hr leak detection)**

ATGS Name and Version: Pneumercator Company ATGS Models TMS 2000 and TMS 3000

Evaluation Period: from 17-Jun-97 to 11-July-97 (Dates)

Test No.	Date at Completion of Last Fill (d-m-y)	Time at Completion of Last Fill (military)	Date Test Began (d-m-y)	Time Test Began (military)	Time Test Ended (military)	Product Temperature Differential (deg F)	Nominal Leak Rate (gal/h)	Induced Leak Rate (gal/h)	Measured Leak Rate (gal/h)	Meas.-Ind. Leak Rate (gal/h)
1	17-Jun-97	18:10	18-Jun-97	02:10	10:15	-5.5	0	0	-0.023	-0.023
2	17-Jun-97	18:10	18-Jun-97	11:00	19:05	-5.5	-0.1	-0.148	-0.129	0.019
3	18-Jun-97	21:30	19-Jun-97	07:45	15:49	-5.5	-0.2	-0.168	-0.193	-0.025
4	18-Jun-97	21:30	19-Jun-97	17:10	01:13	-5.5	-0.3	-0.261	-0.318	-0.057
5	20-Jun-97	08:40	20-Jun-97	16:40	00:44	6.6	0	0	0.007	0.007
6	20-Jun-97	08:40	21-Jun-97	01:00	09:05	6.6	-0.2	-0.198	-0.191	0.007
7	21-Jun-97	10:05	21-Jun-97	18:05	02:09	6.6	-0.1	-0.083	-0.049	0.034
8	21-Jun-97	10:05	22-Jun-97	03:00	11:05	6.6	-0.3	-0.322	-0.316	0.006
9	24-Jun-97	13:15	24-Jun-97	21:15	05:20	-0.3	-0.2	-0.191	-0.215	-0.024
10	24-Jun-97	13:15	25-Jun-97	09:00	17:05	-0.3	0	0	-0.055	-0.055
11	25-Jun-97	17:20	26-Jun-97	20:00	04:03	-0.3	-0.2	-0.292	-0.299	-0.007
12	25-Jun-97	17:20	27-Jun-97	05:00	13:04	-0.3	-0.2	-0.198	-0.203	-0.005
13	27-Jun-97	15:50	27-Jun-97	23:50	07:55	5.2	-0.1	-0.103	-0.128	-0.025
14	27-Jun-97	15:50	28-Jun-97	18:30	02:35	5.2	-0.3	-0.313	-0.295	0.018
15	29-Jun-97	06:40	29-Jun-97	15:25	23:29	5.2	-0.2	-0.19	-0.201	-0.011
16	29-Jun-97	06:40	30-Jun-97	08:55	16:59	5.2	0	0	-0.028	-0.028
17	30-Jun-97	17:56	01-Jul-97	01:56	10:01	0.9	0	0	-0.023	-0.023
18	30-Jun-97	17:56	01-Jul-97	19:00	03:05	0.9	-0.3	-0.285	-0.302	-0.017
19	02-Jul-97	09:26	02-Jul-97	13:26	21:30	0.9	-0.1	-0.084	-0.111	-0.027
20	02-Jul-97	09:26	02-Jul-97	22:00	06:04	0.9	-0.1	-0.115	-0.074	0.041
21	03-Jul-97	10:32	03-Jul-97	18:32	02:37	-5.3	-0.3	-0.314	-0.314	0
22	03-Jul-97	10:32	04-Jul-97	05:00	13:05	-5.3	-0.1	-0.0995	-0.139	-0.0395
23	04-Jul-97	14:00	04-Jul-97	21:00	05:04	-5.3	-0.2	-0.21	-0.174	0.036
24	04-Jul-97	14:00	05-Jul-97	08:00	16:04	-5.3	0	0	0.003	0.003

**Reporting Form for Leak Rate Data
Automatic Tank Gauging System (ATGS)
for Annual Tank Tightness Testing (0.1 gal/hr leak detection)**

ATGS Name and Version: Pneumercator Company ATGS Models TMS 2000 and TMS 3000

Evaluation Period: from 17-Jun-97 to 11-July-97 (Dates)

Test No.	Date at Completion of Last Fill (d-m-y)	Time at Completion of Last Fill (military)	Date Test Began (d-m-y)	Time Test Began (military)	Time Test Ended (military)	Product Temperature Differential (deg F)	Nominal Leak Rate (gal/h)	Induced Leak Rate (gal/h)	Measured Leak Rate (gal/h)	Meas.-Ind. Leak Rate (gal/h)
25	07-Jul-97	15:34	07-Jul-97	23:34	07:39	-5.2	-0.05	-0.053	-0.042	0.011
26	08-Jul-97	19:07	08-Jul-97	23:07	07:10	-5.2	-0.05	-0.052	-0.012	0.04
27	08-Jul-97	19:07	09-Jul-97	09:20	17:24	-5.2	-0.05	-0.052	-0.041	0.011
28	09-Jul-97	20:10	10-Jul-97	04:10	12:15	5.4	-0.05	-0.046	-0.082	-0.036
29	09-Jul-97	20:10	10-Jul-97	12:50	20:55	5.4	-0.05	-0.045	-0.062	-0.017
30	11-Jul-97	10:40	11-Jul-97	06:40	14:39	5.4	-0.05	-0.056	-0.01	0.046

Description

Automatic Tank Gauging System

This section describes briefly the important aspects of the automatic tank gauging system (ATGS). It is not intended to provide a thorough description of the principles behind the system or how the equipment works.

ATGS Name and Version

Pneumercator TMS 2000 and TMS 3000 Automatic Tank Gauging Systems _____

Product

> Product type

For what products can this ATGS be used? (check all applicable)

- gasoline
- diesel
- aviation fuel
- fuel oil #4
- fuel oil #6
- solvents
- waste oil
- other (list) Liquids with specific gravity greater than 0.06 and a viscosity less than 1500 CPS

> Product level

What product level is required to conduct a test?

- greater than 90% full
 - greater than 50% full
 - other (specify) 24 inches *
- * This system is capable of measuring temperature compensated volume to a minimum product level equal to the probe length (L) divided by 6 plus 4 inches $[(L/6)+4]$. In the evaluation, a 120 inch probe was used in a 120 inch diameter tank. The corresponding minimum product level is 24 inches. The procedures for determining the minimum product level limitation are specified in a letter from the Automatic Tank Gauge and Volumetric Tank Tightness Testing Committees of the NWGLDE to Gauge Vendors and other interested parties, April 28, 1997.

Does the ATGS measure inflow of water as well as loss of product (gallon per hour)?

- yes
- no

Does the ATGS detect the presence of water in the bottom of the tank?

- yes
- no

Level Measurement

What technique is used to measure changes in product volume?

- directly measure the volume of product change
- changes in head pressure
- changes in buoyancy of a probe
- mechanical level measure (e.g., ruler, dipstick)
- changes in capacitance
- ultrasonic
- change in level of float (specify principle, e.g., capacitance, magnetostrictive, load cell, etc.) magnetostrictive
- other (describe briefly) _____

Temperature Measurement

If product temperature is measured during a test, how many temperature sensors are used?

- single sensor, without circulation
- single sensor, with circulation
- 2-4 sensors
- 5 or more sensors
- temperature-averaging probe

If product temperature is measured during a test, what type of temperature sensor is used?

- resistance temperature detector (RTD)
- bimetallic strip
- quartz crystal
- thermistor
- other (describe briefly) _____

If product temperature is not measured during a test, why not?

- the factor measured for change in level/volume is independent of temperature (e.g., mass)
- the factor measured for change in level/volume self-compensates for changes in temperature
- other (explain briefly) _____

Data Acquisition

How are the test data acquired and recorded?

- manually
- by strip chart
- by computer

Procedure information

> Waiting times

What is the minimum waiting period between adding a large volume of product (i.e., a delivery) and the beginning of a test (e.g., filling from 50% to 90-95% capacity)?

- no waiting period
- less than 3 hours
- 3-6 hours
- 7-12 hours
- more than 12 hours
- variable, depending on tank size, amount added, operator discretion, etc.

> Test duration

What is the minimum time for collecting data?

- less than 1 hour
- 1 hour
- 2 hours *(2 hours for Monthly Monitoring - 0.2 gal/hr leaks)*
- 3 hours
- 4 hours
- 5-10 hours *(7 hours for Annual Testing - 0.1 gal/hr leaks)*
- more than 10 hours
- variable (explain) _____

> Total time

What is the total time needed to test with this ATGS after a delivery?
(waiting time plus testing time)

- 10 hours 0 minutes *(for Monthly Monitoring - 0.2 gal/hr leaks)*
- 15 hours 0 minutes *(for Annual Testing - 0.1 gal/hr leaks)*

What is the sampling frequency for the level and temperature measurements?

- more than once per second
- at least once per minute
- every 1-15 minutes
- every 16-30 minutes
- every 31-60 minutes
- less than once per hour
- variable (explain) _____

> Identifying and correcting for interfering factors

How does the ATGS determine the presence and level of the ground water above the bottom of the tank?

- observation well near tank
- information from USGS, etc.
- information from personnel on-site
- presence of water in the tank
- other (describe briefly) _____
- level of ground water above bottom of the tank not determined

How does the ATGS correct for the interference due to the presence of ground water above the bottom of the tank?

- system tests for water incursion
- different product levels tested and leak rates compared
- other (describe briefly) _____
- no action

How does the ATGS determine when tank deformation has stopped following delivery of product?

- wait a specified period of time before beginning test
- watch the data trends and begin test when decrease in product level has stopped
- other (describe briefly) _____
- no procedure

Are the temperature and level sensors calibrated before each test?

- yes
- no

If not, how frequently are the sensors calibrated?

- weekly
- monthly
- yearly or less frequently
- never

> Interpreting test results

How are level changes converted to volume changes (i.e., how is height-to-volume conversion factor determined)?

- actual level changes observed when known volume is added or removed (e.g., liquid metal bar)
- theoretical ratio calculated from tank geometry
- interpolation from tank manufacturer's chart
- other (describe briefly)
- not applicable; volume measured directly

How is the coefficient of thermal expansion (C_e) of the product determined?

- actual sample taken for each test and C_e determined from specific gravity
- value supplied by vendor of product
- average value for type of product
- other (describe briefly) _____

How is the leak rate (gallon per hour) calculated?

- average of subsets of all data collected
- difference between first and last data collected
- from data from last _____ hours of test period
- from data determined to be valid by statistical analysis
- other (describe) _____

What threshold value for product volume change (gallon per hour) is used to declare that a tank is leaking?

- 0.05 gallon per hour (for a 0.1 gal/hr test)
- 0.10 gallon per hour (for a 0.2 gal/hr test)
- 0.20 gallon per hour
- other (list) _____

Under what conditions are test results considered inconclusive?

- too much variability in the data (standard deviation beyond a given value)
- unexplained product volume increase
- other (describe briefly) _____

Exceptions

Are there any conditions under which a test should not be conducted?

- water in the excavation zone
- large difference between ground temperature and delivered product temperature
- extremely high or low ambient temperature
- invalid for some products (specify) _____
- other (describe briefly) none _____

What are acceptable deviations from the standard testing protocol?

- none
- lengthen the duration of test
- other (describe briefly) _____

What elements of the test procedure are determined by personnel on-site?

- product level when test is conducted
- when to conduct test
- waiting period between filling tank and beginning test
- length of test
- determination that tank deformation has subsided
- determination of "outlier" data that may be discarded
- other (describe briefly) _____
- none