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Approval # 20030004R1
(Supersedes 20030004)

Environmental & Regulatory Services Division
Bureau of Petroleum Products and Tanks
201 West Washington Avenue
P.O. Box 7837
Madison, WI 53707-7837

Wisconsin COMM 10 Material Approval

Equipment: Automatic Tank Gauging, Volumetric Tank Tightness Testing, Line Leak Detection, and Liquid and Vapor Monitoring Systems

Manufacturer: Veeder-Root Company
125 Powder Forest Drive
P.O. Box 2003
Simsbury, CT 06070

Expiration of Approval: December 31, 2008

SCOPE OF EVALUATION

The sensing probes used with the Veeder-Root TLS 250, TLS 250i, TLS 250i Plus, ILS 250, ILS 350, TLS 300, TLS 300C, TLS 300i, TLS 350, TLS 350J, TLS 350R, TLSpC, TLS 2, , TLS 350 with Continuous Statistical Leak Detection (CSLD), TLS 350 with Manifold Tanks CSLD, TLS Wireless Pressurized Line Leak Detector (WPLLD) and TLS Pressurized Line Leak Detector (PLLD) and dispenser pan sensor, manufactured by Veeder-Root have been evaluated for use as leak detection equipment conforming to specified portions of **ss. COMM 10.61** and **COMM 10.615** of the current edition of the Flammable and Combustible Liquids Code.

This evaluation summary is condensed to provide the specific installation, application and operation parameters necessary to maintain the subject systems in compliance with the Wisconsin Administrative Code – Comm 10.

DESCRIPTION AND USE

All versions of the Automatic Tank Gauges (ATG), Tank Tightness Testing (TTT), and line leak detection systems may be used with gasoline, diesel fuel, aviation fuel, solvents, and used oil: has to be pure oil-not mixtures of oils, gasoline or solvents, etc.

Tank Leak Detection

Probe-Console Application Chart (Tanks)

Probe No.	Application	TLS 250	TLS 250i	TLS 250i Plus	TLS 300	TLS 300i ¹ , TLS 300C ²	TLS 2	TLS 350, 350 Plus, 350R, 350J, PC,
7842	ATG	X	X	X	X	(X)		X
8472	TTT or ATG			X	X	(X)		X
8463	TTT or ATG			X	X	(X)	X	X
8473	TTT or ATG			X	X	(X)	X	X
8463 with Manifolded Tanks and CSLD	Monthly Monitor				X			X
8473 with Manifolded Tanks and CSLD	Monthly Monitor				X			X

1: (X) indicates optional equipment for TLS 300i with in-tank leak detection.

2: The TLS 300C has a two-tank limitation.

The **8463** and **8473** probes measure changes in product volume by detecting changes in the level of a float using the magnetostrictive principle. The **7842** and **8472** probe versions measure changes in product volume by measuring changes in capacitance. These probes, when used with the appropriate consoles, have a preset leak detection threshold that cannot be changed by the operator, installer or technician. Results are reported as “Passed” or “Failed”.

The **CSLD** option operates in a long term sampling mode using statistical analysis to evaluate product and temperature levels collected by the probes every few seconds. The system identifies periods during product dispensing, stabilization periods after product delivery and periods of temperature instability and ignores data from those periods.

The system prints a leak test report daily or on demand. The report indicates a pass, fail or inconclusive result using data from up to, but no more than, the preceding 28-day period.

Line Leak Detection

Probe-Console Application Chart (Line)

Probe No.	Application	TLS 250	TLS 250i	TLS 300	TLS 350, 350 Plus, 350R, 350J, PC	LLD 300
8475	3, 0.2, 0.1 gph				X	
8484	3, 0.2, 0.1 gph				X	
8494	3, 0.2, 0.1 gph				X	X

TLS Volumetric Line Leak Detectors

The Veeder-Root TLS Volumetric Line Leak Detectors, **8475** use a preset threshold and a single test to determine if a pipeline is leaking. The system declares a leak if the output of the measurement system exceeds a threshold of 1.5 gph @ 10 psi when used as an automatic line leak detector, 0.1 when used as a monthly monitor, and 0.079 gph when used as a line tightness test.

The Flexible Pipeline Option version of the Veeder-Root TLS Volumetric Line Leak Detector operates in a similar manner. A leak is declared if the output of the measurement system exceeds a threshold of 1.5 gph at 10 psi when used as an automatic line leak detector, 0.1 gph at system pressure when used as a monthly monitor and 0.079 gph when used as a line tightness test.

TLS Pressurized Line Leak Detectors

The Pressurized Line Leak Detector for both rigid and flexible piping, **8484**, and the Wireless Pressurized Line Leak Detector for rigid piping, **8494**, operate during idle periods by independently pressurizing the pipeline system, then isolating the system from the pump and monitoring the pressure drop. The pressure drop is measured for several pressurization cycles, which are determined by the equipment. When the leak detection system determines that thermal effects have been sufficiently reduced, it compares the final pressure drop with a preset limit. If the pressure drop exceeds that limit, a leak is declared.

Liquid Sensors

The following chart shows the appropriate consoles to be used with sensing probes, and the typical application/capability for each probe.

Sensor-Console Application Chart

Probe No.	Application	TLS 250i	TLS 250i Plus	ILS 250	TLS 300	TLS 300i, 300C	ILS 350	TLS 350, 350 Plus, 350R, 350J, PC
794390-4X0	Steel Tank ¹	X	X	X		X	X	X
794390-40X	Fiberglass Tank ¹	X	X	X		X	X	X
794380-30X	Hydrostatic (FRP) ²					X		X
794380-343	Discriminating (FRP) ^{3,4}							X
794380-20X	Sump ¹	X	X	X		X	X	X
794380-351	Sump ¹							X
794380-350	Discriminating-Sump ^{3,4}							X
794380-352	Discriminating-Sump ^{3,4}				X	X		X
794380-321	Dispenser Pan ¹							X
794380-320	Discr.-Disp. Pan ^{3,4}							X
794380-322	Discr.-Disp. Pan ^{3,4}				X	X		X
794380-34X	Micro ¹							X
794390-700	Vapor ⁵						X	X
794380-62X	Groundwater ³						X	X
794390-62X	Groundwater ³						X	X

- 1: Capable of detecting any liquid that exceeds the threshold level.
- 2: Monitors the level of ethylene glycol or calcium chloride solution in the interstitial of a fiberglass double wall tank.
- 3: May be used for gasoline, synthetic fuel, diesel fuel, fuel oil, aviation fuel, and solvents.
- 4: Capable of detecting water.
- 5: Gasoline or JP-4 jet fuel.

TESTS AND RESULTS

Tank Tightness Testing Systems

The performance of the series **8472**, **8473** and **8463** probes were determined in accordance with the EPA Protocol for volumetric tank testing methods. The probes were found to be capable of detecting a leak of 0.10 gallon per hour leak within a probability of detection (P_D) of 95 percent and probability of false alarm (P_{FA}) of less than 5 percent.

Automatic Tank Gauging Systems

The performance of the series **7842**, **8463**, **8472** and **8473** probes were determined in accordance with the EPA protocol for ATG systems.

The series **7842**, **8472** and **8473** probes were certified to within the 95-5 ranges required by the EPA protocols for detecting a leak of 0.20 gallon per hour.

CSLD Monthly Monitoring

The Veeder-Root TLS **console with CSLD option** and **series 8463** or **8473** probe were evaluated using an alternative test procedure and were certified to within the 95-5 ranges required by the EPA protocols for detecting a leak of 0.20 gallon per hour.

Volumetric Pipeline Leak Detector

The performance of both the rigid and flexible pipeline versions of the Veeder-Root TLS and TLSPC series volumetric line leak detector consoles and probes, Series **8475** were determined using the EPA protocol for evaluation of pipeline leak detection systems.

When used as an automatic line leak detector, the system was certified capable of detecting a 3 gallon per hour leak within the 95-5 ranges required by the EPA protocols.

When used for monthly monitoring, the system was certified capable of detecting a 0.2-gallon per hour leak within the 95-5 ranges required by the EPA protocols.

When used for line tightness testing, the system was certified capable of detecting a 0.1-gallon per hour leak within the 95-5 ranges required by the EPA protocols.

Pressurized Line Leak Detectors

The Veeder-Root TLS series pressurized line leak detector consoles and probes, **series 8484** and **8494**, were evaluated using the Standard Test Procedures for Evaluating Leak Detection Methods: Pipeline Leak Detection Methods.

When used as an automatic line leak detector with rigid and flexible piping, the PLLD system was certified capable of detecting a 3 gallon per hour leak within the 95-5 ranges required by the EPA protocols.

When used as a monthly monitoring leak detector with rigid and flexible piping, the PLLD system was certified capable of detecting a 0.2 per hour leak within the 95-5 ranges required by the EPA protocols.

When used as a line tightness test with rigid and flexible piping, the PLLD system was certified capable of detecting a 0.1-gallon per hour leak within the 95-5 ranges required by the EPA protocols.

When used as an automatic line leak detector with rigid piping, the WPLLD system was certified capable of detecting a 3 gallon per hour leak within the 95-5 ranges required by the EPA protocols.

When used as a monthly monitoring leak detector with rigid piping, the WPLLD system was certified capable of detecting a 0.2 per hour leak within the 95-5 ranges required by the EPA protocols.

When used as a line tightness test with rigid piping, the WPLLD system was certified capable of detecting a 0.1-gallon per hour leak within the 95-5 ranges required by the EPA protocols.

Liquid Sensors

Testing of the liquid sensors was conducted in accordance with a modified version of the EPA Standard "Liquid-Phase Product Detectors" protocol.

MONITORING SYSTEM OUTPUT

Detailed here are examples of the typical, Tank Leak Report, Line Leak Test Report, Continuous Statistical Leak Report (CSLD), and Sensor Status Report. (Site Name/Address is printed on 1ST sheet of report)

<pre>MMM DD, YYYY HH:MM XM LEAK TEST REPORT T 1:REGULAR UNLEADED PROBE SERIAL NUM 105792 TEST STARTING TIME: MMM DD, YYYY HH:MM XM TEST LENGTH = 4.3 HRS STRT VOLUME = 3725 GALS LEAK TEST RESULTS 0.2 GAL/HR TEST PASS</pre>	<pre>MMM DD, YYYY HH:MM XM PRESSURE LINE LEAK TEST RESULTS Q 1:UNLEADED REG LINE 3.0 GAL/HR RESULTS: LAST TEST: MMM DD,YYYY HH:MM XM PASS NUMBER OF TESTS PASSED PREV 24 HOURS : 123 SINCE MIDNIGHT : 81 0.20 GAL/HR RESULTS: MMM DD,YYYY HH:MM XM PASS MMM DD,YYYY HH:MM XM PASS 0.10 GAL/HR RESULTS: MMM DD,YYYY HH:MM XM PASS MMM DD,YYYY HH:MM XM PASS</pre>
<p>Tank Leak Report Example: Last leak report for all active tanks.</p>	<p>Line Leak Report Examples: Automatic, Monthly, and Annual.</p>

<pre>CSLD TEST RESULTS ----- DD-MM-YY HH:MM XM T 2:SUPER UNLEADED PROBE SERIAL NUM 123002 0.2 GAL/HR TEST PER: DD-MM-YY PASS</pre>	<pre>Station Name Street City, State Zip Telephone Number SENSOR STATUS SENSOR 2A NORMAL SENSOR 4A FUEL SENSOR 6A NORMAL SENSOR 8A NORMAL EXTERNAL INP. STATUS OPEN</pre>
<p>Auto Leak Report Example: Current status of 24-hour leak detection (CSLD) for all active tanks.</p>	<p>Sensor Status Report Example</p>

LIMITATIONS / CONDITIONS OF APPROVAL

General

- All monitoring equipment shall be installed, calibrated, operated, and maintained in accordance with the manufacturer instructions, and verified every 12 months for operability, proper operating condition, and proper calibration by a certified service technician. Records of sampling, testing, or monitoring shall be maintained in accordance with **Comm 10.625**.
- The manufacturer shall submit for a revision to this Wisconsin Material Approval application if any of the functional performance capabilities of this equipment are revised. This would include, but not be limited to changes in software, hardware, or methodology.
- While 3rd party testing does determine a required minimum tank level, EPA leak detection regulations require testing of the portion of the tank system which routinely contains product. Consistent testing at low levels could allow a leak to remain undetected.

During leak testing, a minimum level of product in tank shall be maintained so as to ensure testing of the portion of the tank and/or piping that routinely contains product, regardless of testing system capability. For instance, if product levels are routinely maintained at 60%, but the leak detection system is capable of testing at 15% product level, then testing shall be performed at 60% levels.

- If performing a tank tightness test, minimum tank level shall be 95%, regardless of leak detection system minimum capability, in accordance with **Comm 10.61 (3)**.

Tank Monitoring ATG's and Tightness Testing (static monitoring)

- Critical performance parameters for the **series 7842** probe with the **TLS-250, TLS-250i, TLS-250i Plus, TLS-300, TLS-300i, TLS-300C, TLS-350, TLS-350J, TLS-350Plus, TLS-350R and TLSPC** consoles: (Note: These are capacitance probes and they will not work with oxygenated fuels)

Parameter	Value
Maximum Tank Size ¹	Up to 15,000 gallons
Software Version	N/A
Minimum Tank Level	50 %
Waiting time between filling tank or dispensing and test start ²	8 hours, 18 minutes minimum
Minimum Test Period ²	5 hours³

1: Monthly and annual testing can only be performed on one tank at a time. If several tanks are manifolded together, an isolation valve will have to be installed so as to separate the tanks individually.

2: There must be no dispensing or delivery during waiting time or testing.

3: This probe can only perform a 0.2 gph monthly test.

- Critical performance parameters for the **series 8472** probe with the **TLS-250i Plus, TLS-300, TLS-300i, TLS-300C, TLS-350, TLS-350J, TLS-350Plus, TLS-350R and TLSPC** consoles: (Note: These are capacitance probes and they will not work with oxygenated fuels)

Parameter	Value
Maximum Tank Size ¹	Up to 15,000 gallons
Software Version	N/A
Minimum Tank Level	50 % (monthly- 0.2 gph) 95 % (annual- 0.1 gph)
Waiting time between filling tank and test start ²	8 hrs. 18 min. minimum (monthly- 0.2 gph) 8 hrs. 15 min. minimum (monthly- 0.1 gph)
Waiting time between dispensing and test start	See note 3 below (monthly- 0.2 gph) 30 minutes minimum (monthly- 0.1 gph)
Minimum Test Period ²	2 hours

1: Monthly and annual testing can only be performed on one tank at a time. If several tanks are manifolded together, an isolation valve will have to be installed so as to separate the tanks individually.

2: There must be no dispensing or delivery during waiting time or testing.

3: For a 0.2 gph monthly test, there can be no filling (delivery) or dispensing from tank during waiting period.

- Critical performance parameters for the series **8463 and 8473** probes with the **TLS-250i Plus, TLS-300, TLS-300i, TLS-300i Plus and TLS-300C** consoles for annual 0.1 gph and monthly 0.2 gph testing: (Magnetostrictive probe)

Parameter	Value																																		
Maximum Tank Size ¹	Up to 15,000 gallons																																		
Software Version	N/A																																		
Minimum Tank Level (0.2 gph testing only- 0.1 gph testing must be performed at 95%)	Minimum product level is based on tank diameter as follows: <table border="1"> <thead> <tr> <th><u>Probe Working Length</u> (Tank ID in inches)</th> <th><u>Minimum Level (in)</u>²</th> </tr> </thead> <tbody> <tr><td>24 thru 26</td><td>9</td></tr> <tr><td>27 thru 36</td><td>12</td></tr> <tr><td>37 thru 47</td><td>15</td></tr> <tr><td>48 thru 58</td><td>18</td></tr> <tr><td>59 thru 69</td><td>21</td></tr> <tr><td>70 thru 79</td><td>24</td></tr> <tr><td>80 thru 90</td><td>27</td></tr> <tr><td>91 thru 101</td><td>30</td></tr> <tr><td>102 thru 111</td><td>33</td></tr> <tr><td>112 thru 122</td><td>36</td></tr> <tr><td>123 thru 133</td><td>39</td></tr> <tr><td>134 thru 143</td><td>42</td></tr> <tr><td>144 thru 154</td><td>45</td></tr> <tr><td>155 thru 165</td><td>48</td></tr> <tr><td>166 thru 175</td><td>51</td></tr> <tr><td>176 thru 177</td><td>54</td></tr> </tbody> </table>	<u>Probe Working Length</u> (Tank ID in inches)	<u>Minimum Level (in)</u> ²	24 thru 26	9	27 thru 36	12	37 thru 47	15	48 thru 58	18	59 thru 69	21	70 thru 79	24	80 thru 90	27	91 thru 101	30	102 thru 111	33	112 thru 122	36	123 thru 133	39	134 thru 143	42	144 thru 154	45	155 thru 165	48	166 thru 175	51	176 thru 177	54
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Waiting time between filling tank and test start ³ (Stabilization Time)	8 hours minimum (monthly -0.2 gph) 8 hrs. 15 min. minimum (annual- 0.1 gph)																																		
Waiting time between dispensing and test start	30 minutes minimum																																		
Minimum Test Period ⁴	2 hours (0.2 gph test) 3 hours (annual- 0.1 gph)																																		

1: Monthly and annual testing can only be performed on one tank at a time. If several tanks are manifolded together, an isolation valve will have to be installed so as to separate the tanks individually.

2: Minimum level from probe bottom is same as product level in tank, assuming the typical configuration where the probe touches the bottom of the tank.

3: There must be no delivery during waiting time.

4: There must be no delivery or dispensing during testing.

- Critical performance parameters for the **Series 8463 and 8473** probe with the **TLS-350** series, and **TLS-2** consoles for annual 0.1 gph and monthly 0.2 gph testing: (Magnetostrictive probe)

Parameter	Value																																		
Maximum Tank Size ¹	Up to 20,000 gallons (0.1 gph) Up to 30,000 gallons (0.2 gph)																																		
Software Version	N/A																																		
Minimum Tank Level (0.2 gph testing only- 0.1 gph testing must be performed at 95%)	Minimum product level is based on tank diameter as follows: <table border="1"> <thead> <tr> <th><u>Probe Working Length</u> (Tank ID in inches)</th> <th><u>Minimum Level (in)²</u></th> </tr> </thead> <tbody> <tr><td>24 thru 26</td><td>9</td></tr> <tr><td>27 thru 36</td><td>12</td></tr> <tr><td>37 thru 47</td><td>15</td></tr> <tr><td>48 thru 58</td><td>18</td></tr> <tr><td>59 thru 69</td><td>21</td></tr> <tr><td>70 thru 79</td><td>24</td></tr> <tr><td>80 thru 90</td><td>27</td></tr> <tr><td>91 thru 101</td><td>30</td></tr> <tr><td>102 thru 111</td><td>33</td></tr> <tr><td>112 thru 122</td><td>36</td></tr> <tr><td>123 thru 133</td><td>39</td></tr> <tr><td>134 thru 143</td><td>42</td></tr> <tr><td>144 thru 154</td><td>45</td></tr> <tr><td>155 thru 165</td><td>48</td></tr> <tr><td>166 thru 175</td><td>51</td></tr> <tr><td>176 thru 177</td><td>54</td></tr> </tbody> </table>	<u>Probe Working Length</u> (Tank ID in inches)	<u>Minimum Level (in)²</u>	24 thru 26	9	27 thru 36	12	37 thru 47	15	48 thru 58	18	59 thru 69	21	70 thru 79	24	80 thru 90	27	91 thru 101	30	102 thru 111	33	112 thru 122	36	123 thru 133	39	134 thru 143	42	144 thru 154	45	155 thru 165	48	166 thru 175	51	176 thru 177	54
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Waiting time between filling tank and test start ³ (Stabilization Time)	8 hours minimum (0.2 gph test) For 0.1 gph testing the following times are to be matched with the corresponding test times below Scenario: A: 8 hours minimum B: 9 hours minimum C: 10 hours minimum D: 11 hours minimum																																		
Waiting time between dispensing and test start	30 minutes minimum																																		
Minimum Test Period ⁴	2 hours (0.2 gph test) For 0.1 gph match with scenario above Scenario: A: 5 hours minimum B: 4 hours minimum C: 3 hours minimum D: 2 hours minimum																																		

1: Monthly and annual testing can only be performed on one tank at a time. If several tanks are manifolded together, an isolation valve will have to be installed so as to separate the tanks individually.

2: Minimum level from probe bottom is same as product level in tank, assuming the typical configuration where the probe touches the bottom of the tank.

3: There must be no delivery during waiting time.

4: There must be no delivery or dispensing during testing.

Tank Monitoring ATG's w/CSLD(24-hour, 0.2 gph monthly monitoring)

- Critical performance parameters for the **series 8463 and 8473** probe with the **TLS Series** consoles: (Magnetostrictive probe)

Parameter	Value
Maximum Tank Size ¹	45,000 gallons (Single Tank) 37,000 gallons (Manifolded Tanks)
Software Version	N/A
Minimum Tank Level ²	5%
Maximum Monthly Throughput	227,559 gallons (Single Tank) 226,848 gallons (Manifolded Tanks)

1: Manifolded tank capacity is an aggregate capacity of all tanks.

2: The CSLD system will automatically check the tank level, and not perform a test if the tank level is below the minimum.

Electronic Line Leak Detectors

- The Veeder-Root Electronic Line Leak Detectors are approved for use on pipeline systems for underground storage tank facilities that contain petroleum or other chemical products. It is approved for use on rigid piping and flexible piping.
- An annual test of the operation of the leak detector shall be conducted in accordance with the manufacturer requirements for testing to the recognized leak thresholds by inducing a physical line leak. The individual performing the test must be qualified by the equipment manufacturer or an individual meeting the requirements of **Comm 5.88** for pipe testing.
- **Mechanical line leak detectors shall be removed from the pipeline before testing.**
- This test cannot be used if trapped vapor is present in the system.

Volumetric

- Critical performance parameters for the **series 8475** Line Leak Detector with the **TLS** and **TLSPC** consoles:

Rigid Piping: (Fiberglass or steel)

Parameter	Value
Maximum Test Line Size	3 in.
Total maximum allowable volume of product in any rigid test pipeline	158 gallons or less

Note: All other critical parameters, such as test line pressure; minimum test times; minimum wait times between product dispensing and start of test are pre-programmed into the software and are not accessible for viewing.

Flexible Piping:

Parameter	Value
Minimum Flexible Piping Bulk Modulus	Not Applicable for volumetric systems
Total maximum allowable volume of product in any flexible test pipeline	49.6 gallons or less

Note: All other critical parameters, such as test line pressure; minimum test times; minimum wait times between product dispensing and start of test are pre-programmed into the software and are not accessible for viewing.

Pressurized

- Critical performance parameters for the **series 8484** Line Leak Detector with the **TLS** and **TLSPC** consoles:

Rigid Piping: (Fiberglass or steel)

Parameter	Value
Maximum Test Line Size	3 in.
Total maximum allowable volume of product in any rigid test pipeline	98.4 gallons or less

Note: All other critical parameters, such as test line pressure; minimum test times; minimum wait times between product dispensing and start of test are pre-programmed into the software and are not accessible for viewing.

Flexible Piping:

Parameter	Value
Minimum Flexible Piping Bulk Modulus	User selectable on console. For a list of currently approved piping, contact Veeder-Root.
Total maximum allowable volume of product in any flexible test pipeline	40.8 gallons or less

Note: All other critical parameters, such as test line pressure; minimum test times; minimum wait times between product dispensing and start of test are pre-programmed into the software and are not accessible for viewing.

- Critical performance parameters for the Series **8494** Line Leak Detector with the **TLS** and **TLSPC** and **LLD 300** consoles: (Note: This Line Leak Detector is 3rd party certified for rigid piping only)

Rigid Piping: (3" Fiberglass or steel)

Parameter	Value
Maximum Test Line Size	3 in.
Total maximum allowable volume of product in any rigid test pipeline	100 gallons or less

Note: All other critical parameters, such as test line pressure; minimum test times; minimum wait times between product dispensing and start of test are pre-programmed into the software and are not accessible for viewing.

Liquid Sensors

- The Liquid Sensors shall be placed such that a release from any portion of the tank or piping will be detected.
- Reference the Sensor-Console Application Chart under the Description and Use section of this material approval for application of appropriate sensor for the product.

This approval will be valid through December 31, 2008, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The Wisconsin Material Approval Number must be provided when plans that include this product are submitted for review.

DISCLAIMER

The Department is in no way endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive any code requirement unless specified in this document.

Effective Date: July 8, 2004

Reviewed by: _____
Greg Bareta, P. E.
Engineering Consultant
Bureau of Petroleum Products and Tanks

Approved by: _____ Date: _____