



Department of Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

December 11, 1997

Mr. Steve Coats, Professional Engineer
Kingsno Projects
Post Office Box 71025
Market West-Newmarket, Ontario L3X 1Y8 Canada

File No. EQ-305

RE: DEP Approval of the Deltaliner System pursuant to
Rule 62-762.850, Florida Administrative Code (F.A.C.)

Dear Mr. Coats:

The Bureau of Petroleum Storage Systems has concluded its review of the Equipment Approval request dated October 24, 1997, that was submitted for the above referenced equipment.

Based on the information provided by Kingsno Projects, the Department finds that the applicant's Deltaliner System, as described in Exhibit A, will provide environmental protection substantially equivalent to that provided by compliance with the requirements established in Rule 62-762.520(1)(b), F.A.C.

Pursuant to Rule 62-762.850, F.A.C., the request for the use of the above referenced product is **Approved** as a method of secondary containment inside a field-erected tank in the State of Florida provided that:

- (a) The primary floor containment membrane is the new Fiberglass Reinforced Plastic (FRP) membrane;
- (b) The secondary containment is the metal tank floor. The tank floor and the rest of the storage tank shall be inspected and repaired in accordance API 653 requirements;
- (c) The interstitial airspace is monitored for the presence of liquids. This port shall be monitored monthly or an FDEP continuous leak detection system shall be installed; and
- (d) An initial vacuum test shall be done upon installation of the system and every two years thereafter.

If you choose to accept the above decision by the Department about Equipment Approval you do not have to do anything. This Order will become final 21 days after receipt of this order, after which time you cannot file a petition for administrative hearing or request mediation.

"Protect, Conserve and Manage Florida's Environment and Natural Resources"

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If you disagree with the decision, you may do one of the following within 21 days of receipt of this Order:

1. File a petition for administrative hearing with the Office of the General Counsel within 21 days after receipt of this Order.
2. File a request for an extension of time to file a petition for hearing with the Office of the General Counsel within 21 days after receipt of this Order. Such a request should be made if you wish to meet with the Department in an attempt to resolve any disputes without first filing a petition for hearing.
3. Pursue mediation as an alternative remedy under Section 120.573, Florida Statutes ("F.S.") within 21 days after receipt of this Order. Choosing mediation will not adversely affect the right to a hearing if mediation does not result in a settlement.

How to Request an Extension of Time to File a Petition for Hearing or to File an Agreement to Mediate

A request for an extension of time to file a petition for hearing or an agreement to mediate must be filed (received) in the Office of the General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida, 32399-3000, within 21 days after receipt of this Order. Pursuant to Rule 28-106.111(3), F.A.C., a **request for extension of time shall contain a certificate that the moving party has consulted with all other parties, if any, concerning the extension and that the Department and any other parties agree to said extension.** Petitioner, if different from the applicant shall mail a copy of the petition to the applicant at the time of filing. Timely filing a request for an extension of time tolls the time period within which a petition for administrative hearing must be filed **until the request is acted upon.**

How to file a Petition for Administrative Hearing

A person whose substantial interests are affected by this Order may petition for administrative hearing in accordance with Sections 120.569 and 120.57, F.S. The petition must contain the information set forth below and must be filed (received) in the Office of the General Counsel of the Department at 3900 Commonwealth Boulevard, MS 35, Tallahassee, Florida 32399-3000, within 21 days after receiving this Order. Petitioner, if different from the applicant shall mail a copy of the petition to the applicant at the time of filing. Failure to file a petition within this time period shall waive the right of anyone who may request an administrative hearing under Sections 120.569 and 120.57, F.S.

Pursuant to Rules 62-103.155, and 28-106.201, F.A.C., a petition for administrative hearing shall contain the following information:

- a) The name, address, and telephone number of each petitioner, the name, address, and telephone number of the petitioner's representative, if any, the site owner's name and address, if different from the petitioner, the DEP facility number, and the name and address of the facility;
- b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- d) A statement of the material facts disputed by the petitioner, if any;
- e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
- f) A statement of which rules or statutes petitioner contends requires reversal or modification of the Department's action or proposed action; and
- g) A statement of the relief petitioner seeks, stating precisely what petitioner wants the Department to do regarding the Department's action or proposed action.

How to Pursue Mediation

A request for mediation must be filed (received) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000 within 21 days of receipt of this order. Pursuant to Rule 28-106.402, F.A.C., a request for mediation must include the following:

- (1) The name, address, and telephone number of the person requesting mediation and that person's representative, if any (also the DEP facility number, and the name and address of the facility);
- (2) A statement of the preliminary agency action (preferably, including a copy of the Department's order);
- (3) An explanation of how the person's substantial interests will be affected by the agency determination; and
- (4) A statement of the relief sought.

An written agreement to mediate reached by all parties to the proceeding (which include the petitioner, the Department, and any person who has filed a timely and sufficient petition for a hearing) must be filed (received) in the Office of General Counsel of the Department at 3900 Commonwealth

Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000,
10 days after the date the request for mediation is filed.

The agreement to mediate must include the following:

- (1) The names, addresses, and telephone numbers of any persons who may attend the mediation;
- (2) The name, address, and telephone number of the mediator selected by the parties, or a provision for selecting a mediator within a specified time;
- (3) That the **party(s) requesting the mediation agrees to pay all costs** and fees associated with the mediation;
- (4) The agreement of the parties on the confidentiality of discussions and documents introduced during mediation;
- (5) The date and time of the first mediation session, or a deadline for holding the first session, if no mediator has yet been chosen, and that the parties to the mediation agree to meet in the Twin Towers Office Building, 2600 Blair Stone Road, Tallahassee, Florida;
- (6) The name of each party's representative who shall have authority to settle or recommend settlement; and
- (7) The signatures of all parties.

As provided in Section 120.573 of the F.S., the timely agreement of all parties to mediate will toll the time limitations imposed by Sections 120.569 and 120.57, F.S. for requesting and holding an administrative hearing. Unless otherwise agreed by the parties, the mediation must be concluded within sixty days of the execution of the agreement. If mediation results in settlement of the administrative dispute, the Department must enter a final order incorporating the agreement of the parties. Persons whose substantial interests will be affected by such a modified final decision of the Department have a right to petition for a hearing only in accordance with the requirements for such petitions set forth above, and must therefore file their petitions within 14 days of receipt of this notice. If mediation terminates without settlement of the dispute, the Department shall notify all parties in writing that the administrative hearing processes under Sections 120.569 and 120.57, F.S. are resumed.

This Order is final and effective 21 days after receipt of this Order. Timely filing a petition for administrative hearing or mediation agreement postpones the date this Order takes effect until the Department issues either a Final Order pursuant to an administrative hearing or mediation agreement, or an Order Responding to Supplemental Information provided pursuant to meetings with the Department.

Appealing a Final Order

When this Order becomes final, any party to this Order has the right to seek judicial review of this Order pursuant to Section 120.68, F.S., by filing a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Department clerk in the Office of the General Counsel, 3900 Commonwealth Boulevard, MS 35, Tallahassee, Florida 32399-3000. Simultaneously with filing a Notice of Appeal with the Department, Petitioner must file a copy of the Notice of Appeal with the applicable filing fees, with the appropriate District Court of Appeal. The Notice of Appeal must be received by the Department clerk within 30 days from the date this Order becomes final.

Questions

Should you have any questions regarding these processes please contact the Bureau of Petroleum Storage Systems at (850) 487-3299 or the Office of the General Counsel at (850) 488-9730. Any questions regarding the Department's review of your Equipment Approval should be directed to Farid Moghadam (850) 488-3935. Contact with any of the above named persons does not constitute a petition for administrative hearing or request to mediate.

Sincerely,



John M. Ruddell, Director
Division of Waste Management

JMR/fm



DESCRIPTION OF DELTALINER SYSTEM AS INSTALLED
OVER ABOVEGROUND STORAGE TANK FLOORS
IN THE STATE OF FLORIDA UNDER DEP RULE 62-672

Deltaliner System Description

The Deltaliner is based on creating a new interstitial space over the tank floor area. This space is bounded on the bottom by the metal tank floor. The space is bounded on the top by a new primary containment membrane, constructed from manufactured FRP panels. The separation of these two membranes is maintained by a continuous incompressible plastic grid which is approximately 70% air, in volume.

This new interstitial airspace is connected to the outside atmosphere via a conduit which extends from the airspace, and through the tank shell, at an elevation below the minimum operating product level. There is a vent opening for the space located above the maximum liquid level in the tank.

See the attached sketch. This arrangement upgrades the tank in the following ways to meet DEP Rule 62-672 requirements;

1) Double Containment

The tank floor area now has two distinct, liquid tight containment membranes. The primary floor membrane is the new FRP membrane, which is corrosion resistant to the stored product. The secondary membrane is the metal tank floor.

This final layer of defence against liquid escaping from the tank's floor structure is by far the more robust and reliable of the two membranes.

2) Leak Detection

The interstitial airspace is monitored for the presence of liquid in it. Any liquid in the airspace will be stored product. The head of stored product will force the leaked liquid through the open and vented airspace. The liquid will reach the conduit and travel to the inspection port located outside the tank shell.

This port can be monitored by periodic visual inspection (maximum inspection interval to be 30 days) or by one of the approved liquid detection monitors available.

3) Interstitial Airspace Verification

The long term performance of Deltaliner depends on the airspace being bounded by two liquid tight membranes. This is confirmed by an initial vacuum test on the interstitial airspace. This test is performed via the leak detection conduit, outside the tank. The test can be repeated at any time, with the tank in service to confirm the long term secondary containment performance of the Deltaliner system. The maximum interval between these in service tests shall be 2 years.



Deltaliner System Description

Tank Condition

For a Deltaliner system to be installed in a tank, the tank must be structurally sound and the floor must be absolutely free of leaks. Therefore, the tank must first meet the following criteria;

- 1) In compliance with Florida D.E.P. rule 62-762.520, the tank shall be fully inspected to the requirements of API Standard 653, by a qualified inspector. The results of this inspection shall be reviewed by a professional engineer and any recommended modifications or repairs shall be carried out.
- 2) Corrosion pits on the tank floor plate must be found and recorded. This includes the size and location of pits on either side of the floor plate. Pitted areas shall be repaired as set out in API 653. Any serious corrosion mechanism, shall either be eliminated or controlled, using the appropriate technology.
- 3) It is critical that the tank floor plates and all welded seams, be capable of withstanding a vacuum test. Floor welds and plates shall be cleaned and tested, under the direction of an engineer, to ensure that this condition is met. Records of this work shall be maintained as part of the project records. The Deltaliner installation shall not begin until this condition is met.
- 4) All sharp projections, such as weld tacks or old brackets cutoff stubs, shall be removed. These shall be ground off to leave a smooth surface over which the Deltaliner system is installed.

FRP Membrane Construction

The Deltaliner membrane is constructed using manufactured FRP sheets. These sheets are a minimum of 4 feet wide and can pass through a standard shell manhole without damage. The panels are laid over the airspace grid and cut to fit closely to the tank shell and any other protrusions on the tank floor.

The joints between panels are sealed with a field applied laminate of fiberglass reinforcement and a resin which is compatible with the panel material and resistant to the stored product.

The panels are sealed to the tank shell and at any other protrusions using a field applied FRP laminate. This laminate is bonded to the metal tank surface by preparing the metal surface and applying the laminate in the same way that a fully adhered FRP lining is applied to a metal tank.

The construction of the seals between the FRP panels and the tank metal (around the shell and at other protrusions) shall follow the design and procedures for the particular Deltaliner system being installed. The use of preformed FRP shapes, putties, temporary weights and mechanical fasteners, is common in these designs. However each tank will have unique conditions which require a custom design for that tank.



Deltaliner System Description

FRP Panel Construction

The FRP panels can have a wide range of properties. The following are the minimum requirements for this panel design;

- i) Minimum thickness to be 0.080 inches.
- ii) The resin used to construct the panels shall be certified by its manufacturer to be unaffected by long term immersion in the stored product, and in any upset conditions which may occur in the tank.
- iii) There must be a corrosion resistant, resin rich surface veil layer on the stored product side of the panel.
- iv) The panels must have sufficient flexibility to be rolled into a 12" radius roll without suffering any surface damage.

Leak Detection Performance

The Deltaliner leak detection system is based on the open vented airspace and the leak conduit connecting the airspace to the inspection port outside the tank.

The maximum area of any one interstitial space shall be 5,000 sq ft. Tanks which have more floor area than 5,000 sq ft shall have more than one independent sealed and monitored airspaces. The minimum depth of the airspace shall be 0.20 inches. The airspace shall have no obstructions to free flow of liquid within it.

The conduit shall be made of materials which are unaffected by long term exposure in the stored product. The maximum length of the leak conduit shall be 48 inches and the minimum size shall be 0.375 inches in diameter. Flow dynamics predict that this conduit will transmit 0.1 gallons per hour of liquid (viscosity of water) if there is 0.1 inches of stored product head above the elevation of the conduit's path through the tank shell. Additional product head above this level will of course increase the leak rate.

Testing Interstitial Airspace

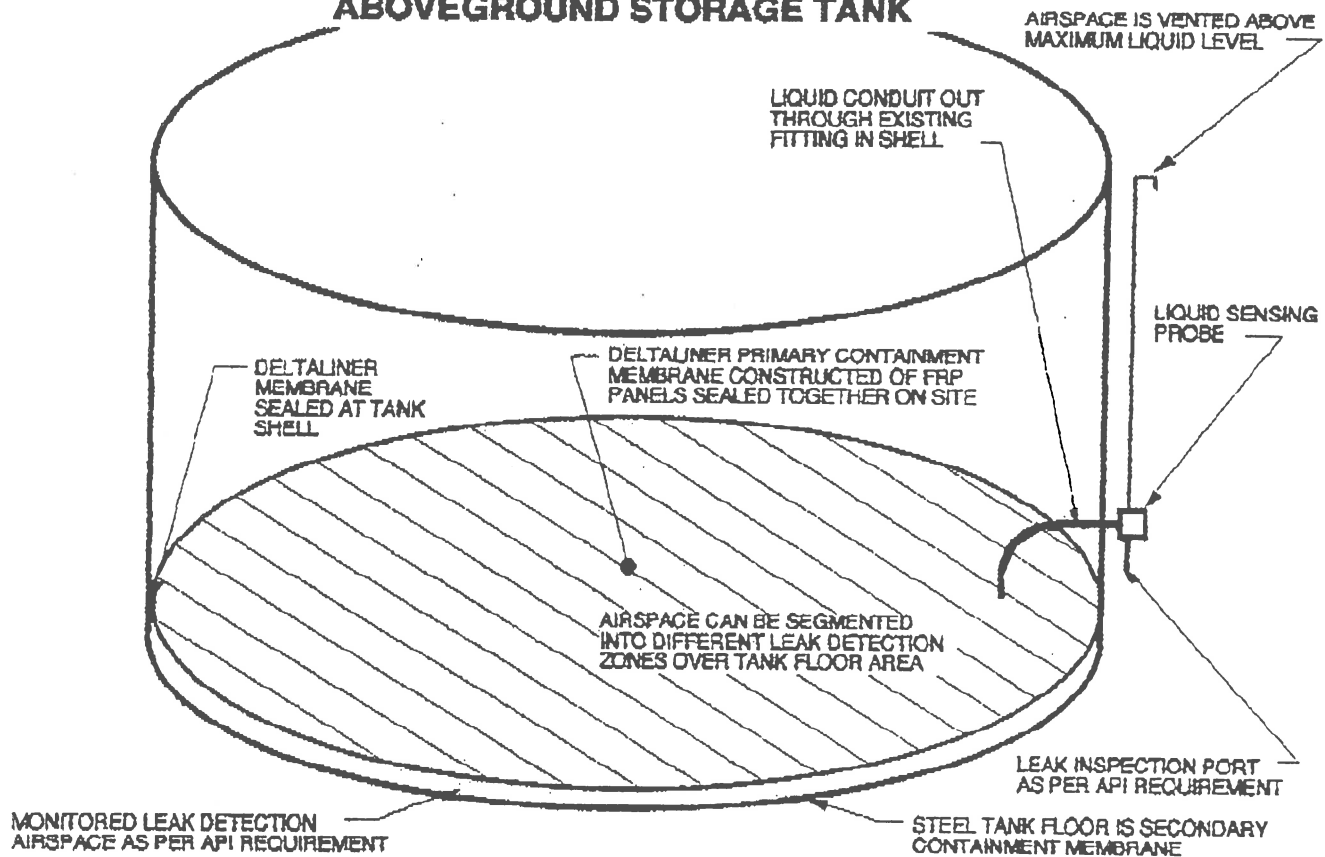
The two floor containment membranes can be easily tested by drawing vacuum on the interstitial airspace. This is done at the leak detection port outside the tank. The vacuum to be drawn is 8-10 inches Hg. The length of time required to expose a leak depends on the size of the airspace. The minimum length of test shall be 4 hours.



LEAK PREVENTION SYSTEM

PATENTS
PENDING

TYPICAL INSTALLATION IN ABOVEGROUND STORAGE TANK



DELTALINER has the properties to provide effective Leak Prevention

LEAK DETECTION

- SIMPLE, RELIABLE SYSTEM BASED ON MONITORED AIRSPACE
- SMALL, FREE DRAINING AIRSPACE VOLUME MINIMIZES LEAKED LIQUID
- AIRSPACE IS OPEN AND VENTED TO ENSURE FASTEST DETECTION
- LEAK REPAIR BY COLD WORK PROCEDURES
- LEAKS DO NOT CONTAMINATE ANY FILL IN AIRSPACE OR UNDER TANK
- CUSTOM DESIGN FOR EACH INSTALLATION

DOUBLE CONTAINMENT

- CORROSION RESISTANT DELTALINER FRP MEMBRANE IS PRIMARY FLOOR CONTAINMENT
- ROBUST TANK FLOOR IS SECONDARY CONTAINMENT
- ANY LEAKED LIQUID IS CONTAINED WITHIN TANK STRUCTURE
- NO TANK MODIFICATION NECESSARY
- NO HYDROTEST REQUIRED
- INTEGRITY OF MEMBRANES CAN BE CHECKED BY VACUUM TEST ON AIRSPACE WITH TANK IN SERVICE

CORROSION PROTECTION

- FACTORY PRODUCED AND INSPECTED FRP PANELS
- NO SURFACE PREPARATION OF TANK FLOOR
- DELTALINER IS INDEPENDENT AND UNAFFECTED BY FAILURES IN STEEL FLOOR
- INSTALLATION MINIMIZES CONFINED SPACE EXPOSURE, WEATHER DEPENDENCY, APPLICATOR SKILL
- FINAL VACUUM TEST ENSURES RELIABLE, LEAK FREE LINING



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DELTALINER SYSTEM PERFORMANCE AND TECHNICAL SPECIFICATIONS



IMMERSION SERVICE

DELTALINER panels can be made with a Polyester or Vinyl Ester resin system. The resins are tested and approved by the resin manufacturer for long term immersion service in a wide range of stored hazardous products from No. 2 Oil to Unleaded Gasoline/Alcohol blends & Jet Fuel. The panel construction includes a resin rich surface veil on the product side.

SERVICE LIFE

DELTALINER will perform as a leak prevention system for 15 years and longer, in the service for which it was designed. The FRP membrane and its adhesion to the tank uses well proven tank lining technology. Tank cleaning and liner inspection is made easier with DELTALINER in place.

TANK CONDITION

Prior to installing a DELTALINER system, the tank must be inspected to API 653 and the findings reviewed by a Professional Engineer. The tank shall be upgraded as required for structural soundness and the floor must be confirmed to be leakfree.

CYCLIC HYDROSTATIC LOADING

As part of Florida D.E.P. approval, DELTALINER has undergone supervised testing for performance under the cyclic hydrostatic loads, in a storage tank. These tests simulated daily filling (to 70 feet of product head) & complete emptying, for 5 years. Panels, airspace polygrid, flat seams and corner seams, all passed these tests with no leaking or degradation.

THERMAL EXPANSION COEFFICIENT

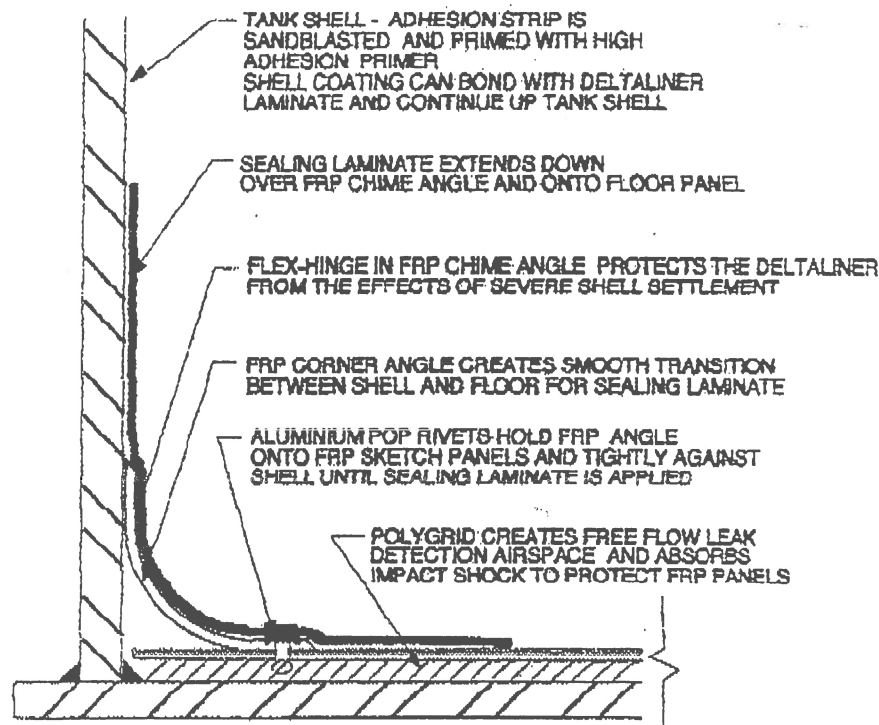
The coefficient of thermal expansion of the DELTALINER membrane is engineered to match that of the steel tank floor.

IMPACT RESISTANCE

The DELTALINER membrane can withstand the impacts commonly seen by a coated tank floor. The airspace polygrid absorbs impact shocks to help protect the membrane from damage.

SYSTEM TESTING

The DELTALINER system is reliably and easily tested during installation or while in service by drawing a vacuum on the interstitial airspace. Individual seams can be tested with a vacuum box. Any repairs require cold work methods only.



COMPLIANCE

DELTALINER is recognized as double floor containment, interstitial space leak detection and a corrosion resistant liner by legislative authorities. Specific approvals are being granted to DELTALINER upon application and review.

LIMITED WARRANTY

DELTALINER Systems installed and operated to the project specifications are warranted against failure causing leakage due to faulty design, materials and workmanship for a minimum period of 5 years from date of installation.

PATENTED DELTALINER CORNER CONSTRUCTION