
TECHNICAL BULLETIN
FOR
COLLAPSIBLE FABRIC FUEL TANKS



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HEADQUARTERS, DEPARTMENT OF THE ARMY
DECEMBER 2009

WARNING SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these warnings could result in serious injury or death to personnel.

WARNING

Do not allow smoking within 100 feet of the storage area. Death or serious injury may result if personnel fail to observe safety precautions.

WARNING

Avoid spillage of fuel. When spillage occurs, cover the affected area with dry soil to reduce the rate of vaporization. Position fire extinguishers at readily accessible positions around the tank(s). Failure to observe this warning may result in death or serious injury.

WARNING

Avoid getting fuel on the body or clothing. If clothing becomes saturated, remove it immediately and wash the body thoroughly with hot, soapy water. Failure to observe this warning may result in death or serious injury.

WARNING

Sludge that accumulates in the bottom of the fuel tank gives off toxic and explosive vapors. Inhaling these vapors can cause lead poisoning. When cleaning tanks, provide ample ventilation to carry off harmful fumes. Failure to observe these precautions may result in death or serious injury to personnel.

LIST OF EFFECTIVE PAGES/TEXT PAGES

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HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 8 DEC 2009

**TECHNICAL BULLETIN
COLLAPSIBLE FABRIC FUEL TANKS**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028 (Recommended Changes to Publications and Blank Forms), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is <https://aeeps.ria.army.mil>. The DA Form 2028 is located under the Public Applications section in the AEPS Public Home Page. Fill out the form and click on SUBMIT. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax or e-mail your letter or DA Form 2028 directly to: US ArmyTACOM Life Cycle Management Command, ATTN: AMSTA-LCL-MPP/TECH PUBS, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The e-mail address is tacomlcmc.daform2028@us.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

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HOW TO USE THIS TECHNICAL BULLETIN (TB)

This technical bulletin (TB) contains general information, service life information, procedures for gauging and procedures for filling out a Product Quality Deficiency Report (PQDR) for Collapsible Fabric Fuel Tanks.

Front matter consists of a warning summary, table of contents, and instructions on how to use this manual. Section I. contains general information on the fuel tanks equipment including maintenance forms, records, reports and instructions for recommending equipment improvements. Section II. discusses Service Life of Bags. The Black, Red, Amber and Green (BRAG) rating system is defined along with an explanation of leak categories Class I thru III. Section III. explains the proper procedures for gauging. Section IV provides standard dimensions of fuel berms for all size tanks. Instructions and samples of Bulk Storage Tank Spreadsheets (BSTS) Bulk Storage Tank Record (BSTR), and Product Quality Deficiency Reports can be found in Appendices A, B and C. The rear matter consists of the authentication page, DA Form 2028 and back cover.

Technical Bulletin Organization

This Technical Bulletin is divided into four major sections that detail the topics mentioned above. Within each section, there are paragraphs covering a range of topics. Each section is numbered sequentially starting at page 1, and paragraph 1 with paragraphs numbered sequentially throughout the entire TB.

Finding Information

The Table of Contents permits the reader to quickly find the information they are seeking.

Section I. GENERAL

1. General. The procedures contained herein will be used to provide guidelines for determining collapsible fuel tank service life and fill levels. The terms collapsible fuel tank, tank and fuel bag are used interchangeably throughout this bulletin.

2. Scope. This Technical Bulletin includes additional information and clarification for the soldier when using collapsible fuel tanks. This is to supplement the existing collapsible fuel tank technical manuals. The Black, Red, Amber, Green (BRAG) rating system will establish a standardized rating system for more accurate reporting of tank conditions. It will also develop a system which aids in the prediction of tank failure while assisting in forecasting bulk fuel storage and deployment capabilities. Actions and precautions will be established for each tank rating. This Technical Bulletin also covers gauging procedures and standardized berm dimensions for collapsible fuel tanks and submitting product quality deficiency reports (PQDR).

3. Reporting Errors and Recommending Improvements.

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028 (Recommended Changes to Publications and Blank Forms), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is <https://aeeps.ria.army.mil>. The DA Form 2028 is located under the Public Applications section in the AEPS Public Home Page. Fill out the form and click on SUBMIT. Using the form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax or e-mail your letter or DA Form 2028 directly to: TACOM Life Cycle Management Command, ATTN: AMSTA-LC-LPIT/TECH PUBS, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The e-mail address is ROCK-TACOM-TECH-PUBS@conus.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

Section II. Service Life of Bags

4. This TB is the official means of rating fuel tank integrity and determining the service life of the fuel tanks.

5. Purpose:

The purpose of this document is to establish a standardized rating system for use by bulk fuel storage site supervisors to accurately record and report fuel tank conditions. The rating system will provide an assessment of the integrity of fuel tanks to prevent catastrophic fuel tank failures. The system will establish actions and precautions to be taken for each fuel tank brought under surveillance. The system can maximize the lifespan and serviceability of tanks and maintain stock objectives for bulk fuel storage. Figures show examples of some deficiencies but are not inclusive of all deficiencies that may be encountered.

6. Black, Red, Amber and Green (BRAG) Rating System:

The BRAG rating system for fuel bags is a system which places a fuel tank into a Black, Red, Amber or Green status based on the inspection criteria detailed within this document. The tank status is the means to establish an overall evaluation of each fuel tank's integrity and ability to hold fuel while allowing the site supervisor to actively manage inventory levels and preserve resources.

- a) **B**lack: Non-mission capable (NMC); non-repairable; discontinue use immediately.
- b) **R**ed: Displays evidence of failure but able to use at 50% of maximum storage capacity.
- c) **A**MBER: Signs of deterioration but able to use at 70% of the maximum storage capacity.
- d) **G**reen: Fully mission capable (FMC) able to use to 100% of maximum storage capacity.

7. Shelf Life and Service Life:

DoD 4140.27 Shelf-Life Management Manual defines Shelf-Life as: The total period of time beginning with the date of manufacture, date of cure (for elastomeric and rubber products only), date of assembly, or date of pack (subsistence only), and terminated by the date by which an item must be used (expiration date) or subjected to inspection, test, restoration, or disposal action; or after inspection/laboratory test/restorative action that an item may remain in the combined wholesale (including manufacture's) and retail storage systems and still be suitable for issue or use by the end user. Shelf-life is not to be confused with service-life (see definition).

Shelf-Life Item. An item of supply possessing deteriorative or unstable characteristics to the degree that a storage time period must be assigned to ensure that it will perform satisfactorily in service. All shelf-life items are classified as one of the following two types:

TYPE I - An individual item of supply, which is determined through an evaluation of technical test data and/or actual experience, to be an item with a definite non-extendible period of shelf-life. One exception is Type I medical shelf-life items (FSC 6505), which may be extended if they have been accepted into and passed testing for extension through the DoD/FDA Shelf-Life Extension Program (SLEP).

TYPE II - An individual item of supply having an assigned shelf-life time period that may be extended after completion of visual inspection/certified laboratory test, and/or restorative action.

COLLAPSIBLE FUEL TANKS ARE CLASSIFIED AS TYPE II SHELF-LIFE ITEMS!!!!

To simplify these definitions for our application on collapsible fuel tanks, Shelf-Life is the amount of time from when the tank is manufactured until it is used. The Army Shelf-Life policy for collapsible fuel tanks as defined in Maintenance Advisory Messages, TACOM #99-007 and #06-048 states: 12 YEARS UNDER DEPOT LIKE CONDITIONS. DEPOT STORAGE CONDITIONS ARE DEFINED AS A DRY-INDOOR ENVIRONMENT. IF A FUEL TANK IS NOT STORED UNDER DEPOT LIKE CONDITIONS, ITS SHELF LIFE IS 5 YEARS FROM THE DATE OF RECEIPT OR 12 YEARS FROM THE DATE OF MANUFACTURE, WHICHEVER COMES FIRST. An example would be: A unit receives a tank that was manufactured eleven years prior. The unit puts the tank into service six months after it is received. This would mean the tank was eleven years, six months old when it was put in service. The tank would still have a minimum service life of three years.

NOTE: Any tank put into service anytime within the shelf-life is expected to have a use / service-life of a minimum of three years.

DoD 4140.27 Shelf-Life Management Manual defines Service-Life as: A general term used to quantify the average or standard life expectancy of an item or equipment while in use. When a shelf-life item is unpacked and introduced to mission requirements, installed into intended application, or merely left in storage, placed in pre-expended bins, or held as bench stock, shelf-life management stops and service life begins.

To simplify Service-Life for collapsible fuel tanks, the Service-Life is the time from when the tank is wetted with fuel (Wet Date) until the tank becomes unserviceable. Use of the BRAG system will determine the serviceability of the tank.

The Service-Life of collapsible fuel tanks is: FROM THE WET DATE UNTIL THE TANK BECOMES UNSERVICEABLE BASED UPON RATINGS FROM THE BRAG SYSTEM.

The expected Service-Life for a collapsible fuel tank is a MINIMUM of 3 years. Anytime a tank develops enough deficiencies to change the BRAG status or becomes unserviceable prior to 3 years, a PQDR is submitted. If the tank becomes unserviceable after 3 years it is disposed of IAW local procedures.

8. Storage Capacity:

- a. The maximum storage capacity shall be set by the status of the fuel tank. Tables 1. through 5. shall be used to determine the maximum storage capacity by cross linking the fuel tank capacity and status.
- b. A reduction in a fuel tank's BRAG status will reduce the maximum storage capacity of the bulk storage site. Once the bulk storage site supervisor determines the status of a tank has changed, that change must be recorded on a Bulk Storage Tank Record (BSTR) (Appendix B). Once the tank is designated as the BRAG status Red, which is 50% of the tank's original design, the capacity will not be further reduced. When a tank is designated as BRAG status Black, command guidance will be issued for corrective actions on tank disposition and replacement.

NOTE

At locations operated by non DOD personnel, changes in tank status must be approved by a US Government representative.

NOTE

The BSTR is the record for an individual tank. The BSTS tracks all the tanks at the bulk fuel storage site. The site supervisor will use the BSTR to build the BSTS. When a bag is removed from service, the BSTR and the BSTS will be scanned and emailed to:

DAMI_AMSTA-LC-CJA@conus.army.mil

See para. 11 for details in determining BRAG status.

TABLE (1): 210,000 Gallon Fuel Tank Maximum Storage Capacity
GREEN
100% = 210,000 gal.
AMBER
70% = 147,000 gal.
RED
50% = 105,000 gal.
BLACK
0% = 0 gal.

TABLE (2): 50,000 Gallon Fuel Tank Maximum Storage Capacity
GREEN
100% = 50,000 gal.
AMBER
70% = 35,000 gal.
RED
50% = 25,000 gal.
BLACK
0% = 0 gal.

TABLE (3): 20,000 Gallon Fuel Tank Maximum Storage Capacity
GREEN
100% = 20,000 gal.
AMBER
70% = 14,000 gal.
RED
50% = 10,000 gal.
BLACK
0% = 0 gal.

TABLE (4): 10,000 Gallon Fuel Tank Maximum Storage Capacity
GREEN
100% = 10,000 gal.
AMBER
70% = 7,000 gal.
RED
50% = 5,000 gal.
BLACK
0% = 0 gal.

TABLE (5): 3,000 Gallon Fuel Tank Maximum Storage Capacity
GREEN
100% = 3,000 gal.
AMBER
70% = 2,100 gal.
RED
50% = 1,500 gal.
BLACK
0% = 0 gal.

9. Baseline Inspection:

Every tank should be free of deficiencies when removed from the manufacturer's packaging and less than 12 years old (date of manufacture). Each tank will be inspected prior to being placed into service also referred to as the service or wet date. This is the point of origin for establishing the Bulk Storage Tank Record (BSTR). The inspector will use the BSTR to record all current deficiencies and signs of deterioration. This will establish a baseline on the condition of each tank. Figure 1 provides examples of manufacturer installed patches and seam repairs that are not considered to be deficiencies. During the baseline inspection, inspectors will ensure the service / wet date is marked on the tank with a permanent means and all required information is marked on the data plate (Figure 2). The site supervisor is responsible for completing the record and determining the overall BRAG status of the fuel tank (Black, Red, Amber or Green). A copy of the BSTR shall be maintained on file by the site supervisor. **Torque of all bolts / nuts on the tank will be checked during the baseline inspection to ensure they are tightened to specification in accordance with the appropriate tank technical manual.** A properly maintained Bulk Storage Tank Spreadsheet (BSTS) (Appendix A) can provide a quick assessment condition of all the tanks at a bulk fuel storage site.

NOTE

At locations operated by non DOD personnel, changes in the tank status must be approved by a US Government representative.

NOTE

Repairs may be found on the fuel tanks which were made by the Manufacturer. Para. 9 and Figure 1 cover manufacturer repairs and should be documented in the baseline inspection process. Emergency repairs will be documented and the tank status will be assigned by the classification of leak after the repair and Table 6. Once a rating is applied to a fuel tank, the rating should never be elevated during the service life.



Figure 1. Two examples of manufacturer repairs/patches not considered deficiencies during the baseline inspection.

(These types of repairs/patches do not affect the BRAG status, but the location shall be noted on the BSTR for future monitoring and inspections.)

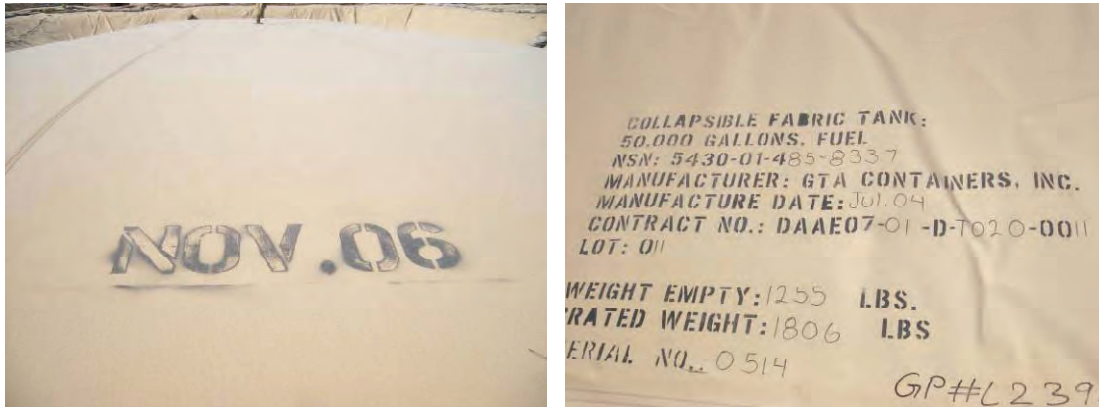


Figure 2. Photo on left shows a tank marked with its service / wet date. The photo on the right shows a data plate.

NOTE

The site supervisor was required to add missing information to the data plate. Because the data plate was missing information, the site supervisor prepared a PQDR. The missing information was found on the external wall of the tank crate.

10. Inspection Cycle:

Inspections shall be conducted on a daily basis. Adjustments to the inspection cycle can be modified by local command prerogatives. Berm liners are to be inspected for serviceability whenever the tanks are inspected. **When a deficiency is found, it should be circled and the date should be marked on the tank adjacent to the deficiency using a permanent means.** This will assist in monitoring and providing documentation for future reference.

11. Methods for Determining BRAG status:

The following information will help the site supervisor and inspector determine the BRAG status based on a visual inspection and overall condition of a fuel tank. Seeps, weeps, drips, leaks and wet spots are terms for leakage and will be identified by CLASS. The location, quantity, size and severity of leakage all contribute to determining the BRAG status of a fuel tank. Learning and understanding these leakage definitions will take hands-on experience. When in doubt, notify the site supervisor for a final decision.

BRAG STATUS

- **BRAG STATUS BLACK:** Critical – Non-Mission Capable (NMC)
- **BRAG STATUS RED:** Major
- **BRAG STATUS AMBER:** Minor
- **BRAG STATUS GREEN:** Fully Mission Capable (FMC)

CLASS OF FLUID LEAKAGE

- **Class I:** Seepage of fluid (as indicated by wetness or discoloration) not great enough to flow. (Wet Spots)
- **Class II:** Leakage of fluid (as indicated by wetness) great enough when wiped dry to reappear and flow within 30 seconds. Flow is not great enough to form puddle on ground.
- **Class III:** Leakage of fluid great enough to flow from the tank and form a puddle of fuel on ground.

Table (6): Fabric Panels

Location	Defect	Status	Description	Corrective Action
Panel	Class I Leakage		Seepage of fluid (as indicated by wetness or discoloration) not great enough to flow. (Wet Spots)	At the discretion of the site supervisor, Class I leaks can be repaired using the repair kit.
		Green	No wet spots exceeding 18 inches. 0 to 6 six wet spots on entire tank. 0 to 3 wet spots less than 12 inches in per panel. 0 to 3 wet spots exceeding 12 inches on the entire tank.	Note the location and deficiency on the BSTR and monitor.
		Amber	No wet spots exceeding 24 inches. 7 to 9 wet spots on entire tank. 4 to 6 wet spots less than 12 inches in per panel. 4 to 5 wet spots exceeding 12 inches on the entire tank.	Note the location and deficiency on the BSTR, down grade tank status to Amber, reduce fill level, monitor and submit a PQDR.
		Red	No wet spot exceeding 30 inches 10 to 15 wet spots on entire tank. 7 to 8 wet spots less than 12 inches per panel. 6 to 7 wet spots exceeding 12 inches. 2 wet spot exceeding 24 inches.	Note the location and deficiency on the BSTR, down grade tank status to Red, reduce fill level, monitor and submit a PQDR.
		Black	When limits for rating a tank RED are exceeded.	Remove tank from service. Initiate PQDR if tank was in service less than 36 months. If over 36 months of service dispose of IAW local policies.
	Class II Leakage		Leakage of fluid (as indicated by wetness) great enough when wiped dry to reappear and flow within 30 seconds. Flow is not great enough to form puddle on ground.	Note the location and deficiency on the BSTR and monitor. At the discretion of the site supervisor, Class II leaks can be repaired using the repair kit.
		Green	0 to 2 class II leaks on entire tank.	Note the location and deficiency on the BSTR and monitor.
		Amber	3 to 4 class II leaks on entire tank.	Note the location and deficiency on the BSTR, down grade tank status to Amber, reduce fill level, monitor and submit a PQDR.
		Red	5 to 6 class II leaks on entire tank.	Note the location and deficiency on the BSTR, down grade tank status to Red, reduce fill level, monitor and submit a PQDR.
		Black	When limits for rating a tank RED are exceeded	Remove tank from service. Initiate PQDR if tank was in service less than 36 months. If over 36 months of service dispose of IAW local policies.
	Class III Leakage		Leakage of fluid great enough to flow from the tank and form a puddle of fuel on	Utilize the repair kit to stop leakage. Note the location and deficiency on

			ground.	the BSTR.
		Green	1 to 2 leaks repaired with repair kit and no leakage.	Utilize the repair kit to stop leakage. Note the location and deficiency on the BSTR and monitor.
		Amber	0 to 3 Repaired with repair kit and no more than a class I leakage 3 to 4 leaks repaired with repair kit.	Utilize the repair kit to stop leakage. Note the location and deficiency on the BSTR, down grade tank status to Amber, reduce fill level, monitor and submit a PQDR.
		Red	Repaired with repair kit and no more than class II leak. 5 to 6 leaks repaired with repair kit.	Utilize the repair kit to stop leakage. Note the location and deficiency on the BSTR, down grade tank status to Red, reduce fill level, monitor and submit a PQDR.
		Black	When limits for rating a tank RED are exceeded	Remove tank from service. Initiate PQDR if tank was in service less than 36 months. If over 36 months of service dispose of IAW local policies.



Figure 3. Example of a Class I leak



Figure 4. Example of Class II leak



Figure 5. Photos show examples of Class III leak

Table (7): Seams

Location	Defect	Status	Description	Corrective Action
Seams	Class I Leakage		Seepage of fluid (as indicated by wetness or discoloration) not great enough to flow. (Wet Spots)	
		Green	No wet spots on a seam exceeding 12 inches. 0 to 5 wet spots on seams for the entire tank. 1 to 3 wet spots less than 6 inches per seam. 1 to 3 wet spots on seams exceeding 6 inches for the entire tank.	Note the location and deficiency on the BSTR and monitor.
		Amber	No wet spots on a seam exceeding 18 inches. 6 to 7 wet spots on seams for the entire tank. 4 to 5 wet spots less than 12 inches per seam. 1 to 3 wet spots on seams exceeding 12 inches for the entire tank.	Down grade tank status to Amber, reduce fill level, monitor and submit a PQDR.
		Red	No wet spot on a seam over 24 inches. 6 wet spots on seams exceeding 12 inches for the entire tank. 6 to 7 wet spots per seam less than 12 inches. 10 wet spots on seams for the entire tank. Two wet spot on a seam exceeding 18 inches.	Down grade tank status to Red, reduce fill level, monitor and submit a PQDR.
		Black	When limits for rating a tank RED are exceeded	Remove tank from service. Initiate PQDR if tank was in service less than 36 months. If over 36 months of service dispose of IAW local policies.
	Class II Leakage		Leakage of fluid (as indicated by wetness) great enough when wiped dry to reappear and flow within 30 seconds. Flow is not great enough to form puddle on ground.	Note the location and deficiency on the BSTR and monitor.
		Green	1 class II leak on a seam for the entire tank.	Note the location and deficiency on the BSTR and monitor.
		Amber	2 class II leaks on seams for the entire tank.	Down grade tank status to Amber, reduce fill level, monitor and submit a PQDR.
		Red	3 class II leaks on seams for the entire tank. 2 class II leaks on same seam.	Down grade tank status to Red, reduce fill level, monitor and submit a PQDR.
		Black	When limits for rating a tank RED are exceeded	Remove tank from service. Initiate PQDR if tank was in service less than 36 months. If over 36 months

				of service dispose of IAW local policies.
	Class III Leakage		Leakage of fluid great enough to flow from the tank and form a puddle of fuel on ground.	Note the location and deficiency on the BSTR.
		Green	No class III leaks.	
		Amber	There is no Amber rating for class III leaks on seams.	
		Red	There is no Red rating for class III leaks on seams.	
		Black	Any class III leak in a seam will rate the tank as black.	Remove tank from service. Initiate PQDR if tank was in service less than 36 months. If over 36 months of service dispose of IAW local policies.

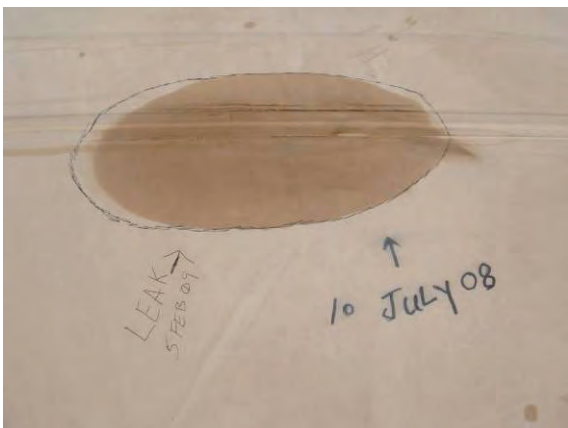


Figure 6. Example of a Class I seam leak



Figure 7. Example of a Class I corner leak

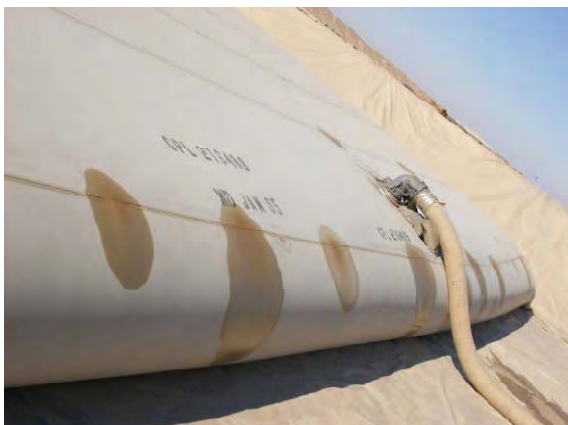


Figure 8. Example of multiple Class I/II seam leak



Figure 9. Example of a Class I/II and III seam leak

Table (8): Blisters / Separation

Location	Defect	Status	Description	Corrective Action
Blisters/Separation			<p>Blister: A blister is where the coating separates from the base fabric showing evidence of trapped vapors or fluid. If fuel is in the blister it indicates a void in the internal coating allowing fluid to pass through the base fabric but not the outer coating. A blister that does not contain fluid indicates, during diffusion, vapor has been trapped between the base fabric and outer coating.</p> <p>Separation: Separation is where the coating separates from the base fabric and shows no evidence of trapped vapors or fluid. Separation will be rated in the same manner as a blister (also called delamination).</p>	
		Green	<p>Panels: No blisters exceeding 12 inches diameter. 0 to 6 blisters on entire tank. 0 to 3 blisters less than 6 inches diameter in per panel. 0 to 3 blisters exceeding 6 inches diameter on the entire tank.</p> <p>Seams: No blisters on a seam exceeding 4 inches. 0 to 3 blisters on seams for the entire tank. 0 to 2 blisters less than 2 inches in per seam. 0 to 3 blisters on seams exceeding 2 inches for the entire tank.</p>	Note the location and deficiency on the BSTR outline and date the blister with a permanent method and monitor.
		Amber	<p>Panels: No blisters exceeding 18 inches diameter. 7 to 8 blisters on entire tank. 4 to 6 blisters less than 12 inches diameter in per panel. 4 to 5 blisters exceeding 12 inches diameter on the entire tank.</p> <p>Seams: No blisters on a seam exceeding 6 inches. 4 to 5 blisters on seams for the entire tank. 3 blisters less than 3 inches per seam. 3 blisters on seams exceeding 4 inches for the entire tank.</p>	Note the location and deficiency on the BSTR. Down grade tank status to Amber, reduce fill level, outline and date the blister with a permanent method, monitor and submit a PQDR.
		Red	<p>No blisters over 24 inches diameter. Ten blisters on entire tank. 7 to 8 blisters less than 12 inches diameter per panel. 2 blisters exceeding 18 inches diameter. 6 blisters exceeding 12 inches diameter.</p> <p>Seams: No blisters on a seam exceeding 8</p>	Note the location and deficiency on the BSTR. Down grade tank status to Red, reduce fill level, outline and date the blister with a permanent method, monitor and submit a PQDR.

			<p>inches. 6 blisters on seams for the entire tank. 3 blisters less than 4 inches in diameter per seam. 3 blisters on seams exceeding 6 inches for the entire tank.</p>	
		Black	When limits for rating a tank RED are exceeded	Remove tank from service. Initiate PQDR if tank was in service less than 36 months. If over 36 months of service dispose of IAW local policies.



Figure 10. Example of blister in panel



Figure 11. Example of blister on seam



Figure 12. Example of blister in panel that ruptured



Figure 13. Example of delamination

Table (9): Seam Separation

Seam Separation		The overlapping fabric panels are no longer adhering to each other.	
	Green	Seam separation doesn't exceed 1/4 the width of seam and no signs of leakage.	Note the location and deficiency on the BSTR and monitor.
	Amber	Seam separation exceeds 1/4 but less than 1/2 the width of seam and no signs of leakage.	Down grade tank status to Amber and reduce fill level, monitor and submit a PQDR.
	Red	Seam separation exceeds 1/2 but less than 3/4 width seam and no signs of leakage. Seam separation of any width showing signs of Class I/II leakage.	Down grade tank status to Red and reduce fill level, monitor and submit a PQDR.
	Black	When limits for rating a tank RED are exceeded	Remove tank from service. Initiate PQDR if tank was in service less than 36 months. If over 36 months of service dispose of IAW local policies.



Figure 14. Example of a seam separation (no leak)



Figure 15. Example of seam separation (leak)

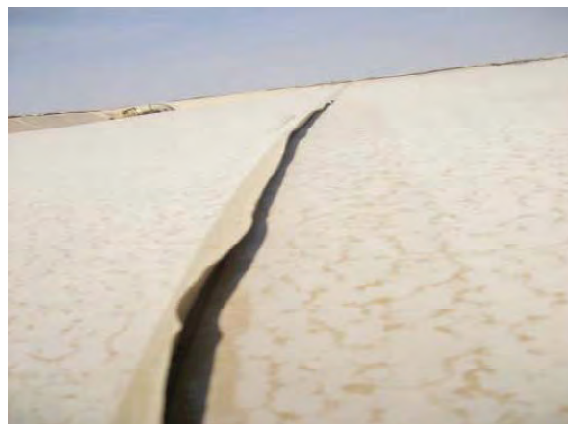


Figure 16. Some manufacturers will use a protective tape to seal the seam edge. This is not considered a seam separation where the tape is no longer adhering to the tank. This condition warrants monitoring but shall not change the BRAG status until leakage is exhibited.

Table (10): Fittings

Fittings			Follow guidance in appropriate TM for torque requirements, repair, and replacement of fittings.
	Green	No more than class I leaks	Note the location and deficiency on the BSTR and monitor.
	Amber	1 or 2 class II leaks.	Down grade tank status to Amber and reduce fill level, monitor and submit a PQDR.
	Red	3 or 4 Class II leaks. Class III leaks that have been repaired and slowed the leak to class II.	Down grade tank status to Red and reduce fill level, monitor and submit a PQDR.
	Black	When limits for rating a tank RED are exceeded	Remove tank from service. Initiate PQDR if tank was in service less than 36 months. If over 36 months of service dispose of IAW local policies.



Figure 17. Vent with class I leak



Figure 18. Closure plate with class I leak

Section III. Procedures for Gauging

12. The following steps are for gauging:

- a. Secure the cord to the bottom of the vent pipe on the bag.



Figure 19. String secured to vent.

- b. Measure the distance from the bottom of the cord to the line surface of the bag. Record the distance. This shall be completed when the cord is initially secured to the vent pipe.



Figure 20. Measuring distance.

NOTE

Use the line level for accuracy. The measurement must be to the fabric and not to the bolted plate. Each bag must have the measurement documented.

- c. Determine the reference point. Paragraph 13 describes procedures for determining the reference point. All gauging will be conducted from the reference point to maintain consistency.

NOTE

The reference point is determined when a bag is put into service.



Figure 21. Marked reference point.

- d. Attach line level to cord.



Figure 22. Line level on string.

- e. Place the gauging stick on the reference point to ensure the stick is plumb.



Figure 23. Gauging stick on marked reference point.

- f. Pull cord taut ensuring the cord is level and not touching the bag.



Figure 24. Photos depict cord pulled taut.

- g. Read the height on the gauging stick to the nearest one eighth inch.



Figure 25. Measuring the height of tank.

- e. Subtract the documented distance between the cord and the surface of the bag.

NOTE

If the manufacturer's strapping chart does not record gallons to one eighth inch, extrapolate the gallons on the strapping chart to the nearest one eighth inch.

- f. Record the height of the bag and convert to gallons.

13. Procedures to Determine the Reference Point:

- a. Secure the cord to the bottom of the vent pipe on the bag.
- b. Measure distance from the bottom of the cord to the surface of the bag. Record the distance.
- c. Pick and mark a spot next to the bag, perpendicular to the vent pipe. Attach line level to cord.
- d. Place gauging stick on reference point ensuring the stick is plumb.
- e. Pull cord taut ensuring that the cord is level and does not touch the bag.
- f. Read the height on the gauging stick. Subtract the documented distance between the cord and the bag surface.
- g. Perform steps c thru f on all sides of the bag.
- h. Add the measurements from all four sides. Divide the total by four which will be the average height of the bag.
- i. The reference point will be on the side of the bag where the measurement was closest to the average height. Mark the spot where the measurement was taken. This is the reference point.

Section IV. Fuel Berms

14. Fuel Berms:

This Technical Bulletin supersedes the dimensions of fuel berms in all manufacturers technical manuals and all other Army publications. Different manufacturers' technical manuals have various dimensions for berms. To standardize all berms, the berms in this TB have been designed to accommodate the largest dimensions the joint bag specification (MIL-PRF-32233) allows for each size bag. These designs also meet the Army requirement for a berm to hold a minimum of 100% of the product with one foot of freeboard. It is understood in many cases, the bag will be smaller than the one in the diagram. Bags with dimensions smaller than the ones in the diagram will not cause a problem; it will just leave more room from the edge of the bag to the base of the berm. Refer to FM 5-482 and FM 10-67-1 for techniques to construct a berm.

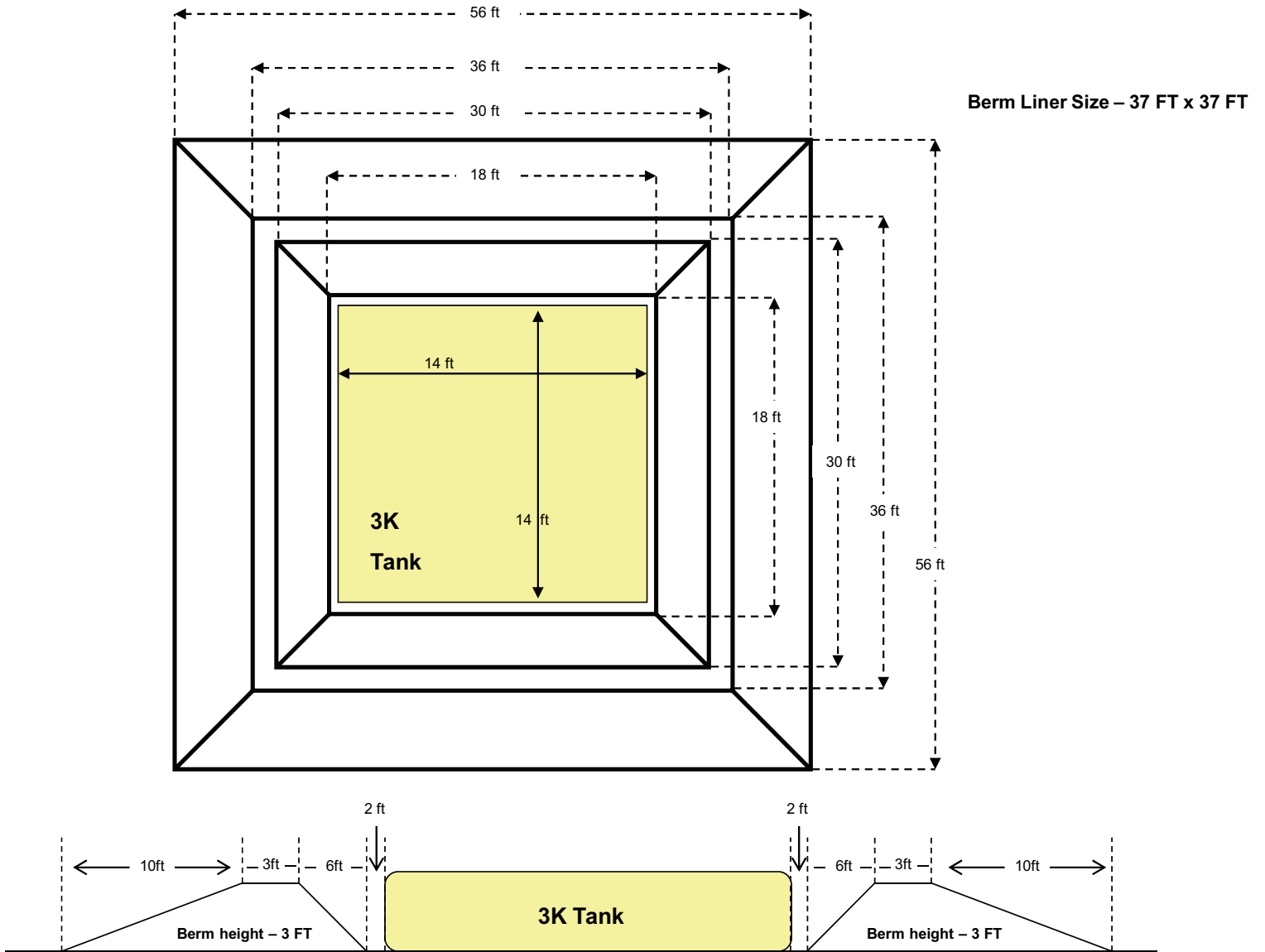


Figure 26. 3,000 Gallon Fuel Tank Berm

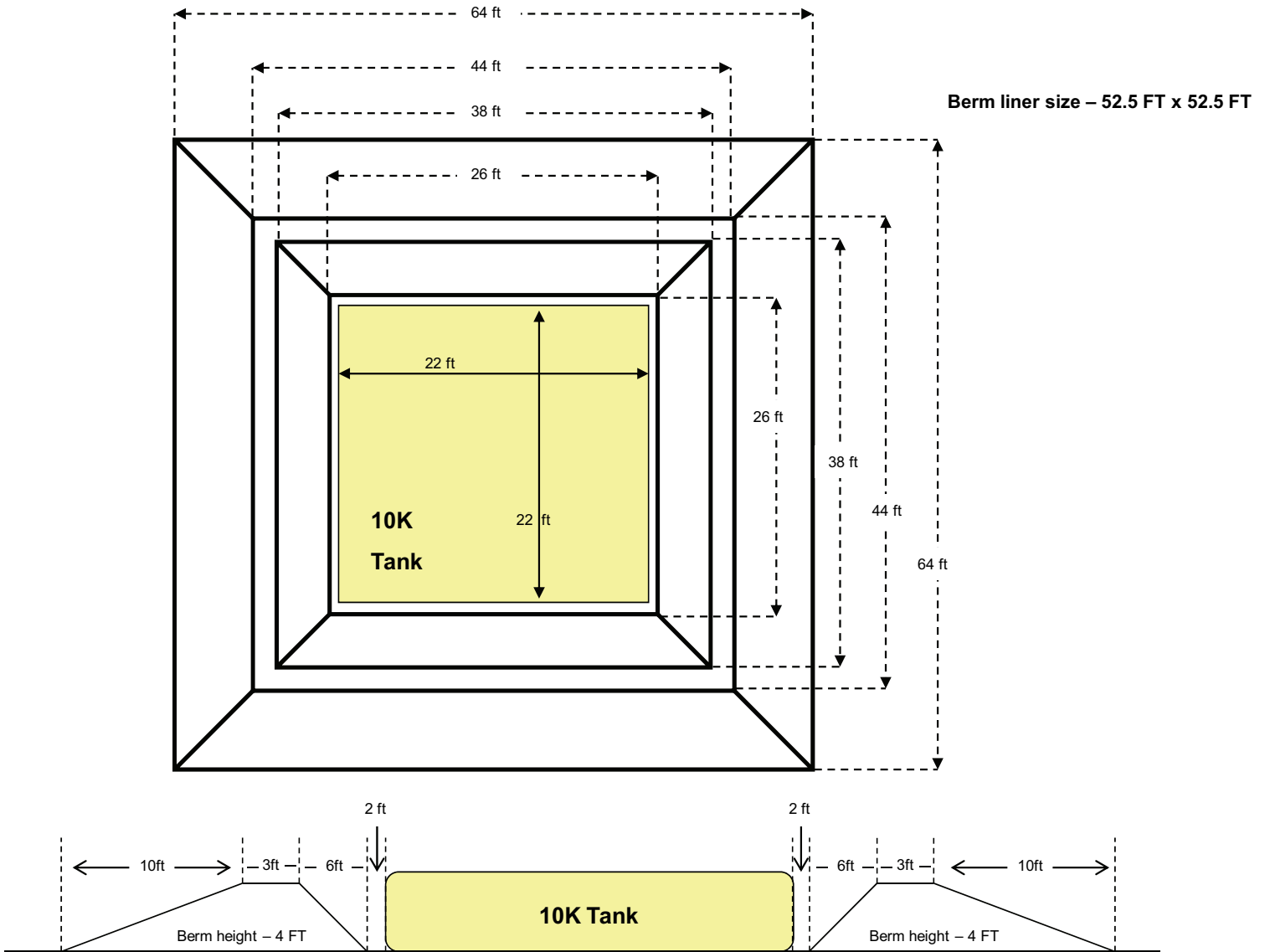


Figure 27. 10,000 Gallon Fuel Tank Berm

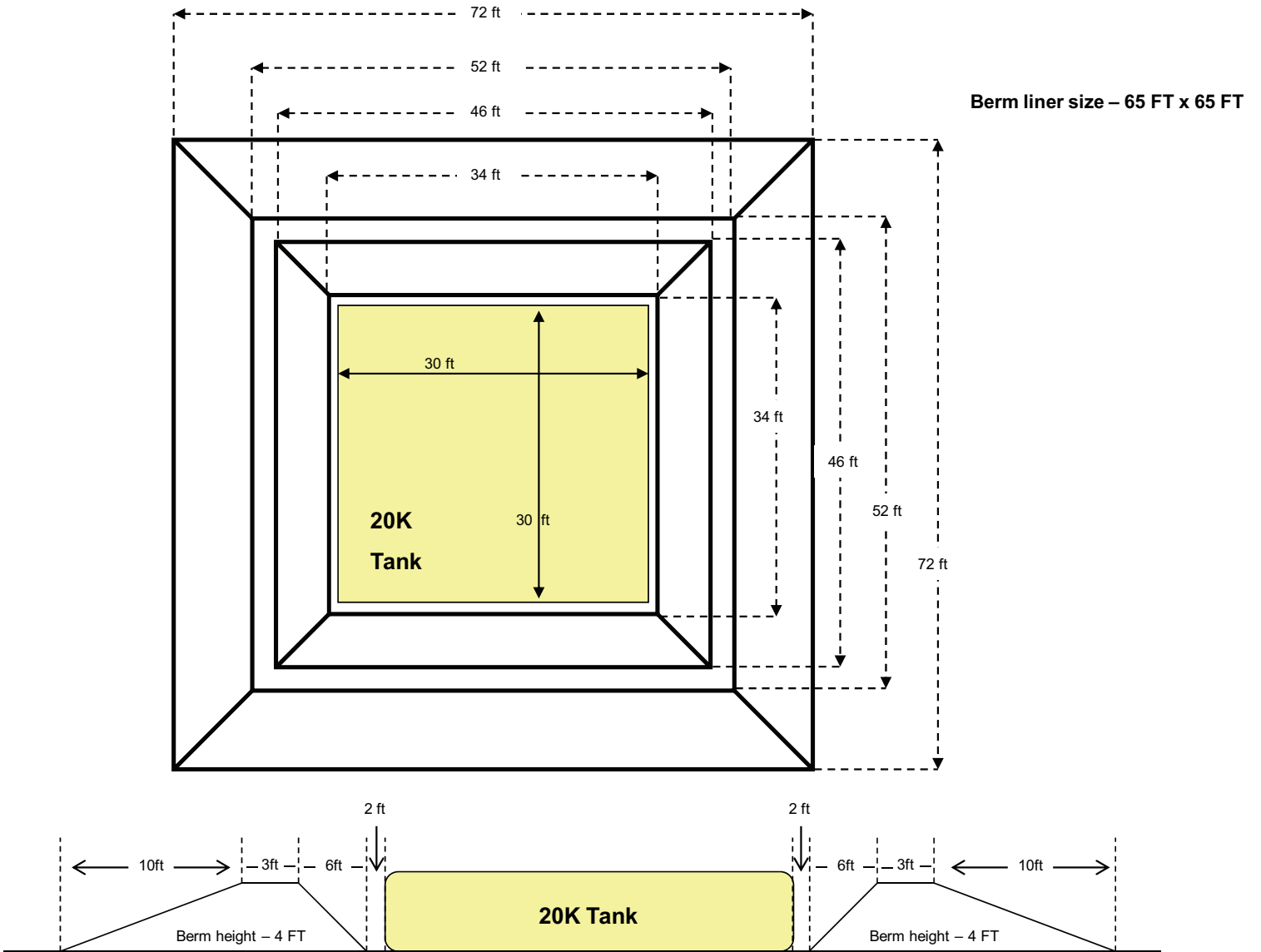


Figure 28. 20,000 Gallon Fuel Tank Berm

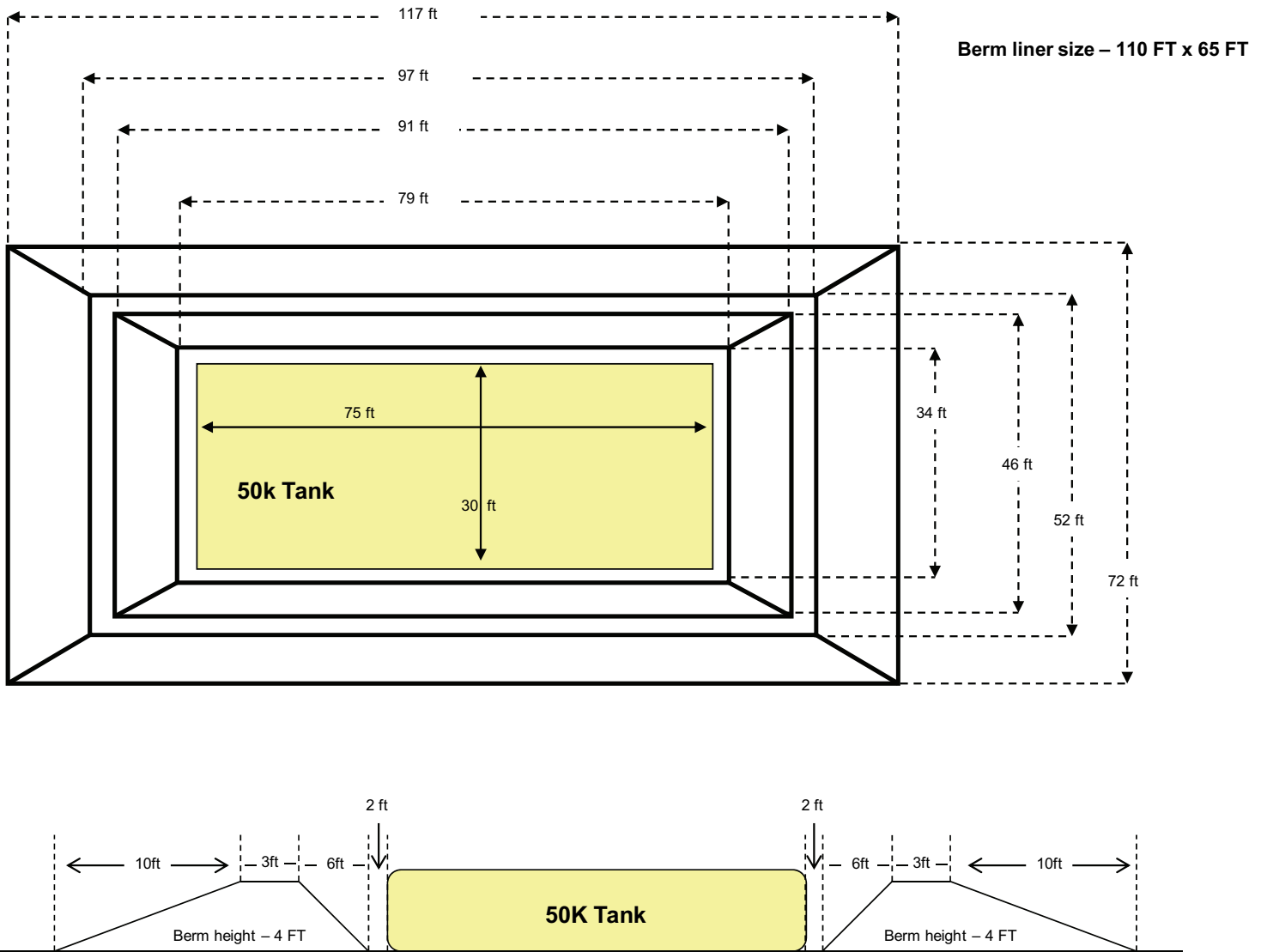


Figure 29. 50,000 Gallon Fuel Tank Berm

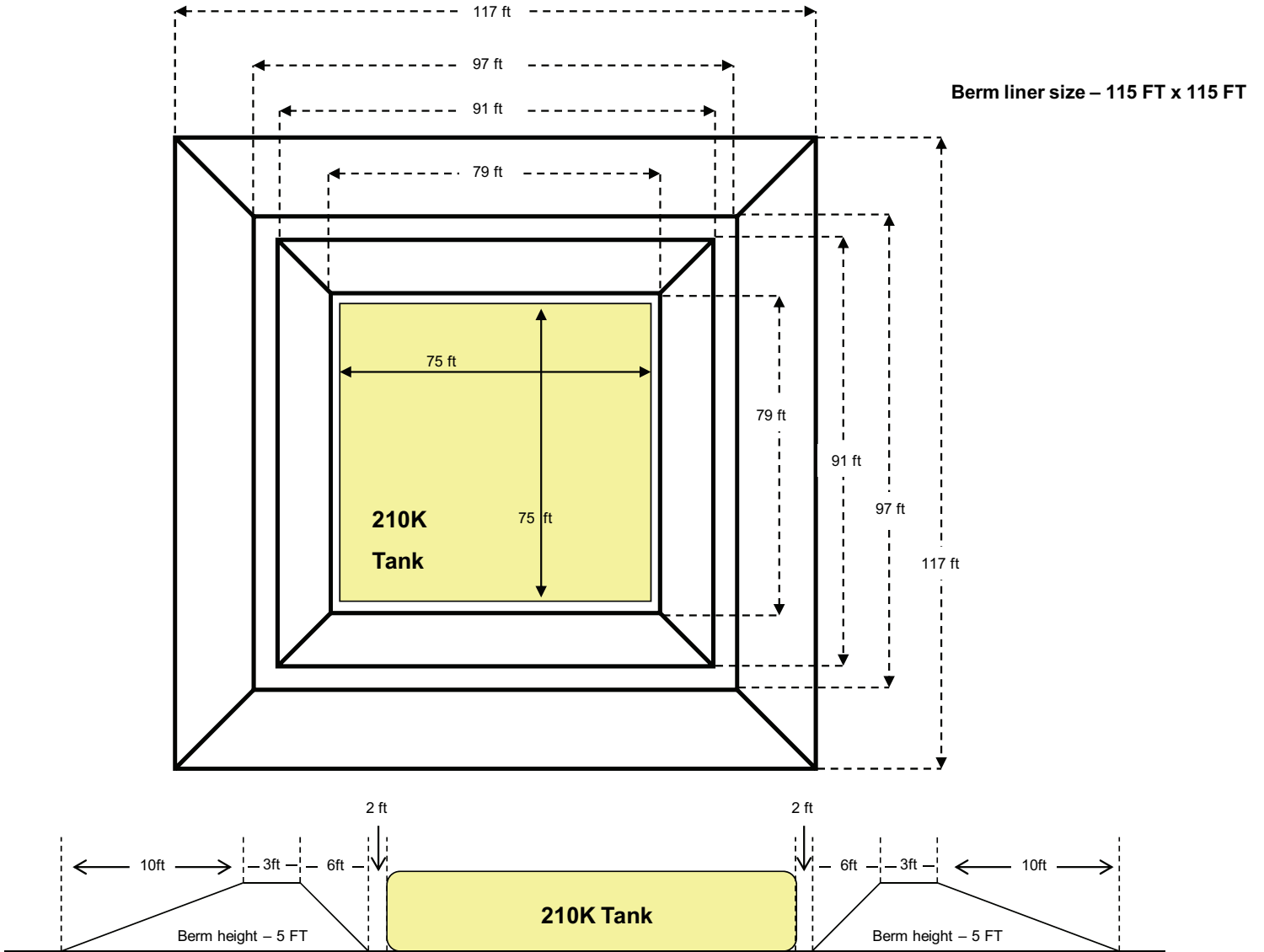


Figure 30. 210,000 Gallon Fuel Tank Berm

APPENDIX A Bulk Storage Tank Spreadsheet (BSTS)

Example of an Electronic Record for a Bulk Fuel Storage Site

Prepared By →	SGT FRAZER
Date of Report →	07-Aug-09

BAG #	PRODUCT	BAG TYPE AND SIZE	ACTUAL CAPACITY (BRAG)	LOT/SERIAL NUMBER	MANUFACTURE DATE	SERVICE DATE	BAG LIFE (Months)	BRAG	DATE OF BRAG CHANGE	REMARKS
B1	JP8	GTA 210	210,000	09/0217	Dec-05	Sep-06	35	Green		
B2	JP8	GTA 210	105,000	07/0044	Feb-04	Mar-06	41	Red	May-09	Red due to blistering
B3	JP8	GTA 210	0					N/A		Waiting berm reconstruction
B4	JP8	GTA 210	210,000	07/0196	Apr-05	Sep-07	23	Green		
B5	JP8	GTA 210	105,000	07/0152	Dec-04	Oct-05	46	Red		Red due to blistering
B6	JP8	GTA 210	210,000	03/0278	Jan-07	May-08	15	Green		
B7	JP8	GTA 210	210,000	09/0395	May-07	Mar-09	5	Green		
B8	JP8	GTA 210	147,000	05/0123	Jul-04	Mar-07	29	Amber	Mar-08	Amber due to minor seepage
B9	JP8	GTA 210	147,000	06/0147	Dec-04	May-05	51	Amber	May-09	Amber due to minor seepage
B10	JP8	GTA 210	147,000	053/0056	Feb-04	Jul-05	49	Amber		Amber due to minor seepage
B11	JP8	GTA 210	105,000	05/0017	Jun-06	Jan-07	31	Red		Red due to blistering
B12	JP8	GTA 210	0	07/0189	Mar-05	Mar-06	41	Black		Bag is Amber, black due to berm maintenance
B13	JP8	GTA 210	0	03/0077	Mar-04	Jul-05	49	Black		Bag is Green, black due to berm maintenance
B14	JP8	GTA 210	0	09/0218	Dec-05	Sep-06	35	Black		Bag is Green, black due to berm maintenance
B15	JP8	GTA 210	0	05/0113	Jun-03	Sep-07	23	N/A		Berm Maintenance
B16	JP-8	GTA 210	0	06/0107	Jun-04	Sep-07	23	N/A		Berm Maintenance
B17	JP-8	GTA 210	0	04/0295	Jan-07	Dec-08	8	N/A		Berm Maintenance
B18	JP-8	GTA 210	0	07/0373	Apr-07	Jan-09	7	N/A		Berm Maintenance
C1	Diesel	GTA 210	210,000	02/0253	Oct-06	Dec-07	20	Green		
C2	Diesel	GTA 210	147,000	04/0092	UKN	Mar-04	65	Amber	2/6/2a008	Amber due to minor seepage
C3	Diesel	GTA 210	147,000	04/0093	May-04	Jul-04	61	Amber	Feb-08	Amber due to minor seepage
C4	Diesel	GTA 210	210,000	02/0251	Oct-06	Feb-08	18	Green		
C5	Diesel	GTA 210	210,000	09/0215	Oct-04	Dec-05	44	Green		
C6	Diesel	GTA 210	0	03/0062	Mar-05	Dec-05	44	N/A	Jul-09	No bag
C7	Diesel	GTA 210	210,000	11/0439	Jun-07	Jan-09	7	Green		
C8	Diesel	GTA 210	147,000	02/0041	Jan-04	Apr-05	52	Amber		
C9	Diesel	GTA 210	210,000	07/0171	Feb-05	Nov-07	21	Green		
C10	Diesel	GTA 210	210,000	02/0264	Nov-06	Nov-08	9	Green		
M1	Mogas	GTA 210	210,000	03/0271	Nov-06	Aug-08	12	Green		
M2	Mogas		0					N/A	Jul-09	Maintenance bag
M3	Mogas	MPC 50	50,000	10/16 of 25	Jan-08	Jul-09	1	Green		
M4	Mogas	MPC 50	50,000	11/25 of 25	Jan-08	Jun-09	2	Green		
M5	Mogas	MPC 50	50,000	20/22 of 25	May-08	Jun-09	2	Green	Jul-09	

APPENDIX B

Instructions for the Bulk Storage Tank Record (BSTR)

1. Purpose:

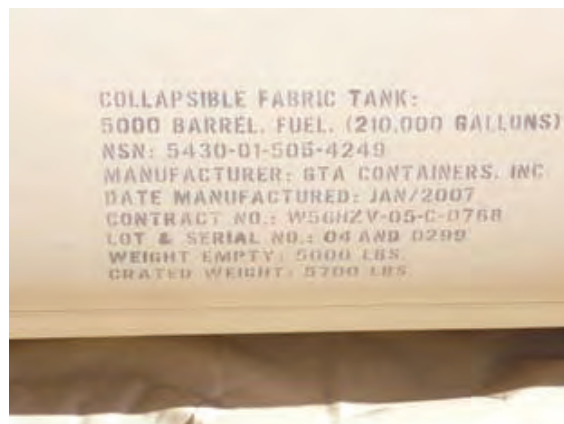
- a. To capture overall condition of an individual fuel tank.
- b. Recorded data feeds the Bulk Storage Tank Spreadsheet (BSTS, Appendix A).
- c. To ensure the quality of the tank in service and establish a timeline of deterioration in the event of tank failure.

2. Responsibility:

The DOD representative or military site supervisor providing oversight of the fuel site is responsible for completing and maintaining the record.

3. Instructions:

- a. A BSTR will be completed and maintained for all tanks in service.
- b. The BSTR will be updated as prescribed in this document or at the commander's prerogative. All changes to the condition of the tank will be annotated.
- c. Information for the BSTR heading will be obtained from the data plate (Figure B-1) located on the tank. Record all information in ink.
- d. Mark the BSTR with the tank's orientation based on another tank or other immovable object.
- e. Use the legend located on the BSTR to provide a snapshot of current conditions. This is to be done in pencil.
- f. Seepage along large areas can be addressed with a large oval circle.
- g. Annotate berm liner deficiencies.
- h. Document the initial inspection as well as all changes to the tank's condition with the date, which is necessary for documenting deterioration and repairs over time.

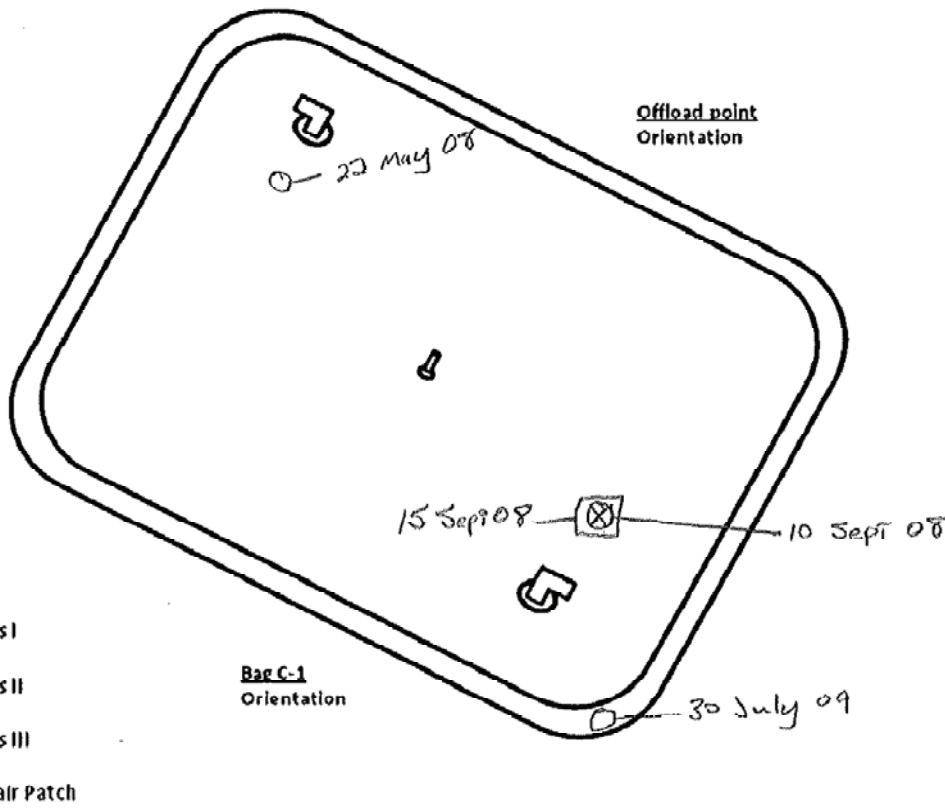


**B-1 Example of a data plate on a 210,000 gallon fuel tank.
This information can also be found stenciled on the packaging crate.**

Bulk Storage Tank Record

Location: *Cedar II*
 Manufacturer: XYZ Tanks
 Manufacture Date: Sep 07
 Lot & Serial No: 02/13
 Date In Service: 14 Jan 08
 Bag Number: B-1

Capacity: 50,000
 Product: JP8
 NSN: xxxx-xx-xxx-xxxx
 Contract #: DAAE0701DT020
 Date Out of Service:



- 14 Jan 08 – Put bag in service

- 22 May 08- 3 inch wet spot developed two feet from inlet

- 10 September 08 – 4 inch class II leak developed six feet from outlet

- 15 September 08 -Repair patch applied to Class II leak.

- 30 July 09-class I leak developed on corner seam

B-3 Example of filled out Bulk Storage Tank Record

APPENDIX C

Product Quality Deficiency Reports (PQDR): Anytime a tank develops enough deficiencies to change the BRAG status or becomes unserviceable prior to 3 years, a PQDR is submitted by the Responsible Officer of that site or equivalent. Data required to fill out a PQDR is located on the data plate of the tank and also on the shipping crate in which it was received. This information shall be written on the BSTR for each tank. If the tank becomes unserviceable after 3 years it is disposed of IAW local procedures.

How to submit a PQDR:

1. Go to web page <http://www.nslcptsmh.csd.disa.mil/webpqdr/files/ezqodr.htm>
2. Click accept.
3. In the Category block click Type II
4. In the "Is this a Repairable Item" block select Yes.
5. In the Status block select Active.
6. Block 1: Enter your DODAAC, Name, Phone Number and Email Address.
7. Block 2: Select TACOM Warren.
8. Block 3: Enter the Report Control Number- The control number is made up of your DODAAC, the last two digits of the current year and a four digit sequence of numbers for each PQDR.
Example: DODAAC - ABC123 /Year – 2009 / PQDR number 0001 = ABC123090001.
DODAAC - ABC123 /Year – 2009 / PQDR number 0001 = ABC123090001.
9. Block 4: Enter Date of Deficiency.
10. Block 5: Enter National Stock Number (NSN) for the tank. The first four digits on the NSN are the FSC. The rest of the numbers in the NSN are the NIIN.
11. Block 6: Enter the tank's Nomenclature. Example: Tank, Fabric, Collapsible, 50,000 Gallon
12. Block 7: Enter Manufacturer's CAGE Code.
13. Block 8: Enter Manufacturer's Part Number (If available).
14. Block 8a: Leave Blank.
15. Block 9: Enter the Serial Number and Lot Number of the tank. In the Type block select Serial. **This is must have information.**
16. Block 10: Enter Contract number. Block 10a and 10b leave blank.
17. Block 11: Click New.
18. Block 12: Select Manufactured and enter Manufacture Date of the Tank.
19. Block 13 thru Block 20: Leave blank.
20. Block 21: Click Other (Explain in Details)
21. Block 22: Provide as many/much details as possible. Example of information requested: product held in the tank, wet date, length of time in use, number and classification of leaks, number and size of blisters, length of seam separation, locations of deficiencies (top, side, end, seam, corner, closure plate, or drain - Please do not use left, right, front, or back to describe the location of these types of deficiencies).
22. Block 22b: Select the appropriate Defect Attribute Code.
23. Block 22d through 22g: Leave blank
24. Block 22h: Select N/A
25. Block 22j: Leave blank
26. Block 23: Enter location of fuel site. Example: Camp Buehring, Kuwait. Cedar II, Iraq. Bagram AB, Afghanistan.
27. Block 23b: Leave blank
28. Click Submit
29. You should receive two emails (to the email account you provided in Block 1) a Copy of Report Submission and Receipt of PQDR Deficiency Report. Keep these for your records and Continuity Book.
30. Maintain tank on hand until disposition instructions are received.

By Order of the Secretary of the Army:

GEORGE W. CASEY, JR.
General, United States Army
Chief of Staff

Official:



JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army

0932704

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TO: (Forward to proponent of publication or form) (Include ZIP Code) Mailing address found on title block page.						FROM: (Activity and location) (Include ZIP Code) Your mailing address.	
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PUBLICATION/FORM NUMBER: TM X-XXXX-XXX-XXX						DATE: Date of the TM.	TITLE: Title of TM.
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	0019 00 1	3	1	1		Step No. 2 says to secure doors open with locking bar or hooks from where to what? The bars or hooks are not identified.	
	0019 00 4	4	1	1		Step No. 19 states to remove locking bars, pins or hooks from where to what? The bars, pins or hooks are not identified. Where are they stored?	
SAMPLE							
<small>* Reference to line numbers within the paragraph or subparagraph.</small>							
TYPED NAME, GRADE OR TITLE Doe, John, CPL			TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION 755-1313			SIGNATURE CPL John Doe	

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PAGE NO.	COLM NO.	LINE NO.	FEDERAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

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* Reference to line numbers within the paragraph or subparagraph.

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--	--	---------------------------

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PUBLICATION/FORM NUMBER						DATE	TITLE
ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)	
* Reference to line numbers within the paragraph or subparagraph.							
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PUBLICATION/FORM NUMBER	DATE	TITLE
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PAGE NO.	COLM NO.	LINE NO.	FEDERAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPROTED	RECOMMENDED ACTION

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PAGE NO.	COLM NO.	LINE NO.	FEDERAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPROTED	RECOMMENDED ACTION

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
 1 decimeter = 10 centimeters = 3.94 inches
 1 meter = 10 decimeters = 39.37 inches
 1 dekameter = 10 meters = 32.8 feet
 1 hectometer = 10 dekameters = 328.08 feet
 1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
 1 decigram = 10 centigrams = 1.54 grains
 1 gram = 10 decigrams = .035 ounce
 1 dekagram = 10 grams = .35 ounce
 1 hectogram = 10 dekagrams = 3.52 ounces
 1 kilogram = 10 hectograms = 2.2 pounds
 1 quintal = 100 kilograms = 220.46 pounds
 1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
 1 deciliter = 10 centiliters = 3.38 fl. ounces
 1 liter = 10 deciliters = 33.81 fl. ounces
 1 dekaliter = 10 liters = 2.64 gallons
 1 hectoliter = 10 dekaliters = 26.42 gallons
 1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. lathes
 1 cu. meter = 1000 cu. decimeters = 35.31 feet

Approximate Conversion Factors

<i>To change</i>	<i>To</i>	<i>Multiply by</i>	<i>To change</i>	<i>To</i>	<i>Multiply by</i>
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	metric tons	short tons	1.102
pound-feet	newton-meters	1.356	kilograms	pounds	2.205
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F Fahrenheit temperature

5/9 (after subtracting 32)

°C Celsius temperature

