



Dryden Flight Research Center
Edwards, California 93523

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Dryden Centerwide Procedure

Code S

Aboveground Storage Tanks & Fuel Dispensing Facilities

Electronically approved by
Assistant Director for Management Systems

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1.0 PURPOSE OF DOCUMENT

This document establishes the procedure for management of aboveground storage tanks (AST), oil/water separators, and fuel dispensing operations at Dryden Flight Research Center (DFRC) as required to maintain compliance with Federal, state, and NASA regulations.

2.0 PROCEDURE SCOPE & APPLICABILITY

Scope: This procedure covers the inspection, spill control, training, operation, and maintenance of all ASTs, oil-water separators, and fuel dispensing operations located at DFRC.

Applicability: This procedure applies to all organizations at DFRC that operate ASTs containing hazardous material, an oil/water separator, and/or fuel dispensing operations.

3.0 PROCEDURE OBJECTIVES, TARGETS, METRICS, & TREND ANALYSIS

Objective:	Maintain compliance with applicable AST rules and regulations
Target:	No Notice of Violations (NOV) from enforcement agencies
Metric:	Notices of Violations

Trend Analysis: If the objective is not met, Code SH will track and trend the NOVs to identify possible causes.

4.0 WAIVER AUTHORITY

This procedure does not include waiver authority.

5.0 RESPONSIBILITIES

5.1 Owner Organizations of ASTs or Oil/Water Separators

- Act as OPR for ASTs and oil/water separators under control of the organization
- Ensure AST, AST systems, and oil/water separators are kept in good repair
- Ensure that periodic inspections are conducted as required

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- Maintain inspection records
- Report any leaks, seeps, weeps, or AST system breakdowns immediately to Code F and to Code SH Environmental
- Respond to and report HM spills immediately in accordance with [DCP-S-110](#).

5.2 Code SH Environmental Management

- Conduct periodic spot inspections of ASTs, AST systems, and oil/water separators
- Provided periodic operator training
- Act as subject matter expert on AST, oil-water separators, fuel dispensing issues, and emergency response actions.
- Act as overall DFRC AST and oil/water separator OPR and coordinate all regulator inspections or NASA Environmental Functional Reviews
- Monitor all pertinent regulations and update this document and training, as required

6.0 ABOVEGROUND STORAGE TANKS

The link for the inventory of DFRC ASTs, including primary POCs, can be found <http://xnet.dfrc.nasa.gov/Organizations/SMA/index.html> .

6.1 General

Typically, an AST or an AST system has the following features:

- Constructed of a material such as steel or plastic that is compatible with the contents
- Coated with paint to prevent corrosion
- A gauge to indicate the fill level
- A submerged fill pipe, e.g., the bottom of the fill pipe is near the bottom of the tank
- A berm designed to contain the entire contents of the tank plus, if the tank is outdoors, rainfall freeboard of 10% (110% of the largest tank inside the berm, after deducting the volume of the tanks below the height of the berm)
- A ventilation valve to relieve excessive internal pressure (pressure/vacuum relief device) caused by exposure to fire:

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- for any gasoline AST of more than 250 gallons, set to within 10 percent of the maximum allowable working pressure of the tank
- for all other tanks, the relief device will comply with NFPA 30.22.7.3, Pressure-Relieving Devices
- Piping, control valves, ventilation valves, area lighting, security fencing and locks, warning labeling or placards, etc.

6.2 Ancillary & Bulk ASTs

Ancillary and bulk ASTs are stationed at a number of locations at DFRC (see Attachment A). These ASTs contain hazardous materials such as fuels, oil, aqueous fire fighting foam, etc.

6.3 Inspection Schedule

The link to owner organizations of ASTs are available at <http://xnet.dfrc.nasa.gov/Organizations/SMA/index.html> . Code F maintenance contractor staff will perform the following tasks: Conduct inspections of the AST and AST systems by using the appropriate checklist or log at the frequency indicated below:

D-WK 242-8	DFRC Oil / Water Separator Inspection Checklist	Quarterly
D-WK 243-8	DFRC AST Berm Stormwater Drainage Log	After each significant rain event
D-WK 244-8,	DFRC Ancillary AST Inspection Checklist	Monthly
D-WK 245-8	DFRC AST Loading / Unloading Area Inspection Checklist	Weekly if AST is frequently used, prior to each use otherwise
D-WK 246-8	DFRC Bulk AST Inspection Checklist	Monthly

- Maintain inspection forms in a file, ready for inspection by auditors
- Be present at inspections by Code SH, regulators, or auditors
- Arrange for any required maintenance

6.4 Maintenance

Owner organizations will ensure maintenance of ASTs and AST systems as follows:

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- Keep in good repair at all times. This includes ensuring tank security, spill prevention and control, corrosion control, placarding and labeling, etc.
- Ensure the pressure relief device is set to within 10 percent of maximum allowable working pressure of container
- Ensure that all pressure relief devices are operational.
- Ensure that the National Fire Protection Association (NFPA) Flammable and Combustible Liquids Code and the California Fire Code requirements for installing storage tanks next to buildings, providing emergency relief vents, locating vents above nearby roof lines, and other requirements are met.
- Ensure that AST system (tank and piping) corrosion control barriers, such as paint, are maintained to prevent rust.
- Ensure that all labels are kept in good order, clean, and visible at all times.
- If the AST is located outside the DFRC or DAOF major compounds, maintain a lock on each aboveground storage tank fill port to prevent potential tampering.
- For storage tanks located within emergency generators (day tanks), lock the cabinet doors.
- Periodically check ASTs containing nonmiscible liquids, such as gasoline, for water at the bottom and promptly remove it. Operators will keep a log of all water monitoring and removal.
- Inspect berms after rain events. If there is more than ½-inch of water in the berm, it should be drained. Prior to draining, inspect the surface of the rain water for signs of tank leakage, such as a visible sheen of oil or indications of product. If product is present, contact Code SH for instructions on treating the rain water. If no product is present or if it has been properly treated, the drain valve may be opened and the rain water drained. Complete [D-WK 243-8](#), DFRC AST Berm Stormwater Drainage Log.
- Ensure access to berm drain valves is from the outside of the berm and the valve does not drain to a storm drainage ditch, a storm sewer, or sanitary sewer.
- Keep berm drain valves closed and locked when not in use.
- Do not store any materials inside of berms.

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6.5 Secondary Containment-Type AST

The following applies to secondary containment-type ASTs, e.g., Convault (self-contained concrete) tanks:

- ASTs with built-in secondary containment are required to have a liquid level indicator accessible to the delivery operator.
- The AST will be equipped with a high level alarm set to annunciate during filling when the contents reaches 90% of capacity and to automatically stop delivery when the liquid level reaches 95% of capacity. See Section 6.8, Overfill Protection
- The AST will be capable of resisting the damage from the impact of a motor vehicle, or have bollards or collision barriers.
- The AST will be provided with some means to determine the integrity of the secondary containment

6.6 Tanks Containing Flammable Substances

6.6.1 Security

The National Fire Protection Association (NFPA) Flammable and Combustible Liquids Code states: *"Unsupervised, isolated aboveground storage tanks shall be secured and marked in such a manner as to identify the fire hazards of the tank and the tank's contents to the general public."*

Tanks located inside the DFRC or DAOF major compounds are secured by fencing and guards. Tanks located outside the major compounds that are not similarly secured will have their fill ports locked when not in use.

6.6.2 Marking and Labeling

Ensure tanks are marked to designate the flammability rating of the tank contents. Mount red diamond placards stating "Flammable 2" or the NFPA diamond placards discussed in NFPA 30.21.7.2.1 that include the health, flammability, and stability ratings of the tank's liquid contents. As a minimum, attach at least one placard on the side of the tank that faces the roadway or the primary right-of-way for approaching emergency vehicles to the tank location. Include complete signage (i.e., "Danger: Diesel Fuel" and flammability rating placards) at all fuel tank locations. In addition, include signage that states "No Smoking".

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NFPA 30.21.7.2.1 gives guidance for marking tanks containing nonflammable hazardous materials. In general, a diamond shaped marker should be placed on the side of the tank where it can be seen. The marker should comply with the requirements of NFPA 704. Consult with Code SH for guidance.

6.6.3 Piping and Valves

Only piping for product, utility, or fire protection purposes, directly connected to a tank, will be routed through a bermed area. Other than vents or relief valves, each connection to an AST through which liquid can normally flow will be provided with a shut-off valve as close to the shell of the tank as possible. Openings for gauging will have vapor-tight caps or covers. Aboveground piping will have appropriate corrosion control. In addition, underground piping will be cathodically protected. Piping systems will be bonded and grounded in accordance with NFPA 30.6.5.4. Each loading and unloading riser will be marked to identify the product for which it is to be used.

6.7 **Spill Response**

Major spills must be responded to following procedures in [DCP-S-110](#), Emergency Preparedness and Response for Hazardous Material Releases.

6.8 **Overfill Protection**

All ASTs over 1320 gallons (5000 L) will either be provided with high-level detection devices that incorporate a gauging and alarm system to prevent overfill during filling operations, or will follow the following procedure (NFPA 30.21.7.1):

Tanks shall be gauged at intervals in accordance with established procedures by NASA personnel continuously on the premises during the product delivery. Acknowledged communications shall be maintained with the supplier so flow can be shut down. The initial gauging shall be used to determine the approximate quantity of needed product and the supplier shall be informed to terminate delivery when the tank is within 5% of full.

Where the AST is equipped with an automatic gauging and alarm system, the NASA person present during the delivery will be familiar with the manufacturers written operation instructions and procedures.

7.0 GAS STATION AST SYSTEM

The gas station AST system will be maintained and labeled as described in Section 6.1, above. This system is unique in that it includes fuel dispensing and vapor recovery systems. In addition, gasoline is regulated by the State to ensure emissions reductions.

7.1 Vapor Recovery / Fuel Dispensing System

This system is regulated by the California Air Resources Board (CARB) Executive Order G-70-7-AD (Exhibit 4 – Minimum Maintenance Requirements for the Hasstech VCP Systems) and/or system documentation. The operator must be prepared for an inspection by the Kern County Air Pollution Control Authority (KCAPCD) at any time. In addition:

- Gasoline tank vapor recovery systems true vapor pressure will be measured annually using Reid vapor pressure [ASTM D323 - 08 Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)] modified by maintaining hot water bath at storage temperature, or as otherwise required by KCAPCD regulations
- The gasoline tank's VOC destruction device (burner) will be tested annually using appropriate KCAPCD methods
- The gas station maintenance contractor will perform all scheduled maintenance on the dispensing system, such as hoses and nozzles, and vapor recovery system specified by the manufacturer.
- The gas station maintenance contractor will keep a log of all maintenance conducted on the gas station and maintain the log for inspection by Code SH, regulatory agencies, or other auditors.

7.2 Gasoline Turnover / Delivery

13 California Code of Regulations (CCR) 2262.4 requires that gasoline distributed by wholesale purchaser consumers like NASA must meet specific Reid Vapor Pressure (RVP) requirements during the regulatory control period of May 1 and October 1. CARB requires use of oxygenated gasoline during summer months. Therefore, the gas station operator must ensure that turnover is monitored and that the last fuel dump prior to the May 1 switchover dated is with the required oxygenated fuel, so that only oxygenated fuel is dispensed from May 1 to October 1.

Bulk ASTs such as gas station tanks are required to comply with the SPCC regulations in CFR 112.7 related to fuel delivery trucks. Specifically, a secondary means of containment such as dikes or

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catchment basins should be furnished for the largest single compartment or tank on the truck.

In addition, special requirements are required by CARB, NFPA, or CFR 112.7 for delivering fuel to the gas station AST. The NASA person present at fuel deliveries will provide a copy of the procedure in Appendix A to the delivery truck driver. Both personnel will be familiar with these requirements prior to beginning a delivery.

7.3 Spill Response

Spills must be responded to following procedures in [DCP-S-110](#), Emergency Preparedness and Response for Hazardous Material Releases.

7.4 Fuel Dispensing

The dispensing system will be maintained to comply with NFPA 30A, Chapter 6, Fuel Dispensing Systems. If fuel is dispensed into a portable container, the container must be constructed of metal, have a tight closure, and be fitted with a spout or so designed that the contents can be poured without spilling.

Operating instructions for fuel dispensers will be conspicuously posted in the dispensing area. The instructions will include location of emergency controls and a requirement that the user stay outside of the vehicle and in view of the fueling nozzle during dispensing. In addition, warning signs will be conspicuously posted in the dispensing area with the following wording required by NFPA 30A.9.2.5.4:

- Emergency Instructions
In case of fire or spill
- (1) Use emergency stop button
 - (2) Report accident and location by calling 911 or DFRC Security at X3256

The telephone at the dispensing island must be kept in good repair to provide means to notify the fire department of emergencies.

8.0 OIL/WATER SEPARATORS

Oil/water separators are typically installed either partially above or completely below ground surface. They are considered control devices, not storage containers.

8.1 Inspections

Owner organizations are responsible for ensuring that oil/water separators are visually inspect quarterly using [D-WK 242-8](#), DFRC Oil / Water Separator Inspection Checklist. If there are signs of leakage or if an unusual material is found in the separator (indicating a spill upstream), contact Code SH immediately.

8.2 Maintenance

Owner organizations will ensure that oil/water separators are kept in good repair at all times and are cleaned often enough to prevent blockage or break-through of contamination to the downstream side (outflow). Contact Code SH for disposal of spoils after cleaning.

8.3 Spill Response

Major spills must be responded to following procedures in [DCP-S-110](#), Emergency Preparedness and Response for Hazardous Material Releases.

9.0 TRAINING

Code SH will conduct annual AST and oil/water separator training for all tank owner organization POCs. The training will address inspection, recordkeeping, and maintenance procedures, and the requirements of the EAFB Spill Prevention, Control, and Countermeasure Plan.

10.0 MANAGEMENT RECORDS & RECORDS RETENTION

Records are preserved, maintained, and disposed of in accordance with NPR 1441.1, NASA Records Retention Schedules, and DFRC records management procedures.

- All inspection checklists and logs will be retained by the responsible organization for a minimum of 3 years.
- All training logs will be maintained by the appropriate supervisor for a minimum of 3 years.

11.0 RELEVANT DOCUMENTS

11.1 Authority Documents

G-70-7-AD	California Air Resources Board (CARB) Executive Order
NPD 8500.1	NASA Environmental Management
NPR 8553.1	NASA Environmental Management System
NFPA 30	National Fire Protection Association, Storage of Liquids in Tanks – Aboveground Storage Tanks
NFPA 30A	National Fire Protection Association, Motor Fuel Dispensing Facilities
NFPA 704	Signs and Labeling
NASA-STD-8719.11	Safety Standard For Fire Protection
CARB EO 6-70-7-AD, Exhibit 4	California Air Resources Board Executive Order, Minimum Maintenance Requirements for the Hasstech VCP Systems
13 CCR 2262.4	California Code of Regulation, Procedures for Evaluating Alternative Specifications for Phase 2 Reformulated Gasoline Using the California Predictive Model
CFR 112.7	Spill Prevention, Control, and Countermeasures

11.2 Reference Documents

DCP-S-110	Emergency Preparedness and Response for Hazardous Material Releases
ASTM Method No. D-323-82	Vapor Pressure of Liquids

11.3 Informational Documents

EAFB Spill Prevention, Control, and Countermeasure Plan

11.4 Forms

D-WK 242-8	DFRC Oil / Water Separator Inspection Checklist
D-WK 243-8	DFRC AST Berm Stormwater Drainage
D-WK 244-8	DFRC Ancillary AST Inspection Checklist

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- [D-WK 245-8](#) DFRC AST Loading / Unloading Area Inspection Checklist
[D-WK 246-8](#) DFRC Bulk AST Inspection Checklist

12.0 ACRONYMS & DEFINITIONS

12.1 Acronyms

AST	Aboveground storage tank
DAOF	Dryden Aircraft Operations Facility
HM	Hazardous materials
KCAPCD	Kern County Air Pollution Control District
NFPA	National Fire Protection Association
NOV	Notice of Violation
OPR	Office of primary responsibility
PID	Photo ionization detector
POC	Primary organizational contact
VOC	Volatile organic compound

12.2 Definitions

Aboveground storage tank	A tank that contains hazardous material, is larger than 55 gallons, and is less than 10% is below ground level.
AST System	The complete hazardous material system that includes the AST, filling and dispensing lines, valves, gauges, spill control berms and equipment, tank vents, loading and unloading areas, and anything else that is associated with the AST.
Ancillary AST	A tank that supports a generator, an electrical transformer, a waste cooking-oil, etc.
Berm	A barrier constructed to contain spills or leaks from a tank.
Bulk AST	A tank that supports multiple customers.
Grease sweep	Granular absorbent.
Leak	A visible flow from a hole or crack in an AST system component, either steady or intermittent.
Oil/water separator	A chambered tank that separates oil from a waste stream.

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Product	The contents of an AST.
Seep	A very slow leak.
Sump	The pan under each pump to contain leaks.
Weep	A very slow leak that causes a visible stain on an AST system component, but has not yet accumulated in a puddle.

Appendix A: Fuel Delivery

The following procedure will be used during fuel deliveries at the gas station:

- Verify and document vacuum shown on the system vacuum gauge during gasoline delivery.
- Ensure the entrance gate is fully open to allow access to the eye wash.
- Ensure that the grounding straps are electrically connected to the delivery truck to discharge static electricity.
- Ensure the engine of delivery truck or motors of auxiliary or portable pumps is shut down during the making and breaking of hose connections.
- Both NASA and delivery truck personnel will not begin delivery until they have determined that the tank has sufficient available capacity.
- Ensure there is both an automatic and manual procedure for emergency shut-down of the delivery.
- Check tank-fill adapters and tank-fill vapor line dry-break for leaks after fill operation.
- Ensure all gates and valves are relocked after the delivery operation.
- Cleanup any spilled or splashed fuel with grease sweep.
- Ensure that some method is used (such as chocks) to prevent vehicles from leaving before the transfer lines have been disconnected prior to filling and departure of any tank truck.
- Ensure that before leaving, the lowermost drain and all outlets of delivery trucks are closely examined for leakage and tightened, adjusted, or replaced if necessary to prevent liquid leakage while in transit.

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