

SP001 Monthly Tank Inspections

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SP001 Monthly Tank Inspections

Objectives

- Review of how industry standards apply to SPCC/APSA
- Provide brief review of SP001 Inspection Standard & key concepts
- Provide background on SP001 monthly inspection content
- Review major items to check and how to complete monthly checklist

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SP001 Monthly Tank Inspections

Disclaimer

- This presentation provides general information about conducting monthly inspections under the SP001 industry standard. This information is presented as guidance, and is not a statute or regulation.
- The universe of ASTs and tank systems is exceptionally diverse, as is the equipment installed on these systems. Some specific equipment on certain tanks may not be covered by the Standard—these are to be inspected following the manufacturer recommended inspection/testing schedules and procedures

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How do STI Inspections Relate to SPCC/APSA Requirements?

SPCC Plan requires integrity testing of Bulk storage containers in 40CFR112.8(c)(6)

(6) Test or inspect each aboveground container for integrity on a regular schedule and whenever you make material repairs. You must determine, **in accordance with industry standards**, the appropriate qualifications for personnel performing tests and inspections, the frequency and type of testing and inspections, which take into account container size, configuration and design (such as containers that are: shop-built, field-erected, skid mounted, elevated, equipped with a liner, double-walled, or partially buried)....

This requirement applies to all SPCC Plans, including Tier I and Tier II Plans. Applies similarly to APSA

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What is SP001?

- Industry standard that contains a comprehensive scope, including considerations of other regulations, codes, laws, and other requirements, including SPCC and Fire Code
- Developed using a consensus process, using a group of experts
- SP001 requires periodic (monthly & annual) inspections using checklists; inspections typically performed by facility staff
- For certain tank sizes and configurations, separate Formal External or Internal Inspections are required to be conducted by STI-trained and certified inspectors, in addition to the periodic inspections

Having the complete standard is essential for understanding the key concepts, definitions, schedules, and many other details of this body of knowledge.



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SP001 Scope

Inspection of three types of ASTs

- Shop Fabricated Tanks
- Small Field Erected Tanks
- Portable Containers

Tanks storing stable, flammable and combustible liquids:

- Operating at atmospheric pressure
- Operating temperatures between ambient and 200° F
- 2018 Edition added tanks storing thermoplastic liquids, such as asphalt cement, that are solids at room temperature and become molten upon heating—typically stored in liquid phase at temperatures from 200-500° F

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SP001 Basics

- SP001 uses a tank categorization scheme based on the installed AST features and risks to the environment.
- Two important concepts in SP001 that comprise the elements of the categorization include
 - **Spill Control:** A means of preventing a release of liquid from the tank including adjoining property and waterways: Common types include
 - Secondary Containment Systems
 - Steel diked ASTs
 - Double wall ASTs
 - Others
 - **Continuous Release Detection Method (CRDM):** A means of detecting a release of liquid through the inherent design of the tank system. Examples include:
 - Double wall ASTs, or double bottom ASTs
 - Elevated ASTs
 - Release Prevention Barriers (RPB)-a liquid containment barrier installed under the tank to divert leaks toward the perimeter of the AST where they can be easily detected, and to prevent liquid from contaminating the environment--e.g., liners, concrete pads, etc.

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Tank Categories

SP001 uses tank categorization hierarchy, based on risk of release

Category 1-tanks that have:

- Spill Control (Secondary Containment) and
- Continuous Release Detection Method (CRDM)

Category 2-tanks that have:

- Spill Control (Secondary Containment) but no CRDM

Category 3-tanks that have:

- No Spill Control (Secondary Containment)

Less risky, more safeguards



More risky, few safeguards

Note that tanks without spill control would not typically conform to SPCC regulations, unless a PE prepared an impracticability determination. It would still remain a Category 3 tank for SP001 purposes.

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Tank Categories

- Category 1: ASTs with both spill control and CRDM
- Spill control provided by engineered concrete berm
- CRDM provided by elevated tank



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Tank Categories

- Category 2: ASTs with spill control, but not CRDM

This site has spill control provided by the earthen dike/berm

The large tank in the photo center rests directly on the earthen bermed area, and a release could occur through the tank bottom and go undetected



Photo Credit: STI/SPFA

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Inspection Standards for Shop Fabricated Tanks

- Category 3: ASTs without spill control

Note that Category 3 tanks would normally not meet SPCC bulk storage container sized secondary containment requirements in 40CFR112.8(c)



Spelling: -5 points

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Inspection Standards for Shop Fabricated Tanks

- In addition to the routine monthly and annual inspections performed by the owner, the need for formal inspections (conducted by STI-Certified inspectors) is based on the tank category and tank size
- The certified inspection frequency is dependent upon the tank category and size. Leak testing is also required in some circumstances
- See Table 5.5 of the SP001 Standard for specifics

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Inspection Schedules

TABLE 5.5 TABLE OF INSPECTION SCHEDULES

AST Type and Capacity in U.S. gallons (liters)		Category 1	Category 2	Category 3
Shop-Fabricated ASTs	0 – 1100 (0-4164 liters)	P	P	P, E&L(10)
	1101 - 5,000 (4168-18,927 liters)	P	P, E&L(10)	[P, E&L(5), I(10)] or [P, L(2), E(5)]
	5,001 - 30,000 (18,931-113,562 liters)	P, E(20)	[P, E(10), I(20)] or [P, E(5), L(10)]	[P, E&L(5), I(10)] or [P, L(1), E(5)]
	30,001 - 75,000 (113,566-283,906 liters)	P, E(20)	P, E&L(5), I(15)	P, E&L(5), I(10)
Portable Containers		P	P	P**

P = Periodic Inspection (Owner’s Inspector)
 E = Formal External Inspection (Certified Inspector)
 I = Formal Internal Inspection (Certified Inspector)
 L = Leak Test (Owner or designee)

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STI SP001 Monthly Inspection Checklist

General Inspection Information:

Inspection Date: _____	Prior Inspection Date: _____	Retain until date: _____
Inspector Name (print): _____	Title: _____	
Inspector's Signature _____		
Tank(s) inspected ID _____		
Regulatory facility name and ID number (if applicable) _____		

Inspection Guidance:

- This checklist is intended as a model. Locally developed checklists are acceptable as long as they are substantially equivalent (as applicable). Inspections of multiple tanks may be captured on one form as long as the tanks are substantially the same.
- For equipment not included in this Standard, follow the manufacturer recommended inspection/testing schedules and procedures.
- The periodic AST inspection is intended for monitoring the external AST condition and its containment structure. This visual inspection does not require a Certified Inspector. It shall be performed by an owner's inspector per paragraph 4.1.2 of the standard.
- Upon discovery of water in the primary tank, secondary containment area, interstices, or spill container, remove promptly or take other corrective action. Inspect the liquid for regulated products or other contaminants and dispose of properly.
- Non-conforming items important to tank or containment integrity require evaluation by an engineer experienced in AST design, a Certified Inspector, or a tank manufacturer who will determine the corrective action. Note the non-conformance and corresponding corrective action in the comment section.
- Retain the completed checklists for at least 36 months.
- **After severe weather (snow, ice, wind storms) or maintenance (such as coating) that could affect the operation of critical components (normal and emergency vents, valves), an inspection of these components is required as soon as the equipment is safely accessible after the event.**

ITEM	STATUS	COMMENTS / DATE CORRECTED
Tank and Piping		
1	Is tank exterior (roof, shell, heads, bottom, connections, fittings, valves, etc.) free of visible leaks? <i>Note: If "No", identify tank and describe leak and actions taken.</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No
2	Is the tank liquid level gauge legible and in good working condition?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3	Is the area around the tank (concrete surfaces, ground, containment, etc.) free of visible signs of leakage?	<input type="checkbox"/> Yes <input type="checkbox"/> No

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STI SP001 Monthly Inspection Checklist

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SP001 Monthly Inspection Questions Tank and Piping

Is tank exterior (roof, shell, heads, bottom, connections, fittings, valves, etc.) free of visible leaks? If no, identify tank and describe leak and actions taken Yes No

Why of Concern? To be able to identify leaks and repair. By being visible for inspection, small leaks can be addressed before they become larger leaks

How to Check: Follow question content and inspect all exterior portions of the tank, including connections, fittings, and valves.

Leaks are far more common on connections to the tank than from the tank shell—it's rare to have the tank shell itself leak. Data from studies conducted in Florida reveal that releases from the tank shell occur in only about 5% of the cases studied. Connections to tank are much more common locations to have releases



Photo credit: Marty Brownfield

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SP001 Monthly Inspection Questions

Is the tank liquid level gauge legible and in good working condition? Yes No NA

Why of Concern? Proper gauge operation is essential to preventing overfills and knowing proper inventory levels

How to Check: One way to determine if the gauge is operable is to compare the level on the gauge with that from another means to check the tank level, such as with a gauge stick. You'll need a tank chart for this for most clock gauges.



Electronic gauge with magnetostrictive probe



Clock Gauge



Simple Float Gauge



Gauge stick

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SP001 Monthly Inspection Questions

How much fuel is in this tank?

Tank chart



(all dimensions are inches)			Length	Width	Height		
External Dimensions			277	96	105		
Internal Dimensions			263.25	82.25	86		
Nominal Capacity			8,000 Gallons				
100% Tank Capacity			8,060 Gallons		93.73	Gallons-per-Inch	
Inches	Gallons	Inches	Gallons	Inches	Gallons	Inches	Gallons
1/8	12	16	1500	40	3749	64	5998
1/4	23	17	1593	41	3843	65	6092
3/8	35	18	1687	42	3937	66	6186
1/2	47	19	1781	43	4030	67	6280
5/8	59	20	1875	44	4124	68	6373
3/4	70	21	1968	45	4218	69	6467
7/8	82	22	2062	46	4311	70	6561
1	94	23	2156	47	4405	71	6655
		24	2249	48	4499	72	6748
1	94	25	2343	49	4593	73	6842
2	187	26	2437	50	4686	74	6936
3	281	27	2531	51	4780	75	7029
4	375	28	2624	52	4874	76	7123
5	469	29	2718	53	4968	77	7217
6	562	30	2812	54	5061	78	7311
7	656	31	2906	55	5155	79	7404
8	750	32	2999	56	5249	80	7498
9	844	33	3093	57	5342	81	7592
10	937	34	3187	58	5436	82	7686
11	1031	35	3280	59	5530	83	7779
12	1125	36	3374	60	5624	84	7873
13	1218	37	3468	61	5717	85	7967
14	1312	38	3562	62	5811	86	8060
15	1406	39	3655	63	5905		

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SP001 Monthly Inspection Questions Tank Foundation/Supports

Is the area around the tank (concrete surfaces, ground, containment, etc.) free of visible signs of leakage? Yes No

Why of Concern? Visual integrity check

How to Check: Inspect area around the tank following the inspection content. Dark areas of staining are clues that leaks may be occurring. Check areas above stained areas for source of leak.

Key Notes: 40 CFR 112.8(c)(10): You must promptly remove any accumulations of oil in diked areas



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SP001 Monthly Inspection Questions Tank and Piping

Is the primary tank free of water or has another preventative measure been taken? **NOTE: Refer to paragraphs 6.10 and 6.11 of the standard for alternatives for Category 1 tanks. N/A is only appropriate for these alternatives.** Yes No N/A

Why of Concern? Water is not only corrosive to steel, it also can serve as a media for microbial growth. Certain microbes can rapidly accelerate corrosion and lead to premature tank failure. Water also affects fuel quality and can impact downstream equipment operability

How to Check: Common methods used include water finding pastes and water discriminating sensors on ATG probes on electronic monitoring systems.

Key Notes: Water checks are particularly important for emergency generator systems, where fuels rarely get used. For critical operations, fuel polishing is recommended. More sophisticated testing on fuel samples can also be performed by commercial fuel testing labs, and usually includes other parameters

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AUG  6, 2020 11:39 AM

SYSTEM STATUS REPORT
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ALL FUNCTIONS NORMAL

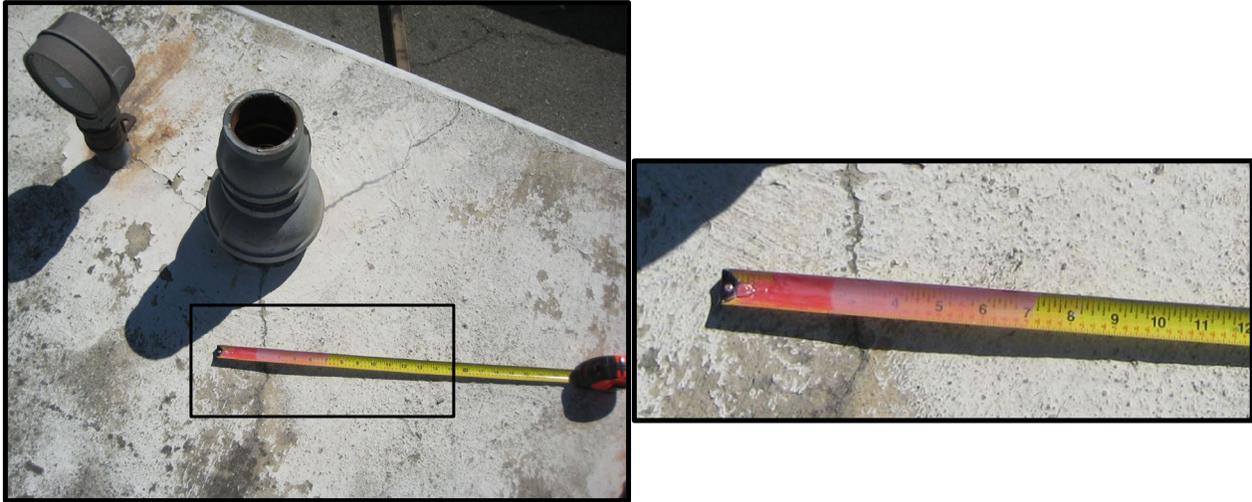
INVENTORY REPORT

T 1:DIESEL
VOLUME      = 928 GALS
ULLAGE      = 1585 GALS
90% ULLAGE  = 1333 GALS
TC VOLUME   = 918 GALS
HEIGHT      = 23.63 INCHES
WATER VOL   = 0 GALS
WATER       = 0.00 INCHES
TEMP        = 82.5 DEG F

* * * * * END * * * * *
    
```

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SP001 Monthly Inspection Questions Using Water Finding Paste



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SP001 Monthly Inspection Questions-Water Checks

Alternatives for Category 1 tanks:

- If facility meets performance criteria in 6.10.2, checks may move to annually-if no measurable amounts of free-standing water are found during four consecutive months, the frequency can move to annual for Category 1 tanks
- For Category 1 tanks, if written program to ensure water is removed or treated on a regular basis (6.11)

See SP001 Section 6 for more details on these provisions

Some ASTs do not require water checks

- ASTs containing miscible liquids (6.10.3)
- ASTs completely emptied every 120 days or less (6.10.4)
- ASTs containing liquids agitated on a schedule (6.10.5)
- ASTs containing thermoplastics (6.10.6)

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SP001 Monthly Inspection Questions Tank Foundation/Supports

For double-wall or double bottom tanks or CE-ASTs, is interstitial monitoring equipment (where applicable) in good working condition?

Yes No N/A

Why of Concern? Checks of interstitial monitoring equipment (typically ports, mechanical, or electronic monitors) are essential to determine primary tank leakage.

How to Check: Inspect the interstitial monitor equipment—for simple ports checked by hand, these should not be damaged or corroded shut. Mechanical floats, if used, should be in good condition and visible. Electronic systems should be checked to ensure the sensors remain operable

Key Notes: Double bottom tanks are not common in shop fabricated tanks, but are found on some field erected tanks.



Mechanical Leak Sensor



Electronic Leak Sensor

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SP001 Monthly Inspection Questions

For double-wall or double bottom tanks or CE-ASTs, is interstice free of liquid? Remove the liquid if found. If tank product is found, investigate possible leak.? Yes No N/A

Why of Concern? Checks of interstitial monitoring equipment (typically ports, mechanical, or electronic monitors) are essential to determine primary tank leakage.

How to Check: This can be conducted by manually checking the interstice, by checking mechanical or electronic leak gauges.

Key Notes: Water is sometimes found in the interstice due to condensation, or by rainwater entering leaking tank top fittings. This issue appears more commonly in coastal areas, or in humid locations

Product, if found, is sometimes the result of operational errors, where individuals try to fill the wrong port on the tank. Proper labeling of each tank top port reduces this risk



This tank had secondary filled by mistake—this is more common than you might think

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SP001 Monthly Inspection Questions Equipment on Tank

If overfill equipment has a “test” button, does it activate the audible horn or light to confirm operation? If battery operated, replace battery if needed. Yes No N/A

Why of Concern? Needed to check operability of equipment

How to Check: Activate test button. Consult owners manual or instructions if device does not operate



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SP001 Monthly Inspection Questions Equipment on Tank

Is overfill prevention equipment in good working condition? If it is equipped with a mechanical test mechanism, actuate the mechanism to confirm operation. Yes No N/A

Why of Concern? Overfills are among the most common ways that tanks have releases, and can be catastrophic.

How to Check: If OPV has a means to test the mechanism, it can be used to check if float on overfill valve operates properly. If OPV installed on system is not testable, visually inspect connection for damage, corrosion, or leakage

Key Notes: Testable OPVs not commonly installed in CA. Facilities should never rely solely on OPVs as sole overfill prevention method.

OPV: Overfill Prevention Valve



OPV with testable float

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SP001 Monthly Inspection Questions Equipment on Tank

Is the spill container (spill bucket) empty, free of visible leaks and in good working condition?

Yes No N/A

Why of Concern? Spill containers are designed to capture small releases that occur during connection/disconnection. These include remote fill boxes (ground level) or tank top spill bowls.

How to Check: Open spill container and check for residual product or water. If found, remove. Inspect area around spill container for leaks, especially at connections. Ensure that return valves or hand pumps are operable.

Key Notes: Standing product is a fire hazard and needs to be removed. Remote fill boxes should be equipped with a return line and hand pump to be used to pump liquid back into piping or tank.



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SP001 Monthly Inspection Questions Equipment on Tank

Are piping connections to the tank (valves, fittings, pumps, etc.) free of visible leaks? Note: If "No", identify location and describe leak. Yes No

Why of Concern? Piping connections are locations where small releases can become larger releases over time. Piping and connections are also locations where releases have been common historically.

How to Check: Inspect all piping and connections on the system in an organized manner. Threaded fittings are common locations where leaks or staining occurs. Identify leak location and provide description on form. Leaking equipment requires repairs. Staining should be monitored during monthly inspections

Key Notes: Diesel fuel is an exceptionally good penetrant, and staining is often found on piping runs that routinely contain fuel. Why do threaded fittings leak? Wrong pipe dope, poor installation quality, loosening from vibrations over time, lack of expansion relief, others.

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SP001 Monthly Inspection Questions



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SP001 Monthly Inspection Questions Equipment on Tank

Do the ladders/platforms/walkways appear to be secure with no sign of severe corrosion or damage? Yes No NA

How to Check: Inspect these items for corrosion and loose connections. Connection points on ASTs are locations where corrosion often occurs. Loose bolts and nuts, or brackets that aren't secure enough to attach ladders or platforms are safety hazards



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SP001 Monthly Inspection Questions Containment (Diking/Impounding)

Is the containment free of excess liquid, debris, cracks, corrosion, erosion, fire hazards and other integrity issues? Yes
No NA

Why of Concern? Various, including containment capacity, integrity, and fire hazards

How to Check: Inspect containment areas for the items above. Containment areas tend to be attractive locations for unauthorized storage of other equipment, which takes up containment space needed to comply with SPCC regulations.



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SP001 Monthly Inspection Questions Containment (Diking/Impounding)

Are dike drain valves closed and in good working condition? Yes No
NA

Why of Concern? Drain valves for containment areas are to be kept closed, and need to be operational for releasing liquids.

How to Check: Inspect drainage valve position (open/closed). Exercise valve (open/close) to confirm it actually works.



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Concrete Exterior Tanks



This style of tank features an inner steel tank, with a HDPE liner that forms the secondary space. Reinforced concrete surrounds the tank.



Source: Oldcastle Convault Brochure

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SP001 Monthly Inspection Questions Concrete Exterior Tanks

Inspect all sides for cracks in concrete. Are there any cracks in the concrete exterior larger than 1/16"? Yes No NA

Why of Concern? Because of the design of concrete exterior tanks, cracks in the exterior concrete—especially on the top surface—are potential entry points. Once inside the concrete external shell, rainwater can migrate into the inside and penetrate into the secondary HDPE liner

How to Check: Check the entire tank surface—including the top—and note any areas where cracks are evident. For cracks larger than 1/16" follow the owners manual for remediation of these cracks. Monitor smaller cracks monthly—you can mark on the tank where these are located for future checks.

Humid/wet environments, such as those in coastal areas, may face challenges in keeping the interstice dry, especially if cracks are present. Ensure liquids found in the interstice are removed promptly consistent with manufacturer's instructions

Key Notes: 1/16th of an inch is about the thickness of a quarter

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SP001 Monthly Inspection Questions Concrete Exterior Tanks

Inspect concrete exterior body of the tank for cleanliness, need of coating, or rusting where applicable. Tank exterior in acceptable condition? Yes No NA

Why of Concern? This check evaluates the overall external concrete condition, including the coating.

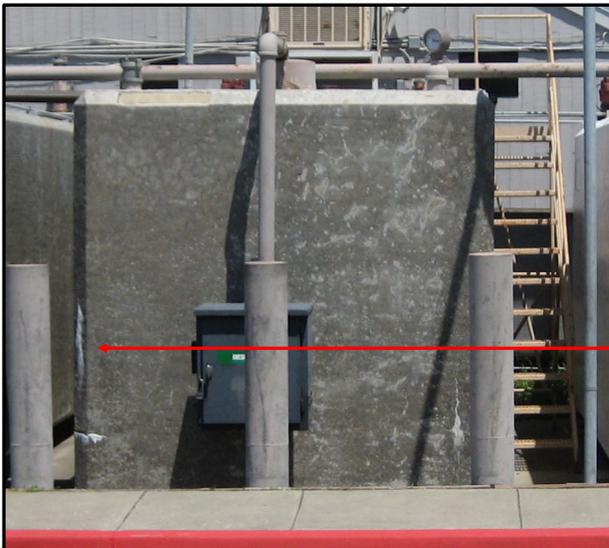
How to Check: Check the tank exterior for the items noted in the question. Rusting can occur at the tank top where steel fittings are exposed. Rust streaks on the concrete may also be a result of corrosion of tank top equipment.

Key Notes: Tanks that exhibit efflorescence (precipitated salts/staining), suggests that water has infiltrated the concrete. This should be investigated further and the secondary should be checked for water. This is more easily observed on tanks with exposed aggregate finishes



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SP001 Monthly Inspection Questions Concrete Exterior Tanks



Efflorescence



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SP001 Monthly Inspection Questions Concrete Exterior Tanks

Visual inspect all tank top openings including nipples, manways, tank top overflow containers, and leak detection tubes. Is the sealant between all tank top openings and concrete intact and in good condition? Yes No NA

Why of Concern? Due to the design of these tanks, these are prime locations where rainwater can penetrate and enter the secondary space

How to Check: Check all tank top openings for the items noted in the question.

Key Notes: The Convault owners manual is a good reference for this type of issue

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SP001 Monthly Inspection Questions Other Conditions

Is the system free of any other conditions that need to be addressed for continued safe operation?Yes No

Why of Concern? A general check for any other conditions that may require actions

How to Check: Follow manufacturer's instructions for inspecting and/or repairing equipment.

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Questions?



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