

Chemical Storage Tanks Management Plan: Regulations and Standards for Above Ground Storage Tanks

ERM 401/501: Hazardous
Waste Management
Group 1

Project Description:

Glendale has at least 135 known above ground storage tanks. They need management to ensure tank permits are up-to-date, all operation requirements are met, and thorough inspections are conducted regularly. Our task was to research applicable standards and regulations for above ground storage tanks that are not covered under the scope of the SPCC requirement and RCRA. Our research and analysis resulted in a list of recommendations for Glendale's above ground storage tank management program.

Process:

Researched existing permits held by the city facilities and possible permits they may need to comply with.

Analyzed professional organizations and governmental code to determine requirements for proper tank maintenance and operation.

Compiled schedules and checklists to provide the city with standards for tank inspections.

Results:

City facility permits have conditions and requirements that need to be met for renewal.

The International Fire Code, OSHA, and EPCRA require Hazardous Materials Management Plans, Hazardous Materials Inventory Sheets, and Safety Data Sheets for facilities with hazardous materials on site.

NFPA 30, OSHA HazWOPER, the State Fire Marshal's Office, and NSF ANSI 61 contain requirements for hazardous material spill containment, fire protections, and hazard signage.

OSHA defines tanks as confined spaces, so a permit is required before entry work such as cleaning, per NFPA 623, and inspections.

The Steel Tank Institute and the American Petroleum Institute have published criteria checklists and inspection schedules based on tank capacity and corrosion rates.

Figure 1: International Fire Code required forms

Hazardous Materials Management Plan	Includes a site and floor plan showing the location of emergency equipment, exits, above ground and underground storage tanks, and hazard classes of each area
Hazardous Materials Inventory Sheets	Provides a summary report for each area, and includes inventory amounts of solids, liquids, and gases, locations of tanks, and hazard classification
Safety Data Sheets	Contains information about the potential health, fire, reactivity, and environmental hazards of a chemical product, and how to work safely with it

Recommendations:

- Facilities should ensure compliance with permit and renewal conditions and submit appropriate and timely revisions as necessary.
- Any facilities meeting the applicability standards of the International Fire Code should submit current HMMP, HMIS, and all SDSs to the appropriate city's Fire Marshal Hazardous Materials Unit and ensure that permits are renewed on time.
- Facilities using hazardous materials must also keep appropriate SDSs and an HMIS on site, according to OSHA requirements.
- Operate tanks containing flammable and combustible liquids, and possibly toxic and corrosive materials as well, over 1,320 gallons with overfill protections, as specified by NFPA 30, and maintain according to manufacturer's instructions.
- Facilities should follow OSHA HazWOPER requirements to prevent and contain spills, as detailed in 29 CFR 1920 Subpart H.
- Glendale facility supervisors should be familiar with proper protocol for tank entry and cleaning and should ensure outside contractors are following OSHA and NFPA 326 requirements.
- Managers should ensure the ASTs are inspected regularly following the STI or API, or a combination, inspection schedule. Inspections must follow the provided criteria checklists to ensure proper tank cleanliness, usability, and safety. Include API STD 653's recommendations for thickness calculations and recording corrosion extent during scheduled inspections.

Figure 2: Inspection standards comparison

	STI/SPFA ST001	API STD 653
Periodic Inspections	Conducted monthly and annually by the owner's inspector using the monthly and annual checklists provided in the standard	Conducted on a routine basis by the owner/operator checking for corrosion, leaks, or signs of settlement
External Inspections	Conducted every 5, 10, or 20 years, depending on tank capacity, by an STI Certified Inspector checking structure, thickness, and secondary containment condition	Conducted every 5 years minimum by an API Authorized Inspector checking walls and roof condition, thickness, and grounding systems
Internal Inspections	Conducted every 10, 15, or 20 years, depending on tank capacity, by an STI Certified Inspector checking for structure, thickness, and corrosion and cracking	Conducted every 20 years minimum, more often based on higher corrosion rate, by an API Authorized Inspector checking for bottom corrosion and leaks and signs of settlement



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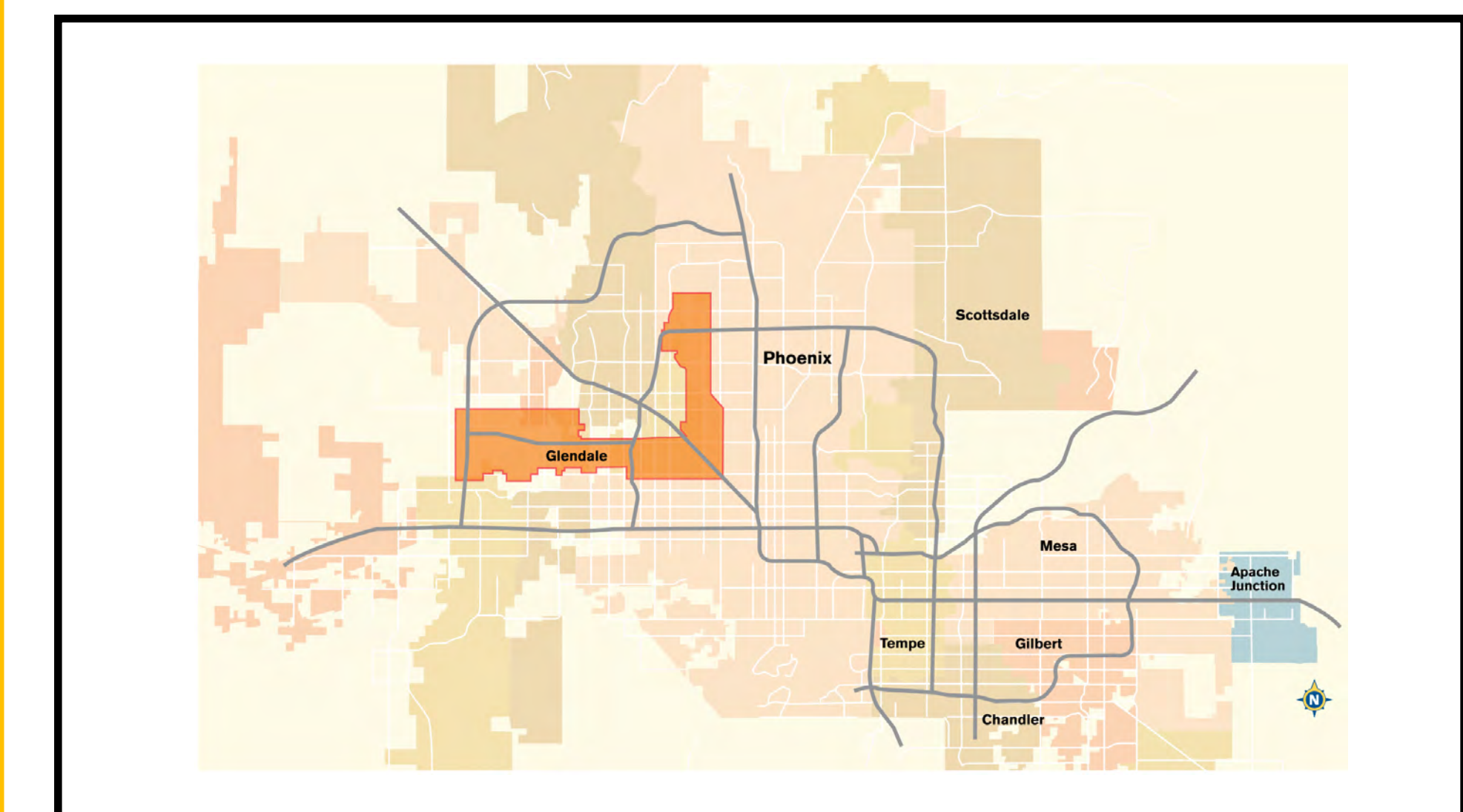
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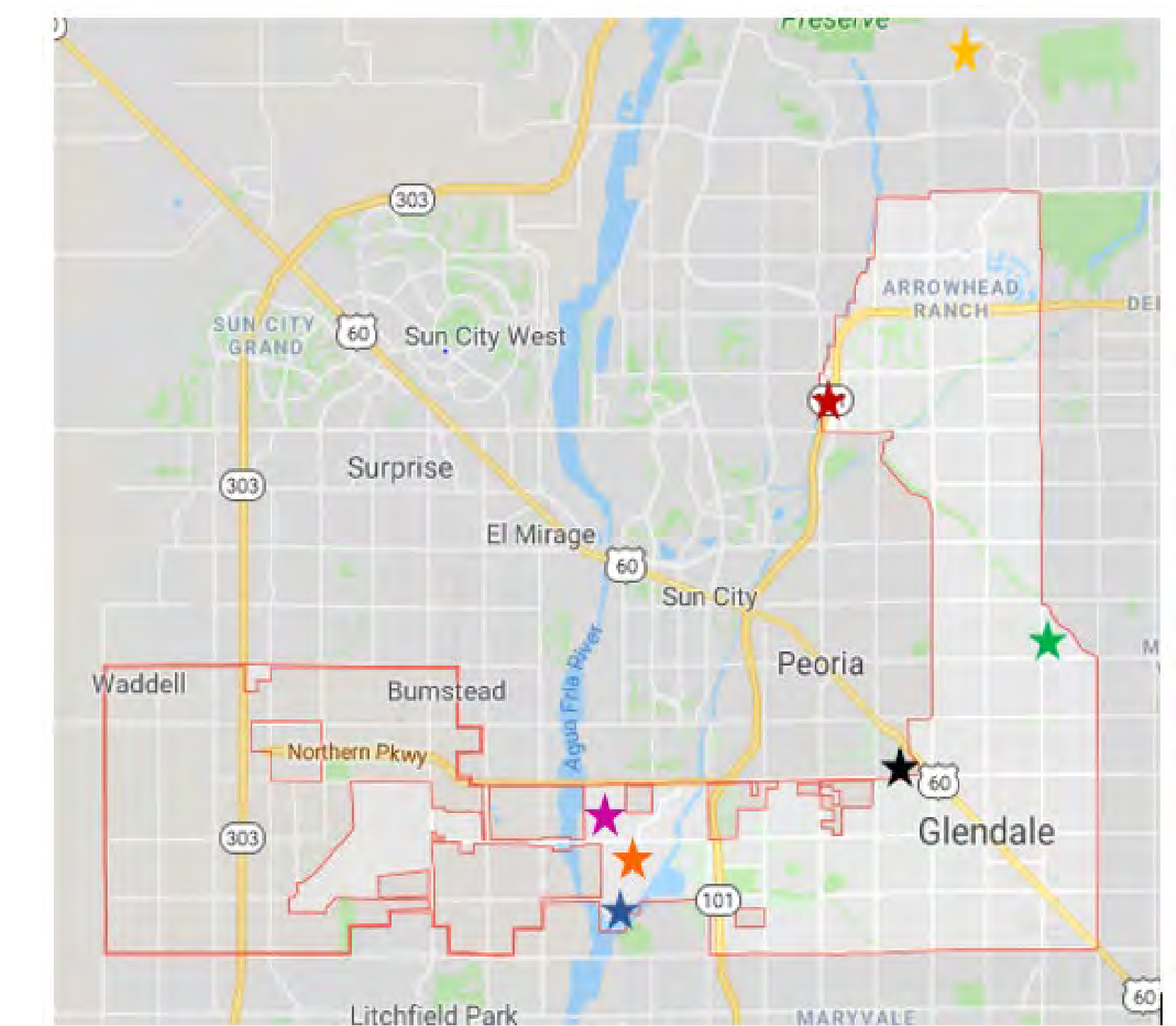


Figure 3: Map of Glendale showing locations of project interest

★ Oasis WTP ★ Pyramid Peak WTP ★ Cholla WTP ★ Arrowhead WRF ★ West Area WRF
★ Field Ops Service Center and City Landfill ★ Glendale Municipal Airport

Chemical Storage Tanks Management Plan: Benchmarking Study- Assessing Other Aboveground Storage Tank (AST) Programs

Project Description



Figure 1: Several ASTs at Glendale Oasis Water Treatment Plant, housed in a secondary containment apparatus

The primary purpose of this project was to assist the City of Glendale in maintaining compliance with regulatory requirements and in developing a responsible, effective and efficient, operations and maintenance (O&M) program for their ASTs. The City currently has 135 ASTs in-service and lack a formal compliance document to help regulate them. We have been tasked with creating a Standard Operating Procedure (SOP) for Glendale's AST program.

Our Mission

Benchmark with other cities, governments, and businesses for their AST programs. Prepare and recommend an internal city compliance, operations and maintenance program to help Glendale maintain compliance with all ASTs.

Process

Methods used

- Research
 - Literature Review
- Leveraged professional contacts of students and faculty.
 - Collected internal data from industry and military contacts on AST documents and materials

Procedures followed

- Email and phone communications
- On-site field trip to Oasis WTP

Results

Research Findings

- Few formal SOPs exist within the compliance range of ASTs. Owners and operators must rely on industry standards and best management practices to derive their own inspection system for their tanks.
- See Figure 2 for all data from benchmark study

Project Deliverables

- Created Comprehensive Project Report on Benchmarking of the municipal, military, and commercial sectors.
- Drafted a Sample Standard Operating Procedure (SOP) for the City of Glendale to manage and maintain their ASTs
- Supplementary AST Inspection Criteria Checklists were made to accompany the SOP
- Amassed an appendix of over 20 documents of existing AST internal compliance data from multiple industries, military branches, and governments

Benchmarking Summary of AST Management						
	SOP	Regulating Agencies/ Standards	Tanks Type/ Chemicals	Inspection Criteria	Frequency of Inspection	Recordkeeping
Municipal:						
State of Pennsylvania	✓	PA Dept. of Environmental Protection, SPCC	API, STI, Petroleum Equipment Institute RP 200, NACE Intl.	checklists	Every 72 hrs. (visual)	3 yrs. min.
NASAP	✓	National Association of reps from state AST reg. agencies	national database for all ASTs (varies by state)	checklists	varies by state	varies by state
Navajo Nation (T)	×	Navajo Nation Council, Navajo Nation Storage Tank Program, NNCWA, NN Pollution Prevention Regs., SPCC	/	checklists	Every 30 days	3 yrs. min.
Apache (T)	ü	NPDES, NFPA, SPCC	Water, various chemicals	checklists	Every 30 days	3 yrs. min.
Military:						
Airforce	ü	Airforce, OSHA, DoD, SPCC, AFI, AFMANs, MIL-STDs, ETLs	Flammable/ Combustible liquids, motor & aviation fuels, oils	checklists	Every 30 days	3 yrs. min.
Army	ü	Army, NFPA, SPCC, Army Environmental regs.,	/	checklists	Every 30 days	3 yrs. min.
Navy & Marines	ü	Marine Corps Order, STI, MCBQ ESOP, SPCC	/	checklists	daily/ weekly / monthly / annually	5 yrs. min.
Coast Guard	ü	EPA, AR 200-1, AR 200-3, SPCC	Fiberglass, steel	checklists	Every 30 days	3 yrs. min.
International Bases	✓	SPCC, AR 200-1, AR 200-3, EU	/	checklists	Every 30 days	3 yrs. min.
Commercial:						
Honeywell (i)	ü	SPCC, STI, APS, HSEMS	oil, chemicals	checklists	Every 30 days	3 yrs. min.
Boeing (i)	×	CWA, NPDES, SPCC	Batch metal treatment chemicals	checklists	Every 30 days	3 yrs. min.
NXP & PURECHEM (i)	ü	FIFRA, CWA, RCRA, SPCC	/	checklists	/	3 yrs. min.
APS (i)	×	SPCC, API, STI	oil, chemicals	checklists	Every 30 days	3 yrs. min.
ASU EH&S (i)	×	EH&S FDM Guidelines, SPCC	Hydraulic Fluid	checklists	Every 30 days	3 yrs. min.
FAA (t)	×	SPCC	Fuel	checklists	/	3 yrs. min.
LAX (t)	×	Cal/EPA, LAFD, NFPA, FAR, SPCC, UP, CUPA	Fuel	checklists	Every 30 days	3 yrs. min.
PHX (t)	ü	SPCC	Fuel	checklists	Every 30 days	3 yrs. min.
FedEx, USPS, UPS, U-Haul (t)	ü	SPCC	/	checklists	/	3 yrs. min.
Key: (T) - Tribal; (I) - Industry; (t) -Transportation; Data not found or none - /; Present - ü; Not Present - ü						

Figure 2: Background data collected from benchmarking study

Recommendations

General Recommendations

- Implement a Mandatory SOP Plan Incorporating Industry Standards and Derived Best Practices
- Create a Spill Plan that Marks Where Contamination Could Occur in the Event of a Release
- Delegate Record Keeping and Compliance to a Responsible Party

Recommended Best Management Practices

- Routine visual inspections every 72 hours
- Visual inspection of grass for leak detection
- Mandatory reporting of any upgrade, change in use, or replacement of tank within 30 days
- Standard Operating Procedure compiling best practices and industry standards into comprehensive guide (e.g. Air force Manual (AFMAN), Army Regulations, ESOP)
- Annual update of AST and SOP plans
- Battery inspection criteria on checklist for battery-powered devices (e.g. horn, automatic lights)
- Daily/weekly/ monthly/ annual checklists,
- Minimum recordkeeping for 5 years minimum
- Routine annual training of employees
- Monitoring of pollution by vapors in soil and groundwater
- Interstitial monitoring, use of double-wall tanks
- Use of double-wall tanks
- Creation of specific regulations for storage and containment areas including provisions for outdoor storage and secondary containment wall height



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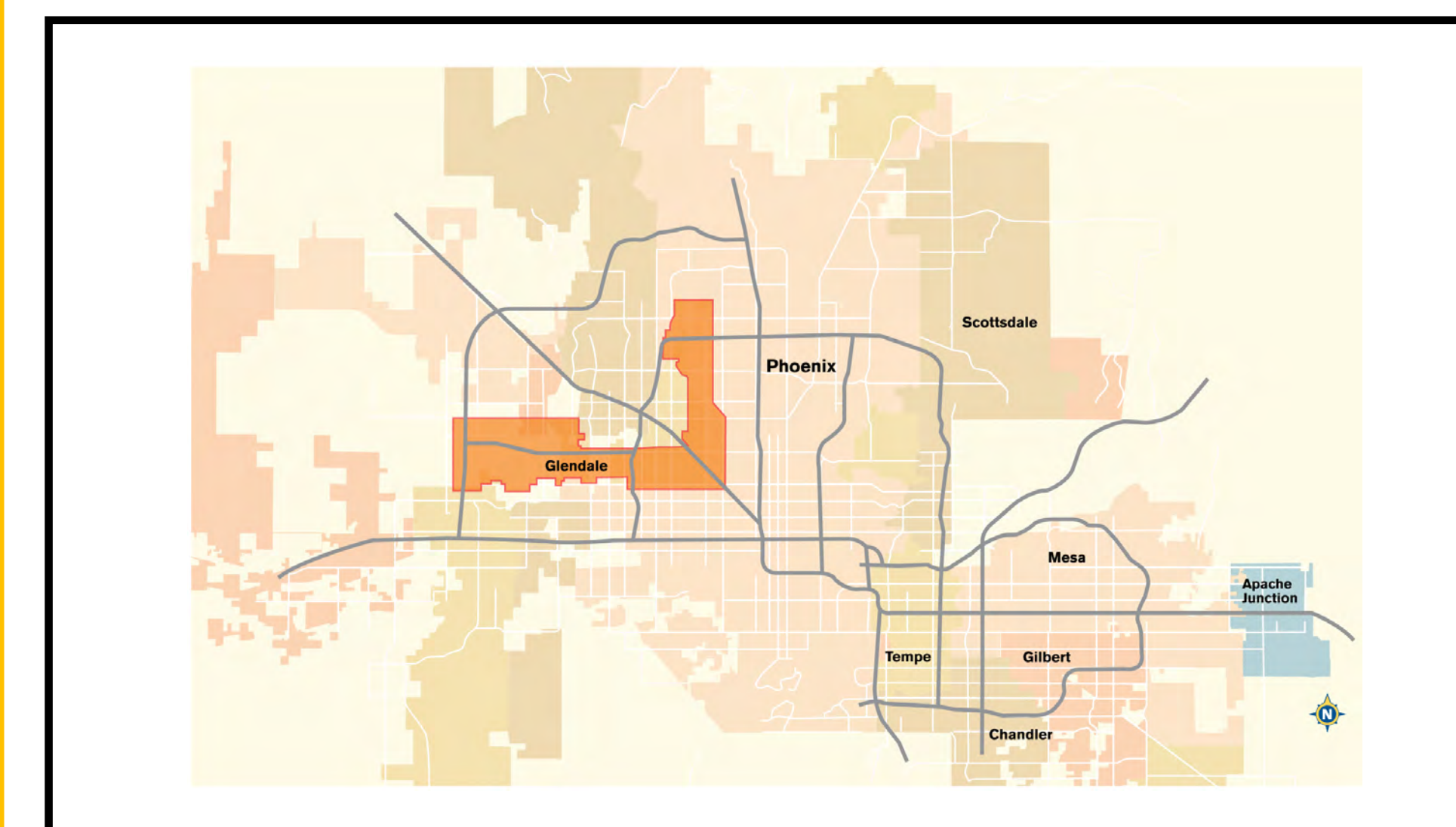
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Figure 3: Fall, 2019: 24 students from ASU Polytechnic, Tempe and Online campuses toured the Glendale Oasis Water Treatment Plant (WTP), to learn firsthand what policies and practices were already in place, as well as to get a sense of the overall scope of their project.

Figure 4: Glendale's Monica Rabb and Jamie Teatsworth led students on a comprehensive tour of five sites with relevant ASTs and other potential contamination hazards, including the Oasis WTP, the West Water Reclamation Facility (WRF), Glendale's landfill/MRF center, the Glendale public safety training facility, and Glendale's municipal airport.



Chemical Storage Tanks Management Plan: Regulations and Standards for Above Ground Storage Tanks

ERM 401/501: Hazardous
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Group 3

Project Description:

To ensure that Glendale's facilities with tanks are following all required rules and regulations set forth by governing agencies as well as keeping up with the industrial standards, the City of Glendale has partnered with ASU (Arizona State University). In doing so the City hopes to maintain compliance with all AST (Aboveground Storage Tank) regulatory requirements. The ERM 401/501 class reviewed commonly used AST practices used by similar cities to ensure the integrity of the tanks and financial responsibility for the city.

Task 3 for this project focused on answering the following questions for ASTs less than 1320 gallons containing fuel products.

1. Is the STI-SP001 Standard the correct one to use for these tanks? Are other industry standards recommended for certain types of tanks? (steel vs. fiberglass)
2. Does diesel fuel age? Many of Glendale's back-up generator fuel tanks do not run that often, but must work in an emergency. How can/should a fuel testing program be integrated into the program?
3. Is checking the tanks on a backup generator standard practice for contractors (Cummins, GenTech, etc.)?

Process:

- Utilize reference files provided by the City of Glendale to define size and location of the various tanks present on the city facility sites. Files used include "SPI SP001 Inspection Guidance", "SP001 6th edition Jan 2018", "Diesel Fuel Long Term Storage", and "2018 Inventory of ASTs_rev2".
- Individual research completed by each team member focused on finding testing methods and standards of independent contractors. This research would then be used to make recommendations based on other successful operations.
- To understand the standards that apply to the tanks on City of Glendale facilities, STI-STP001 and API Standard 653 were analyzed. The applicable conditions were compared against the conditions of the Glendale facilities. .
- To answer the question of backup generator standard practice, online research of independent contracting company practice was combined with observations and technician comments during a onsite tour of the Glendale water treatment facility.

Results:

- It is best practice to check the user's and construction manual of each tank, to find the appropriate inspection methods recommended by the manufacturer.
- Calculate total oil storage capacity yearly to ensure SPCC rule applicability. The SPCC rule only applies when the total aboveground oil storage capacity is greater than 1320 gallons of oil. Though this plan is intended for fuel tanks that are under 1320 gallons, the total fuel capacity of each facility should be regularly calculated to determine if new SPCC tanks have been added.
- Based on the analysis from BP oil, AST fuel storage has a 1-2 year lifespan under good conditions with an ambient temperature of 20 °C. When an ambient temperature higher than 30 °C was observed, BP found fuel deteriorated within 6 - 12 months.
- The back-up generators and related tanks should follow inspection schedules recommended by STI SP001, based on the material, construction, and the substances within in the tanks present at the facilities.

Recommendations:

- To determine correct inspection schedules, look to the manufacturer's instructions, and the regulation that the tanks were built to (UL, AST, etc.) to determine correct inspection schedule.
- If qualified, a hybrid inspection program may be made, but only under the guidance of a certified P.E.
- Each individual tank must be evaluated, and knowledge of the manufacturing regulation, method of fabrication (shop vs. field-erected), material, size, and specific gravities of the containing substance must be known.
- Utilize STI-SP001 for standards regarding storage of diesel in ASTs.
- As SP001 only covers storing stable, flammable, and combustible liquids at atmospheric pressure with a specific gravity less than approximately 1.0, consider creating a hybridized standard for other substances being stored onsite.
- Calculate total oil storage capacity yearly to ensure SPCC rule applicability. The SPCC rule only applies when the total aboveground oil storage capacity is greater than 1320 gallons of oil. Though this plan is intended for fuel tanks that are under 1320 gallons, the total facility should be regularly calculated.
- Provide general secondary containment material for common oil spills. Common oil spills may occur during the transfer between containers. This prevents further contamination of water sources.
- Use non-flammable containers for fuel storage. This includes material such as steel alloys.
- Perform routine maintenance inspections that City of Glendale has implemented and practiced with the contractors. This includes annual inspections of back-up generators along with quarterly maintenance.
- Continue fuel vendor contracts that include diesel fuel maintenance.
- Record all maintenance activities and inspections to assess operating costs.
- Per EPA Power Resilience Guide a sample of oil should be sent to a lab for metals testing. Metals could indicate engine wear, which may indicate that other repairs are needed.
- Run generators regularly to test them for continued proper operation. This ensures proper operation during power outages.
- Replace diesel fuel at least once a year, especially after the summer months due to the high heat and possibility of water from monsoons.



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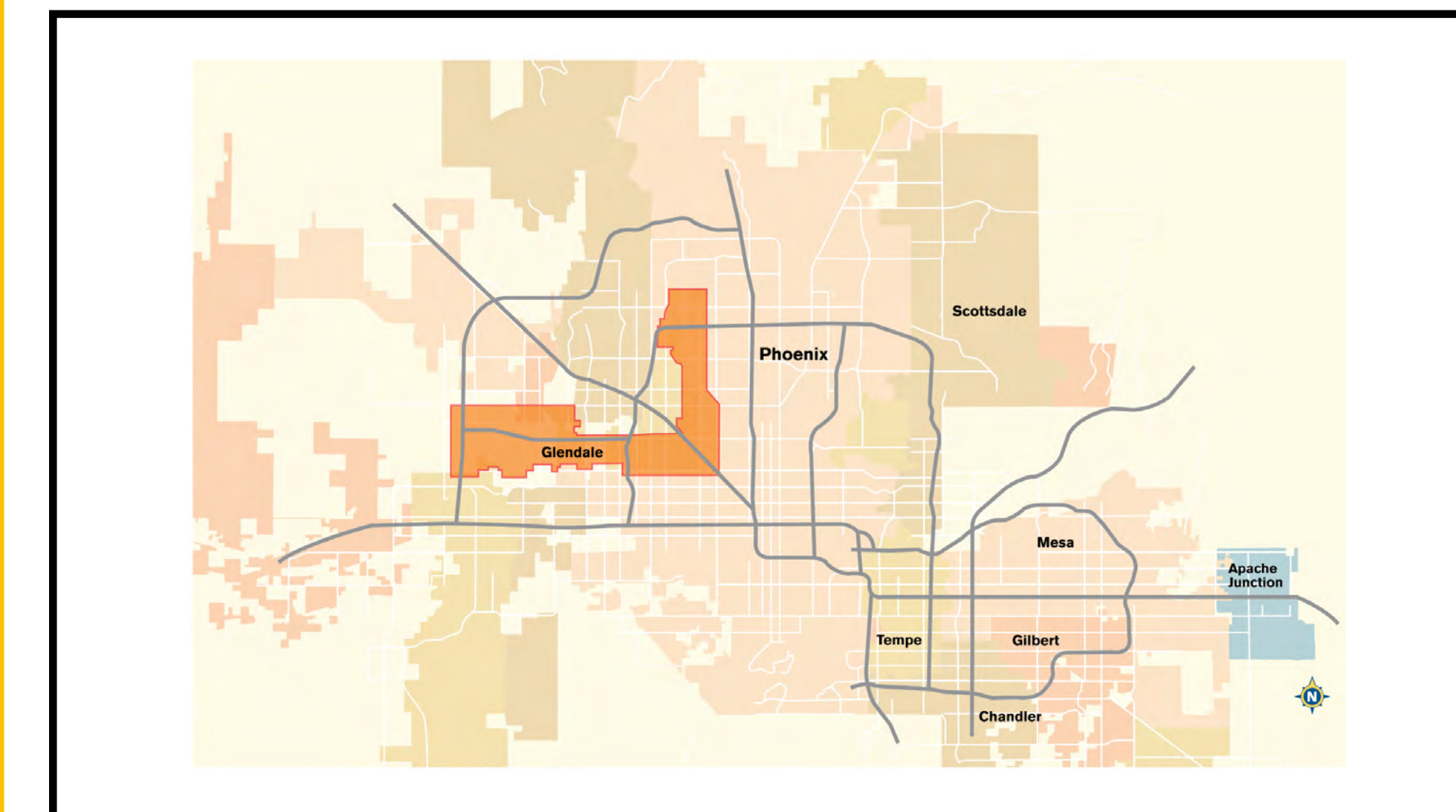
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Figure 1: Fuel tank and emergency generator at Glendale Oasis Water Treatment Plant