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February 26, 2018

Sent Via Email

Eric Norris, Planning Director
City of Eastvale
Planning/Engineering/Building Department
12363 Limonite Avenue, Suite 910
Eastvale, CA 91752
enorris@eastvaleca.gov

Re: Lewis Retail and Civic Center (PLN17-20015) and Al's Corner (PLN17-20029)

Dear Mr. Norris:

This law firm represents the Southwest Regional Council of Carpenters (Southwest Carpenters) and submits this letter on the above-referenced project on its behalf.

Southwest Carpenters represents 50,000 union carpenters in six states, including in Southern California, and has a strong interest in the environmental impacts of development projects, such as the Lewis Retail and Civic Center and Al's Corner project (Project). The City of Eastvale (City) issued a Notice of Preparation signaling the City's intent to prepare a Draft Environmental Impact Report (DEIR) for the Project on January 25, 2018. As indicated in its Initial Study, the City has determined the Project may have a significant effect on the environment warranting the preparation of an Environmental Impact Report.

The Project would comprise 24.38 acres shared across two sites, identified in the Initial Study as Site 1 (23 acres), and Site 2 (1.38 acres). For Site 1, the Project Proponent, Lewis Development, LLC, has applied for approval of the Lewis Retail and Civic Center. The Lewis Retail and Civic Center would contain a variety of proposed uses, including a gas station, four restaurants, retail space, a medical office, a 130-room hotel, a new City Hall, and a public library. The City does disclose a proposed use for Site 2, but intends for this site to be devoted to commercial uses. The Project would require several approvals, including:

- General Plan Amendments (Sites 1 and 2)
- Zone Change (Site 1) from Rural Residential and Watercourse, Watershed, and Conservation Area (W-1) to General Commercial.
- Tentative Parcel Map (Site 1) – subdivision into eight commercial parcels and one right-of-way parcel.

- Major Development Plan Reviews (Sites 1 and 2).

The City has initially determined the Project may have a significant impact as to the following impact areas:

- Air Quality
- Geology and Soils
- Greenhouse Gas Emissions/Energy
- Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Noise
- Transportation and Circulation
- Tribal Cultural Resources

The comments presented herein should not be interpreted as being exhaustive by any means, but are preliminary concerns based on the Notice of Preparation and Initial Study. Southwest Carpenters look forward to reviewing the DEIR and its full discussion of environmental impacts, including alternatives and mitigation.

Project Description

CEQA Guidelines define "project' as "the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment." 14 Cal. Code Regs. § 15378(a). The Project Description must contain "A general description of the project's technical, economic, and environmental characteristics." 14 Cal. Code Regs. § 15124(c). Failure to adequately define the Project may invalidate EIR for the Project.

The Notice of Preparation and Initial Study fail to provide basic information regarding the project. The City states all Site 1 structures, combined, would occupy approximately 169,300 square feet, or under 4 acres of the 23 acres available. The City does not provide an estimate as to the site coverage for the proposed gas station, instead opting to describe it by the total number of pumps. The initial study does not explain the uses or development proposed to occur on the remaining 19 acres of Site 1. The DEIR should clarify the proposed uses for the remainder of the Project site.

The City evaluates Sites 1 and 2 together in its Initial Study, yet states in its Notice of Preparation that evaluation of the environmental impacts of these sites "may be considered together, or separately, by the City." Courts have interpreted the requirement to analyze "the whole of an action" as a prohibition against piecemealing of a project. Project "piecemealing" or "segmentation" occurs where two or more related actions are separated and their environmental impacts evaluated separately. Precedent has long established that the environmental impacts of a project cannot be "submerged by chopping a large project into many little ones, each with a potential impact on the environment, which cumulatively may have disastrous consequences." See *Burbank-Glendale-Pasadena Airport Authority v. Hensler* (1991) 233 Cal.App.3d 577, 592; *Bozung v. Local Agency Formation Comm'n* (1975) 13 Cal.3d 263, 274, 283-284. The City cannot break up its environmental evaluation of Sites 1 and 2 because doing so would constitute piecemealing, in violation of CEQA.

Furthermore, the Initial Study does not fully disclose the current or future status of Site 2. The City states it currently owns this property, but at the moment it is unclear whether the City plans to retain ownership of Site 2, whether the City is currently in the process of selling or leasing the site, or whether it plans to sell or lease the site in the future. The City is required to finalize any environmental review under CEQA prior to taking any action that may commit to a definite course of action, such as committing itself to selling or leasing the site to a private entity. In the DEIR, please clarify whether the City has given, or intends to give, any private entity an ownership or possessory interest in Site 2, and identify that private entity if the City currently knows its identity. As an aside, any transaction with the City involving the lease, sale, or expenditure of City property or other resources must be transacted in a way that does not make a gift of public funds, in violation of California Constitution, article XVI, § 6. The City should avoid any transaction that would amount to, or have the appearance of being, a gift of public funds.

Aesthetics

The City has determined the Project will have a less than significant impact on the aesthetics of the Project site and its surroundings. To reach this conclusion, the City has determined the Project will not cause glare in next-door residential neighborhoods because the Project would comply with City Code sections designed to reduce glare. The Project will be required to address competing concerns of ensuring sufficient lighting for safety purposes, while also attempting to prevent light pollution from spilling into nearby neighborhoods. The City determined the Project does not have the potential to cause glare to spill into these neighborhoods because "the height of all pole-mounted lighting fixtures would be limited based on proximity to residential uses."

In its DEIR, the City will be required to rely on more than conjecture to support its conclusion that Project lighting will cause less-than-significant impacts on nearby residential neighborhoods. Blindly assuming City Code sections regarding pole height will eliminate the potential for light glare to significantly impact these neighborhoods does not amount to substantial evidence. 14 Cal. Code Regs. § 15384.

Air Quality

Southwest Carpenters concurs with the initial determination that the Project has the potential to significantly decrease every aspect of air quality in the region. The City is in a region that is currently in nonattainment for multiple National Ambient Air Quality Standards Criteria Pollutants, including PM 2.5 and 8-Hour Ozone. The Los Angeles County South Coast Air Basin is also in nonattainment for Lead. Therefore, the Project, which will increase emissions, will (i) conflict with or obstruct implementation of SCAQMD Air Quality Management Plan, (ii) contribute substantially to an existing or projected air quality violation; and (iii) result in a cumulatively significant net increase of any criteria pollutant for which the project region is in nonattainment. Furthermore, the Project's location abutting residential development and other sensitive uses has the potential to expose sensitive receptors to substantial pollutant concentrations and create objectionable odors affecting a substantial number of people.

Biological Resources

In its discussion on Biological Resources, the City states that surveys for a variety of protected and special status species did not indicate the presence of any of these species or their habitat. The Initial Study does not disclose the full list of species and habitat types evaluated, making more in-depth commentary difficult. However, the City's conclusion that the Project site does not contain suitable wildlife habitat bears further scrutiny. Although the Project site has been partially cleared, it may still serve as habitat for species that utilize nearby riparian habitat directly to the south and east of the Project site. The Project site is currently unutilized, has only consisted of lower-intensity uses, and shares a border with the Silverlakes Sports Complex, which is a set of open fields and a pond. At a minimum, it would appear the Project site may serve as a buffer between development and this nearby riparian habitat.

Southwest Carpenters looks forward to reviewing the City's full analysis of biological resources in its DEIR.

Greenhouse Gases

Southwest Carpenters agrees with the initial assessment that the Project has the potential to generate significant volumes of greenhouse gas emissions, and that it may conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases. If the Project is approved, it has the potential to increase vehicle trips and vehicle miles traveled. Project uses, including the City Hall, restaurants, gas station, and hotel, would produce high numbers of new trips.

As mentioned in Southwest Carpenters' recent comments on the South Milliken Distribution Project (Project No. PLN 17-20013), included herein by reference, the City has not adopted a Climate Action Plan to reduce greenhouse gas emissions, so the City must exercise extra care when analyzing greenhouse gas-related impacts and carefully disclose how the Project will impact statewide and local goals. The City must consider in its greenhouse gas analysis:

(1) The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;
(2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project; and
(3) The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of greenhouse gas emissions

Center for Biological Diversity v. *Department of Fish & Wildlife* (2015) 62 Cal. 4th 204, 217.

In its South Milliken Distribution Center Mitigated Negative Declaration, the City chose to apply the California Air Resources Board's Scoping Plan Policies to that project, a practice that was roundly rejected in *Center for Biological Diversity v. Department of Fish and Wildlife*. Assuming the City chooses to evaluate the Project in reference to the Scoping Plan, the following comments regarding the South Milliken Distribution Center would apply equally here:

The City may be unique in its continued reliance on the California Air Resource Board's Scoping Plan, post-*Center for Biological Diversity*. In that case, the California Supreme Court invalidated an Environmental Impact Report that incorrectly relied on the California Air Resources Board Scoping Plan. *Id.* at 216. This is because "neither Assembly Bill 32 nor the Air Board's Scoping Plan set out a mandate or method for CEQA analysis of greenhouse gas emissions from a proposed project." *Id.* at 216-217.

> The Scoping Plan adopted pursuant to Assembly Bill 32 is a plan for reducing greenhouse gas emissions, but does not itself establish the regulations by which it is to be implemented; rather, it sets out how existing regulations, and new ones yet to be adopted at the time of the Scoping Plan, will be used to reach Assembly Bill 32's emission reduction goal. At the time the Natural Resources Agency promulgated Guidelines section 15064.4, the agency explained that the Scoping Plan "may not be appropriate for use in determining the significance of individual projects … because it is conceptual at this stage and relies on the future development of regulations to implement the strategies identified in the Scoping Plan.

Id. at 222. "In short, neither Assembly Bill 32 nor the Scoping Plan establishes regulations implementing, for specific projects, the Legislature's statewide goals for reducing greenhouse gas emissions. Neither constitutes a set of "regulations or requirements adopted to implement" a statewide reduction plan within the meaning of Guidelines section 15064.4, subdivision (b)(3)."

As was the case in *Center for Biological Diversity*, the City has not "related that statewide level of reduction effort to the percentage of reduction that would or should be required from individual projects, and nothing . . . cited in the administrative record indicates the required [analysis] is the same for an individual project as for the entire state population and economy." *Id.* at 225-226.

Here, all the City does in its Mitigated Negative Declaration and Appendix 3a is compare certain of the Project's activities with policies in the Scoping Plan, without explanation or evidence to substantiate the validity of this approach. This is the exact same fault that invalidated the Environmental Impact Report in *Center for Biological Diversity*. To prevent itself from falling victim to the same mistake that respondents made in *Center for Biological Diversity*, the City should reevaluate the impacts of the Project using a more suitable, project-level analysis. This task is made more difficult because the City has neglected to prepare an Climate Action Plan, which the City could use as guidance for evaluating project-level greenhouse gas impacts. As it stands now, the City's greenhouse

gas analysis is faulty and does not serve to inform decisionmakers and members of the public of the true impacts of the Project.

Hazards and Hazardous Materials

The City determined that the Project has the potential to create significant hazards through the routine transport, use, or disposal, or release of hazardous materials. Initial surveys of both sites uncovered multiple hazardous materials present on both sites, which may pose a treat to construction workers, employees, and the public. However, the Initial Study does not disclose the impacts regarding hazards and hazardous materials during the operational phase of the Project. The Project will include a gas station and car wash, both of which will emit and handle hazardous or acutely hazardous materials (see attached materials). The DEIR must discuss these hazards and propose adequate mitigation.

Southwest Carpenters takes any potential environmental impact to worker safety seriously. The City should disclose all pertinent information regarding hazards and require mitigation that reduces potential hazards to workers and the public.

Hydrology and Water Quality

The City stated the Project does not fall within a 100-year flood zone; however, a portion of the Project appears to fall within a Special Hazard Flood Area, as shown on maps prepared by the Federal Emergency Management Agency. The DEIR should disclose the potential flood hazard for the Project and require necessary mitigation.

The Initial Study discloses that the majority of the Project is currently zoned as a Watercourse, Watershed, and Conservation Area. This is the most protective zoning designation available within the City's Zoning Code. While the Zoning Code contains a relatively sparse description of this zoning designation, it is clear from the list of permitted uses that the W-1 Zone is designed to protect wetland resources. In the DEIR, please explain the full impacts and implications from removing this land from the W-1 Zone.

The City determined the Project will not substantially deplete groundwater supplies or interfere substantially with groundwater recharge because the Project will "not install any new groundwater wells and would not otherwise directly withdraw any groundwater." However, in its Utilities discussion, the City discloses the Jurupa Community Services District (JCSD), the local agency with water district powers, would supply water to the Project. "The JCSD's primary water source is groundwater from the Chino Groundwater Basin." In the Hydrology and

Water Quality section of the DEIR, please discuss the Project's potential impacts on groundwater resources as these impacts relate to provision of water services from JCSD.

Utilities and Service Systems

The City states the capacity of the JCSD Wastewater Treatment Plant is 6 million gallons per day[1], and concludes that the Project's expected wastewater generation of 48,760 gallons per day is less than significant because "it would only result in an increase of wastewater flows equal to 0.81 percent" of the current JCSD capacity. This analysis fails to inform readers whether the JCSD Wastewater Treatment Plant is currently suffering from capacity issues or will foreseeably have capacity issues in the near future. The City's analysis provides no information regarding historic and current peak flows during wet weather events, when the risk of a sewer service overflow (SSO) is greatest. If the Wastewater Treatment Plant is past, or near, capacity during peak wet weather events, adding even 0.81 percent of flows to this plant would be significant, in that this increased flow has the potential to increase the volume of any spill.

The City should disclose the ability of the Wastewater Treatment Plant to handle current flows now and in the foreseeable future. The City should report if there are any capacity issues, and it should require mitigation if the Project has the potential to cumulatively contribute to any SSOs.

Cumulative Impacts

The City must also consider and provide mitigation for the cumulative impacts of the Project. 14 Cal. Code Regs. § 15064(h). Cumulative impacts "refer to two or more individual effects, which, when considered together, are considerable or which compound or increase other environmental impacts." 14 Cal. Code Regs. § 15355.

> When assessing whether a cumulative effect requires an EIR, the lead agency shall consider whether the cumulative impact is significant and whether the effects of the project are cumulatively considerable. An EIR must be prepared if the cumulative impact may be significant and the project's incremental effect, though individually limited, is cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

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[1] The South Milliken Distribution MND stated the JCSD Wastewater Treatment Plant had a capacity of 9.8 million gallons per day. If the Project Initial Study and South Milliken Distribution Center MND reference the same facility, the City should ensure consistent discussion of this facility.

14 Cal. Code Regs. § 15064(h)(1). The City should have considered and disclosed these potential impacts in its Initial Study. 14 Cal. Code Regs. § 15064(h)(2).

The Initial Study provided almost no discussion or consideration of cumulative impacts. This makes it difficult to address cumulative impacts at this stage. The lacking cumulative impact analysis is further troubling because this indicates the City has failed to evaluate the potential of the Project to cause cumulative impacts across most, if not all, impact areas. It is highly likely the City's underdeveloped cumulative impacts analysis caused it to dismiss entire impact areas as less than significant (*e.g.*, Aesthetics, Agriculture and Forestry Resources, Biological Resources, Cultural Resources, Geology and Soils, Hazards and Hazardous Materials, Mineral Resources, Population and Housing, Public Services, and Recreation). The Project has the potential to cause cumulatively significant impacts to the environment in each of these impact areas.

The City's failure to adequately evaluate cumulative impacts in its Initial Study will almost certainly affect the scope and quality of the City's cumulative impacts analysis in the DEIR. Ideally, the City would withdraw its Initial Study to conduct an adequate cumulative impacts analysis and then reopen its revised Initial Study to public comment.

Conclusion

Southwest Carpenters thanks the City for providing an opportunity to comment on the Initial Study. Moving forward, please send all future notices relating to this Project to Nicholas Whipps at nwhipps@wittwerparkin.com. Thank you for your consideration of these comments.

Very truly yours,
WITTWER PARKIN LLP

Nicholas Whipps

Attachments: Occupational Hydrofluoric Acid Injury from Car and Truck Washing — Washington State, 2001–2013
How Do I Handle My Professional Car Wash Wastewater?
Class V UIC Study Fact Sheet: Car Wash Wells Without Undercarriage Washing or Engine Cleaning

Dangerous Waste Guidance for Gas Stations
Preventing Leaks and Spills at Service Stations

Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Weekly / Vol. 64 / No. 32
August 21, 2015

Contact Lens Health Week — August 24–28, 2015

August 24–28, 2015, marks the second annual Contact Lens Health Week. In collaboration with partners from clinical, public health, industry, and regulatory sectors, CDC is promoting healthy contact lens wear and care practices to reduce the risk for eye infections and complications associated with poor contact lens hygiene.

Research following outbreaks of rare but serious eye infections in the United States showed that these types of infections occur most often in contact lens wearers who do not take proper care of their contact lenses and cases. This finding signaled that action needed to be taken to promote safer contact lens wear and care.

A report in this issue of *MMWR* provides an updated population-based estimate of the number of contact lens wearers in the United States. The report finds that there are 40.9 million contact lens wearers aged ≥18 years. It also includes results of a survey that found more than 99% of contact lens wearers report at least one contact lens hygiene habit that could put them at risk for an eye infection, with the majority of respondents reporting behaviors that can raise the risk for eye infection. Nearly one third of contact lens wearers reported ever experiencing a contact lens-related red or painful eye that required a doctor's visit.

Contact lens wearers represent a significant proportion of the U.S. population, and their contact lens hygiene habits put them at risk for painful, costly eye infections that could lead to vision problems. This year's observance targets teenage contact lens wearers, who have been associated with lower contact lens compliance and higher risk for serious eye infections. Proper contact lens hygiene habits, supplies, and regular visits to the eye doctor are all essential to keeping contact lens wearers' eyes healthy. Additional information on Contact Lens Health Week and the proper wear and care of contact lenses is available at http://www.cdc.gov/contactlenses.

Contact Lens Wearer Demographics and Risk Behaviors for Contact Lens-Related Eye Infections — United States, 2014

Jennifer R. Cope, MD[1]; Sarah A. Collier, MPH[1]; Maya M. Rao, MPH[1]; Robin Chalmers, OD[2,3]; G. Lynn Mitchell, MAS[2,4]; Kathryn Richdale, OD, PhD[2,5]; Heidi Wagner, OD[2,4]; Beth T. Kinoshita, OD[2,6]; Dawn Y. Lam, OD[2,7]; Luigina Sorbara, OD[2,8]; Aaron Zimmerman, OD[2,4]; Jonathan S. Yoder, MPH[1]; Michael J. Beach, PhD[1]

Contact lenses provide safe and effective vision correction for many Americans. However, contact lens wearers risk infection if they fail to wear, clean, disinfect, and store their contact lenses as directed. Over the past decade, CDC has investigated several multistate outbreaks of serious eye infections among contact lens wearers, including *Acanthamoeba* keratitis (*1*). Each investigation identified frequent contact lens hygiene-related risk behaviors among patients. To guide prevention efforts, a population-based survey was used to estimate the number of contact lens wearers aged ≥18 years in the United States. A separate online survey of contact lens wearers assessed the prevalence of contact lens hygiene-related risk behaviors. Approximately 99% of wearers reported at least one contact lens hygiene risk behavior. Nearly one third of contact lens

INSIDE

Continuing Education examination available at http://www.cdc.gov/mmwr/cme/conted_info.html#weekly.

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

wearers reported having experienced a previous contact lens-related red or painful eye requiring a doctor's visit. An estimated 40.9 million U.S. adults wear contact lenses, and many could be at risk for serious eye infections because of poor contact lens wear and care behaviors. These findings have informed the creation of targeted prevention messages aimed at contact lens wearers such as keeping all water away from contact lenses, discarding used disinfecting solution from the case and cleaning with fresh solution each day, and replacing their contact lens case every 3 months.

Nearly one million U.S. health care visits for keratitis (inflammation of the cornea) or contact lens complications occur annually, at a cost of $175 million (*2*). The largest single risk factor for microbial keratitis is contact lens wear (*3*). Quantifying the number of contact lens wearers at risk for serious eye infections is important for future prevention efforts, but requires a population-based estimate of the number of contact lens wearers in the United States.

To estimate the size of the population at risk for contact lens-related complications in the United States and describe its demographics, the Porter Novelli 2014 summer ConsumerStyles survey, an online survey of 4,269 respondents, was used.* Participants in the ConsumerStyles survey were part of market research firm GfK's Knowledge Panel. Panel members are recruited using address-based probability sampling methods and are provided with internet access and a computer if needed. ConsumerStyles survey participants receive entry into a monthly sweepstakes with a prize usually worth <$500. Statistical weighting was used to make the panel representative of the U.S. population on age, sex, race/ethnicity, education level, household income, household size, census region, metropolitan status, and internet access before joining the panel. Respondents were asked demographic questions and what type of contact lenses they wore.

To describe the prevalence of contact lens hygiene-related risk behaviors, an adapted version of the Contact Lens Risk Survey, a previously validated survey,† was administered to a convenience sample of online, contact lens-wearing panelists to describe the prevalence of usual contact lens hygiene-related risk behaviors. Participants were members of market research firm Schlesinger Associates' research panel and wore contact lenses. Panel members are recruited in-person or via internet advertising, email campaigns, or telephone calls. Questions about usual contact lens-related behaviors included the following responses regarding the usual frequency of the behavior: always, fairly often, sometimes, infrequently, or never. For this report, questions with these responses were coded as "ever" if the response was not "never."

* Porter Novelli Public Services. ConsumerStyles 2014 Methodology. Washington, DC: Deanne Weber; 2014.

† Adapted from Wagner H, Richdale K, Mitchell GL, et al. Age, behavior, environment, and health factors in the soft contact lens risk survey. Optom Vis Sci 2014;91:252–61. Responses from the Contact Lens Risk Survey reported here reflect usual behavior as assessed in December 2014.

The *MMWR* series of publications is published by the Center for Surveillance, Epidemiology, and Laboratory Services, Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services, Atlanta, GA 30329-4027.

Suggested citation: [Author names; first three, then et al., if more than six.] [Report title]. MMWR Morb Mortal Wkly Rep 2015;64:[inclusive page numbers].

Using the population-based survey, an estimated 40.9 million persons in the United States aged ≥18 years wear contact lenses (16.7% of U.S. adults)[§]; 93.0% of contact lens wearers reported wearing soft contact lenses (lenses made of soft, flexible plastics that allow oxygen to pass through to the cornea). Overall, contact lens wearers were younger, female, more educated, and of white, non-Hispanic race/ethnicity when compared with non-contact lens wearers (Table 1). No significant geographic differences between contact lens wearers and non-contact lens wearers were found. Among subtypes of contact lens wearers, rigid contact lens (lenses made of more durable materials resistant to deposit buildup) wearers did not differ significantly in age from non-contact lens wearers, although wearers of soft, daily disposable (lenses worn once and discarded) and overnight contact lens (lenses prescribed for wear while sleeping) were significantly younger.

Approximately 1,000 contact lens wearers completed the Contact Lens Risk Survey. Respondents were mostly female (82%) and aged ≥40 years (62%). Approximately 99% of respondents reported at least one contact lens hygiene behavior previously associated with an increased risk for eye infection or inflammation (Table 2). Half or more of wearers reported ever sleeping overnight in contact lenses (50.2%), ever napping in contact lenses (87.1%), ever topping off disinfecting solution (adding new solution to existing solution in the contact lens case instead of emptying and cleaning the case before adding new solution, 55.1%), extending the recommended replacement frequency of lenses (49.9%) or cases (82.3%), and ever showering (84.9%) or swimming (61.0%) in contact lenses. Approximately one third (35.5%) of contact lens wearers reported ever rinsing their lenses in tap water and 16.8% reported ever storing their lenses in tap water. Almost all rigid wearers (91.3%) reported ever rinsing their lenses in water, and 33.3% reported ever storing their lenses in tap water. Nearly one third of all wearers reported ever having experienced a contact lens-related red or painful eye that required a doctor's visit.

Discussion

An estimated one in six adults in the United States wears contact lenses, and one third of them report at least one health care visit for a red or painful eye while wearing lenses. Approximately 99% of contact lens wearers reported at least one risk behavior ever for eye infections or inflammation. Of particular concern, contact lens wearers of all types frequently reported exposure of their contact lenses to water, including storing or rinsing their lenses in tap water and showering or swimming while wearing lenses. Exposure of lenses to water raises the risk for infection because microorganisms living in water can be transferred to the eye. Even household tap water, although treated to be safe for drinking, is not sterile and contains microorganisms that can contaminate lens cases and contact lenses and cause eye infections.

Sleeping in contact lenses was a frequently reported behavior. Although many soft and some rigid contact lenses have U.S. Food and Drug Administration-approved indications for overnight wear, sleeping in any type of contact lens increases risk for eye infection, although the precise mechanism is not known (*4*). Noncompliance with recommended lens and case replacement schedules was also commonly reported. Infrequent replacement of contact lens cases has been linked to serious eye infections (*5*). Additionally, contact lens wearers who do not follow recommended contact lens replacement schedules have more complications and eye discomfort (*6*). These behaviors raise the risk for eye infections because repeated handling of the lens and case provides opportunities for introduction of microorganisms, while the moist surface of the lens and case provide an environment conducive to microbial growth. This risk is compounded if wearers top off solution in the case, as a majority of surveyed contact lens wearers reported having done at least once. Topping off also decreases the effectiveness of contact lens disinfection (*7*).

Daily disposable contact lens wearers might have a lower risk for infection if contact lenses are disposed of daily as recommended. Although 40% of daily disposable contact lens wearers did not use a case, thereby avoiding potential contamination associated with the case, a large proportion of daily disposable contact lens wearers did use a case and did so improperly, using tap water to store their lenses.

The number of contact lens wearers in the United States presented here is higher than previous estimates. Another study estimated 38 million contact lens wearers, although the data collection methods were not described (*8*). A more recent study used data from the National Health and Nutrition Examination Survey (NHANES) and estimated that 18.6 million persons aged ≥12 years wore contact lenses (*9*). However, the NHANES protocol used a more restrictive contact lens wearer definition[¶] and might have underestimated the total number of contact lens wearers in the United States. The demographic patterns observed in the population used for the estimate reported here were similar to the NHANES population; however, the estimate reported here, based on self-reported contact lens use, is a more inclusive estimate. Contact lens wearers are younger

[§] Based on 16.7% of respondents who reported wearing contact lens and U.S. Census Bureau population estimate of population aged ≥18 years on June 1, 2014. Available at http://www.census.gov/popest/data/national/asrh/2014/index.html.

[¶] In the NHANES protocol, a contact lens wearer was defined as a study participant wearing contact lenses at the time of their examination and who used contact lenses for distance vision.

TABLE 1. Demographic characteristics of wearers and non-wearers of contact lenses, by type of contact lens — United States, 2014*

			Contact lens wearer, by type											
	Non-wearers (n = 3,528)		Daily disposables (n = 82)		Planned replacement, soft (n = 461)		Overnight, soft (n = 55)		Rigid (n = 46)		Other† (n = 65)		All contact lenses (n = 709)	
Characteristic	(%)	(95% CI)	(%)	(95% CI)	(%)	(95% CI)	(%)	(95% CI)	(%)	(95% CI)	(%)	(95% CI)	(%)	(95% CI)
Age group (yrs)														
18–25	(11.1)	(9.6–12.6)	(19.5)	(7.3–31.6)	(20.7)	(15.4–26.0)	(16.5)	(2.1–30.9)	(13.7)	(0.0–30.8)	(11.9)	(0.5–23.3)	(19.0)	(14.8–23.2)
25–29	(7.3)	(6.1–8.5)	(7.9)	(0.0–17.2)	(12.6)	(8.6–16.6)	(19.5)	(3.1–35.9)	(15.8)	(1.4–30.1)	(15.8)	(2.0–29.6)	(13.1)	(9.6–16.5)
30–39	(15.4)	(13.8–16.9)	(22.5)	(11.9–33.0)	(26.1)	(20.9–31.4)	(37.0)	(18.7–55.2)	(8.2)	(0.0–17.4)	(19.9)	(6.7–33.1)	(24.8)	(20.7–29.0)
40–49	(15.7)	(14.4–17.0)	(22.9)	(12.5–33.2)	(19.5)	(15.3–23.6)	(11.1)	(3.1–19.1)	(6.3)	(0.0–13.4)	(32.0)	(16.4–47.7)	(19.5)	(16.1–23.0)
50–59	(20.4)	(19.0–21.8)	(20.2)	(9.3–31.0)	(13.7)	(10.5–17.0)	(8.6)	(1.0–16.2)	(29.5)	(14.7–44.4)	(9.7)	(2.7–16.6)	(14.7)	(11.9–17.5)
60–69	(18.2)	(16.8–19.5)	(6.4)	(1.1–11.8)	(6.0)	(3.9–8.0)	(7.4)	(0.9–13.9)	(21.1)	(9.7–32.6)	(7.4)	(0.7–14.1)	(7.2)	(5.4–9.1)
≥70	(12.0)	(10.9–13.1)	(0.7)	(0.0–2.1)	(1.4)	(0.4–2.4)	NA	NA	(5.3)	(0.0–11.4)	(3.4)	(0.0–7.2)	(1.6)	(0.8–2.5)
p-value				0.01§		<0.0001§		<0.0001§		0.20		<0.01§		<0.0001§
Sex														
Female	(50.2)	(48.2–52.1)	(73.3)	(61.9–84.7)	(60.8)	(55.1–66.5)	(54.6)	(36.3–73.0)	(57.9)	(40.4–75.4)	(50.7)	(34.2–67.2)	(60.7)	(56.0–65.3)
Male	(49.8)	(47.9–51.8)	(26.7)	(15.3–38.1)	(39.2)	(33.5–44.9)	(45.4)	(27.0–63.7)	(42.1)	(24.6–59.6)	(49.3)	(32.8–65.8)	(39.3)	(34.7–44.0)
p-value				<0.001§		<0.001§		0.64		0.40		0.95		<0.0001§
Education														
Less than high school	(12.7)	(11.1–14.2)	(9.9)	(0.0–20.6)	(7.5)	(3.7–11.3)	(10.6)	(0.0–24.6)	(13.7)	(0.0–30.8)	(30.5)	(13.0–48.0)	(10.5)	(6.8–14.2)
High school	(31.5)	(29.7–33.3)	(10.5)	(3.5–17.4)	(19.4)	(15.0–23.7)	(24.6)	(9.3–39.9)	(16.6)	(5.1–28.1)	(37.0)	(21.6–52.5)	(20.2)	(16.6–23.8)
Some college	(29.1)	(27.4–30.8)	(44.0)	(30.4–57.6)	(29.5)	(24.3–34.7)	(17.0)	(5.9–28.1)	(22.6)	(8.6–36.6)	(16.8)	(6.2–27.4)	(28.6)	(24.4–32.8)
Bachelor's or higher	(26.7)	(25.1–28.4)	(35.6)	(23.5–47.8)	(43.7)	(38.0–49.3)	(47.8)	(29.4–66.2)	(47.1)	(29.8–64.3)	(15.7)	(6.3–25.0)	(40.7)	(36.2–45.2)
p-value				0.01§		<0.0001§		0.10		0.10		<0.01§		<0.0001§
Race/Ethnicity														
White, non-Hispanic	(66.4)	(64.4–68.4)	(65.4)	(51.6–79.2)	(67.5)	(61.7–73.4)	(45.2)	(27.6–62.8)	(71.2)	(54.2–88.3)	(53.3)	(36.6–70.0)	(64.5)	(59.6–69.3)
Hispanic	(14.8)	(13.2–16.4)	(18.3)	(7.5–29.0)	(14.9)	(10.2–19.6)	(15.9)	(1.2–30.6)	(18.0)	(1.9–34.1)	(18.7)	(3.9–33.5)	(15.9)	(12.0–19.8)
Black, non-Hispanic	(11.9)	(10.6–13.3)	(5.8)	(0.6–11.0)	(6.2)	(3.5–8.8)	(21.2)	(4.7–37.6)	(10.0)	(0.4–19.6)	(22.2)	(7.8–36.7)	(9.0)	(6.2–11.8)
Other, or ≥2 races	(6.8)	(5.6–8.0)	(10.5)	(0.0–22.3)	(11.4)	(7.0–15.9)	(17.7)	(1.3–34.1)	(0.8)	(0.0–2.4)	(5.7)	(0.0–13.7)	(10.6)	(7.0–14.2)
p-value				0.47		0.01§		0.06		0.48		0.28		0.04§
Metropolitan living area														
Metro	(83.7)	(82.2–85.1)	(84.8)	(75.9–93.8)	(87.7)	(84.2–91.2)	(87.3)	(77.2–97.4)	(88.1)	(77.5–98.8)	(85.1)	(72.9–97.2)	(87.1)	(84.2–90.0)
Nonmetro	(16.3)	(14.9–17.8)	(15.2)	(6.2–24.1)	(12.3)	(8.8–15.8)	(12.7)	(2.6–22.8)	(11.9)	(1.2–22.5)	(14.9)	(2.8–27.1)	(12.9)	(10.0–15.8)
p-value				0.81		0.05		0.53		0.48		0.83		0.05
Region														
Northeast	(18.1)	(16.6–19.6)	(24.9)	(13.2–36.7)	(17.6)	(13.5–21.6)	(32.6)	(13.9–51.4)	(5.1)	(0.0–12.4)	(8.1)	(0.3–15.9)	(17.9)	(14.4–21.5)
Midwest	(21.1)	(19.6–22.6)	(21.6)	(11.3–31.8)	(23.6)	(19.0–28.2)	(13.6)	(3.4–23.8)	(35.6)	(19.7–51.4)	(17.3)	(5.1–29.5)	(22.8)	(19.1–26.5)
South	(37.2)	(35.3–39.1)	(34.0)	(20.9–47.1)	(34.5)	(28.9–40.0)	(41.8)	(24.5–59.2)	(34.0)	(16.0–51.9)	(57.5)	(41.3–73.7)	(37.1)	(32.5–41.7)
West	(23.6)	(21.9–25.3)	(19.5)	(8.6–30.4)	(24.3)	(19.2–29.5)	(11.9)	(0.0–25.9)	(25.4)	(11.0–39.7)	(17.1)	(4.3–29.9)	(22.2)	(18.1–26.3)
p-value				0.60		0.70		0.13		0.10		0.07		0.85

Abbreviations: CI = confidence interval; NA = not available (insufficient sample size).
* Based on responses to Porter Novelli 2014 summer ConsumerStyles survey with questions on contact lens use and wearer/non-wearer demographics as of summer 2014.
† Other = Contact lens wearers that said they wore another type of contact lens not captured by the survey choices.
§ Significantly different from non-wearers at the 95% confidence level.

on average than non-contact lens wearers. Teens and college age persons (those aged 15–25 years) have been associated with lower contact lens compliance and with higher risk for corneal inflammatory events, a category of eye problems that includes serious eye infections (*10*).

The findings in this report are subject to at least two limitations. First, the estimated number of contact lens wearers in the United States reported here does not include those aged <18 years. Since younger age is a predictor of more frequent complications, the current estimate does not include some contact lens wearers who might be most at risk for complications. Second, the Contact Lens Risk Survey used a convenience sample and respondents were more likely to be older and female than the general contact lens-wearing population. Because risk factors have been shown to vary by age, the survey might have underestimated the prevalence of contact lens risk behaviors.

Tens of millions of U.S. adults enjoy the benefits of contact lens wear, but many of them might be increasing their risk for complications because of poor wear and care behaviors. Improved estimates of the extent of contact lens-associated

TABLE 2. Prevalence of risk behaviors for eye infections* among contact lens wearers, stratified by type of contact lens — United States, 2014

Risk factor/Behavior	% of wearers, by type of contact lens				
	Daily disposable (n = 154)	Planned replacement, soft (n = 730)	Overnight, soft† (n = 182)	Rigid (n = 85)	Overall (n = 1,141)
Sleeping overnight in contact lens (ever)§	(48.7)	(45.1)	(88.6)	(17.3)	(50.2)
Napping in contact lens (ever)	(85.1)	(86.9)	(96.4)	(74.1)	(87.1)
Topping off solution (ever)	(72.0)	(51.3)	(59.3)	(60.5)	(55.1)
Replacing lenses at interval longer than recommended or when problem	(39.0)	(48.5)	(47.4)	NA¶	(49.9)
Not using contact lens case	(39.6)	(1.9)	(13.4)	(0.0)	(8.9)
Replacing contact lens case at interval longer than recommended	(83.9)**	(81.1)	(82.0)	(91.4)	(82.3)
Storing lenses in tap water (ever)	(28.0)**	(12.4)	(20.9)	(33.3)	(16.8)
Rinsing lenses in tap water (ever)	(40.3)	(27.2)	(38.3)	(91.4)	(35.5)
Showering in contact lens (ever)	(85.1)	(84.6)	(94.6)	(67.5)	(84.9)
Swimming in contact lens (ever)	(59.1)	(61.7)	(64.9)	(50.6)	(61.0)
Infrequently or never washing hands before inserting lenses	(1.3)	(4.8)	(2.4)	(2.5)	(3.7)
Infrequently or never washing hands before removing lenses	(19.5)	(12.5)	(9.0)	(17.3)	(13.3)
Where lenses were purchased					
Provider office	(66.9)	(64.7)	(67.5)	(84.0)	(66.9)
Retail store without eye exam	(8.4)	(11.8)	(7.5)	(8.6)	(10.4)
Internet	(23.4)	(21.3)	(24.4)	(4.9)	(20.8)
Had a red/painful eye while wearing contact lens that required a doctor's visit (ever)	(29.2)	(29.3)	(35.3)	(28.9)	(30.2)

* Based on responses to Contact Lens Risk Survey, reflecting usual behaviors as assessed in December 2014.
† Overnight contact lens wearers replied "yes" to "Are your contact lenses recommended by your eye doctor for overnight wear?"
§ Ever indicates the combined results of those who answered question "always," "fairly often," "sometimes," or "infrequently" (i.e., questions with these responses were coded as "ever" if the response was not "never").
¶ NA = 100% of rigid wearers reported replacing their lenses when they had a problem, which is compliant with recommendations for rigid lenses.
** Case replacement and storage in tap water questions were only asked if respondent reported using a contact lens case; 39.6% of daily disposable wearers did not use a case. Thus, the reported percentages are the proportion of the 60.4% (n = 93) of daily disposable users that reported using a case.

Summary

What is already known on this topic?

Contact lenses are a safe and effective form of vision correction for the millions of Americans who require it, if worn and cared for as directed. Poor contact lens hygiene behaviors such as exposing contact lenses to water and topping off storage cases with disinfection solution put contact lens wearers at risk for eye infections.

What is added by this report?

In 2014, there were an estimated 40.9 million contact lens wearers aged ≥18 years in the United States. Approximately 99% of contact lens wearers completing the Contact Lens Risk Survey in 2014 reported at least one contact lens hygiene behavior ever that could put them at risk for an eye infection. One third of contact lens wearers reported ever experiencing a red or painful eye that required a doctor's visit.

What are the implications for public health practice?

Prevention efforts could include vigorous health promotion activities that encourage contact lens wearers to improve their hygiene behaviors, such as keeping all water away from contact lenses, discarding used disinfecting solution from the case and cleaning with fresh solution each day, and replacing their contact lens case every 3 months.

disease and increased surveillance capacity for microbial keratitis are needed. Prevention efforts could include vigorous health promotion activities that encourage contact lens wearers to improve their hygiene behaviors, such as keeping all water away from contact lenses, discarding used disinfecting solution from the case and cleaning with fresh solution each day, and replacing their contact lens case every 3 months (Box).

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BOX. Wear and care recommendations to reduce the risk for contact lens-associated complications*†

Contact lens habits and hygiene

- Never sleep in contact lenses unless advised to do so by an eye care provider.
- Keep all water away from contact lenses. Avoid showering while wearing contact lenses, remove them before using a hot tub or swimming, and never rinse or store contact lenses in water.

Contact lenses and supplies

- Replace contact lenses as often as recommended by an eye care provider.
- Discard used solution from the contact lens case and clean it with fresh solution, never water, every day. Store contact lens case upside down with the caps off after each use.
- Replace the contact lens case at least once every 3 months.

Eye care provider involvement

- Visit an eye care provider as often as recommended by your primary health care provider.
- Remove contact lenses immediately and call an eye care provider if you are experiencing eye pain, discomfort, redness, or blurred vision.

Be prepared

- Carry a backup pair of glasses with a current prescription in case contact lenses need to be removed.

Additional information about healthy contact lens wear and care is available at http://www.cdc.gov/contactlenses and http://www.cdc.gov/contactlenses/show-me-the-science.html.

* Adapted from previously published information: Collier SA, Gronostaj MP, MacGurn AK, et al. Estimated burden of keratitis—United States, 2010. MMWR Morb Mortal Wkly Rep 2014;63:1027–30.

† These recommendations were developed through solicitation of expert consensus opinion and scientific literature review by CDC in collaboration with a workgroup that included members from the U.S. Food and Drug Administration, the American Academy of Ophthalmology, the American Academy of Optometry, the American Optometric Association, the Contact Lens Association of Ophthalmologists, the Contact Lens Society of America, and the National Academy of Opticianry. The rationale and publications used to support these recommendations can be found on CDC's Healthy Contact Lens "Show Me the Science" web page, available at http://www.cdc.gov/contactlenses/show-me-the-science.html.

CDC Grand Rounds: Getting Smart About Antibiotics

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Each year in the United States, approximately two million persons become infected with antibiotic-resistant bacteria, at least 23,000 persons die as a direct result of these infections, and many more die from conditions complicated by a resistant infection (*1*). Antibiotic-resistant infections contribute to poor health outcomes, higher health care costs, and use of more toxic treatments (*2*). Although emerging resistance mechanisms are being identified and resistant infections are on the rise, new antibiotic development has slowed considerably (*2*).

Inappropriate antibiotic prescribing is an important and modifiable contributor to antibiotic resistance and is a problem in all health care settings (*1*). Inappropriate antibiotic use contributes to excess health care costs, promotes antibiotic resistance, and contributes to preventable adverse drug reactions. Antibiotics cause approximately 142,000 adult emergency department visits annually for adverse drug reactions; almost four out of five of these visits are for allergic reactions (*3*). Antibiotics also contribute to both health care- and community-associated *Clostridium difficile* infections, which are associated with considerable costs to patients and the health care system (*1*,*4*). In 2009, approximately $10.7 billion was spent on antibiotic therapy in the United States, including $6.5 billion, $3.6 billion, and $526.7 million in the outpatient, inpatient acute, and long-term care settings, respectively (*5*). The cost of antibiotic resistance to the U.S. economy is an estimated $20 billion annually in excess direct health care costs, with an additional $35 billion in lost productivity (*1*).

Antibiotic prescribing must be tracked to understand and improve antibiotic use. Several data sources and surveillance systems have been employed to examine antibiotic prescribing in hospitals and the community. These include the National Ambulatory Medical Care Survey, the National Hospital Ambulatory Medical Care Survey, the National Healthcare Safety Network, claims data from health plans and insurance companies, and data from private vendors (*6*). An accurate assessment of antibiotic prescribing, regardless of clinical setting, is important to identify opportunities to improve prescribing and maintain provider accountability.

This is another in a series of occasional MMWR reports titled CDC Grand Rounds. These reports are based on grand rounds presentations at CDC on high-profile issues in public health science, practice, and policy. Information about CDC Grand Rounds is available at http://www.cdc.gov/cdcgrandrounds.

An estimated half of antibiotic prescriptions given during pediatric ambulatory care visits are inappropriate, and over one quarter of adult prescriptions are for conditions for which antibiotics are rarely indicated (*6*,*7*). Health care providers prescribed 262.5 million courses of antibiotics in 2011 (842 prescriptions per 1000 persons), and prescriptions per 1,000 persons vary markedly according to geography (*8*). The highest prescribing states in 2011, Kentucky and West Virginia, had a rate more than twice that of the lowest prescribing state (Alaska). Why such variability exists is unclear, but this variability is unlikely to be explained by differences in population distribution and extent of infectious diseases.

Inappropriate antibiotic use is not limited to the outpatient setting. A recent evaluation of prescribing for inpatients in two specific scenarios (urinary tract infections in patients without indwelling catheters and treatment with intravenous vancomycin) identified that antibiotic use could have been improved in 37% of cases (*9*). Frequency of antibiotic prescribing among inpatients varies considerably among hospitals. A recent study of 19 hospitals that had completed data validation and submitted antibiotic use data from one or more patient care settings, found threefold differences in usage rates among 26 medical/surgical wards (*9*).

Visits for acute respiratory tract infections lead to more inappropriate antibiotic prescribing than visits for any other group of diagnoses. For example, antibiotic treatment for acute uncomplicated bronchitis is not recommended, and despite decades-long, widespread efforts to curb antibiotic prescribing, in 2010, 71% of all outpatient visits for this condition resulted in an antibiotic prescription (*10*). Similarly, overprescribing for pharyngitis is common. Only 5%–10% of pharyngitis cases among adults are caused by group A *Streptococcus*, for which antibiotic treatment is recommended, yet antibiotics are prescribed for approximately 60% of ambulatory care visits for adult pharyngitis (*7*). Outpatient antibiotic prescribing for children with acute respiratory tract infections has been decreasing since the mid- to late-1990s, but the rate of decline has slowed and might have reached a plateau (*11*). Several factors have been hypothesized to have contributed to this decrease, including the increased use of pneumococcal conjugate and influenza vaccines, national education campaigns to promote appropriate antibiotic use, and increasing concern among both the general public and health care professionals about antibiotic resistance.

In addition to the problem of overuse, antibiotic selection is often inappropriate. Prescribers often choose second- or third-line antibiotics, which are typically broad-spectrum drugs, despite established clinical practice guidelines recommending more targeted agents. Overuse of broad-spectrum antibiotics (e.g., second- or third-generation cephalosporins, fluoroquinolones) is especially problematic because of their potential for increased selection of resistant bacterial populations and their role in treating serious infections. Among U.S. ambulatory care visits during 2007–2009, broad-spectrum antibiotics accounted for 74% of antibiotics prescribed to patients during visits for respiratory conditions (*7*). Among hospitalized patients, 56% received an antibiotic during their stay and 30% received at least 1 dose of a broad-spectrum antibiotic (*9*).

Improving Prescribing and Antibiotic Stewardship

The goal of antibiotic stewardship is to maximize the benefit of antibiotic therapy while minimizing harms to both the individual person and the community. Modest reductions in antibiotic prescribing can make a substantial impact. One study predicted that a 10% decrease in outpatient antibiotic prescribing rates would lead to a 16% decrease in *C. difficile* infection incidence in the community (*12*). Likewise, reducing exposure of hospitalized patients to broad-spectrum antibiotics by 30% can result in an estimated 26% reduction in inpatient *C. difficile* infections (*9*).

To reduce inappropriate prescribing, recent guidelines for common outpatient infections emphasize stringent case definitions and clinical observation for mild cases. For example, children aged ≥24 months with unilateral acute otitis media and mild symptoms are less likely to benefit from antibiotics, and are good candidates for close observation with shared decision-making that involves clinicians and caregivers. A mechanism for follow-up in 48–72 hours in such cases is recommended (*8*).

Several interventions have been shown to improve antibiotic prescribing. Audit and feedback involves tracking individual provider prescribing behaviors and giving feedback on their performance relative to peers or established benchmarks. Academic detailing is a method that adapts some strategies developed by pharmaceutical companies to influence prescribing behaviors that involves active, tailored, and personalized education to promote desired behaviors. Clinical decision support can be integrated with electronic health records to promote appropriate prescribing practices for common infections. Effective ambulatory care interventions have been summarized previously (*13*) and may be adapted to different settings. Although no single intervention can improve all prescribing behaviors in a given outpatient setting, multifaceted interventions involving active provider education appear to have the greatest benefit. Evidence increasingly supports the reduction of unnecessary antibiotic use through delayed prescribing strategies, where patients are given an antibiotic prescription to be filled within a specified timeframe if symptoms do not improve (*8*).

Measures promoting appropriate antibiotic prescribing in inpatient settings are primarily implemented through antimicrobial stewardship programs, which CDC recommends for all hospitals in the United States (http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html) (*9*). In a recent review of hospital interventions to improve antibiotic prescribing (*14*), both restrictive interventions (e.g., required approval from an infectious disease specialist to order certain antibiotics) and persuasive interventions (e.g., audit and feedback on prescribing behaviors or provider education) appeared to be equally effective after approximately 6 months. Interventions intended to reduce excess antibiotic prescribing have also been associated with reductions in *C. difficile* infection, and a meta-analysis of clinical outcomes found no significant increases in mortality caused by reductions in antibiotic prescribing when intervention groups were compared with controls (risk for mortality 0.92; 95% confidence interval = 0.81–1.06).

Educational campaigns aim to decrease inappropriate antibiotic prescribing by promoting judicious prescribing among providers and by increasing general public and provider knowledge about antibiotic resistance. Strategies to further employ appropriate antibiotic use messages include distribution of public health messages via pharmacies, child daycare centers, and workplaces. The CDC "Get Smart: Know When Antibiotics Work" and "Get Smart for Healthcare" campaigns (http://www.cdc.gov/getsmart) inform consumers and providers about antibiotic use and resistance, promote adherence to clinical practice guidelines, and support state- and local-level appropriate antibiotic use programs.

Challenges, Success Factors, and Directions for the Future

Although guidelines exist for diagnosis and treatment of common infections, diagnostic uncertainty remains a challenge. Health care providers are frequently influenced by psychosocial factors which drive prescribing decisions, including concerns for both patient satisfaction with a clinical visit and potential negative consequences because of missed diagnoses (*15*). Providers are also concerned about losing dissatisfied patients to other providers who might be more likely to prescribe antibiotics. Patients who are aware of the potential risks for antibiotic overuse might still express a preference for antibiotic treatment because of perceived benefits. Antibiotic

stewardship interventions and educational efforts aimed at addressing both diagnostic uncertainty and patient expectations will remain important.

Interventions to improve antibiotic prescribing have proven effective in the short-term and within specific settings. It remains less clear which interventions are sustainable and scalable. For this reason, strong stakeholder partnerships and buy-in at the personal, clinic, and health care system levels are fundamental to improving antibiotic prescribing. CDC is working with federal partners, including the Centers for Medicare and Medicaid Services, the U.S. Food and Drug Administration, and the Veterans Health Administration to improve prescribing. CDC partnerships with nonfederal stakeholders, such as vendors of antibiotic prescribing data, state health departments, and professional medical societies are also important.

In March 2015, *The National Action Plan for Combating Antibiotic-Resistant Bacteria* was released, outlining key actions to combat antibiotic resistance in the United States (https://www.whitehouse.gov). These actions include preventing the development and spread of resistant infections, increasing surveillance efforts, developing new drugs and diagnostic tests, and promoting international collaboration to prevent and control antibiotic resistance. In the United States, changes in health care delivery and increased implementation of quality measures provide opportunities to integrate antibiotic stewardship practices. Tracking antibiotic prescribing, regardless of clinical setting, is important in identifying opportunities to improve prescribing and maintain provider accountability. Priority should be placed on reducing prescribing for diagnoses for which inappropriate antibiotic prescribing is common (e.g., acute bronchitis) and on U.S. regions with higher antibiotic prescription rates. Reducing inappropriate antibiotic use and addressing the threat of antibiotic resistance is critical to improve health care quality and to safeguard patient safety across all health care settings.

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Occupational Hydrofluoric Acid Injury from Car and Truck Washing — Washington State, 2001–2013

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Exposure to hydrofluoric acid (HF) causes corrosive chemical burns and potentially fatal systemic toxicity. Car and truck wash cleaning products, rust removers, and aluminum brighteners often contain HF because it is efficient in breaking down roadway matter. The death of a truck wash worker from ingestion of an HF-based wash product and 48 occupational HF burn cases associated with car and truck washing in Washington State during 2001–2013 are summarized in this report. Among seven hospitalized workers, two required surgery, and all but one worker returned to the job. Among 48 injured workers, job titles were primarily auto detailer, car wash worker, truck wash worker, and truck driver. Because HF exposure can result in potentially severe health outcomes, efforts to identify less hazardous alternatives to HF-based industrial wash products are warranted.

HF (Chemical Abstracts Service [CAS] no. 7664-39-3) can produce serious health effects through any exposure route. Exposure of HF solution to the eye can cause irritation as well as potentially permanent ocular damage. Tissue damage from skin contact occurs by two mechanisms. Free hydrogen ions can cause a corrosive burn, and free fluoride ions can cause local cellular destruction and penetrate the skin, causing muscle and bone necrosis. HF is insidiously toxic at the low concentrations (<20%) used in vehicle washing, because no overt corrosive skin burn is present at these concentrations and no initial pain alerts the worker to the exposure (*1*–*3*). Numbness, induced by the nerve damage resulting from fluoride ion penetration, leaves the injured worker unaware of the underlying necrosis that can progress for up to 24 hours after exposure (*1*,*2*). Systemically, fluoride toxicity by any route of exposure can cause fatal cardiac arrhythmias precipitated by hypocalcemia and hyperkalemia. Topical application and subcutaneous administration of calcium or magnesium compounds can be used to quench fluoride ions and preempt tissue damage.

Injuries in Washington State during 2001–2013 that met the case definition for exposure to HF among workers engaged in car or truck washing, including auto detailing, were identified through a number of sources. The single fatality was identified from Washington's Division of Occupational Safety and Health (WA-DOSH) program. The seven hospitalized patients with burns were identified through Washington's hospitalized occupational burn notifiable conditions rule. The 41 nonhospitalized workers with burns were identified through Washington's State Fund workers' compensation data system (*4*). Washington's law mandates workers' compensation insurance coverage for all employers, with 97.7% of employers and approximately two thirds of the state workforce insured through the Washington State Fund. Potential nonhospitalized burn patients were identified using the following Occupational Injury and Illness Classification System injury nature codes assigned to workers' compensation claims: 050 (burns unspecified), 051 (chemical burns), 058 (multiple types of burns), and 059 (burns not elsewhere classified) (*5*). Among potential cases in both hospitalized and nonhospitalized workers, HF exposure (versus exposure to other or unspecified acids) during car or truck washing was confirmed through review of employer, worker, and/or physician narrative statements in the workers' compensation medical record. Exposure information, including product Safety Data Sheets, were obtained from WA-DOSH inspection records or the medical record. Time-loss payments begin when work is missed on the fourth calendar day after the date of injury.

In 2012, a truck wash worker aged 38 years died after ingestion of a HF-based truck wash solution.* The victim placed a call to 911 emergency medical services; his 5-hour emergency department course was consistent with previous case reports of HF ingestion, including recurrent ventricular dysrhythmias (*6*). The product ingested was Fast Bright (NW Chemical, LLC) containing HF at <12% and sulfuric acid at <20% concentrations, with a pH of 1.5–1.6. The product is diluted before use on trucks, and the employer reported a dilution ratio resulting in a solution concentration of 0.65% HF. Both the concentrated and diluted solutions were present in the workplace, and it is not known which was ingested.

Workers' compensation data from 2001–2013 were reviewed, and 48 HF chemical burn cases were identified. The median age of injured workers was 29 years (range = 15–62 years), three were female, and burn depth included superficial (first-degree), partial-thickness (second-degree), and full-thickness (third-degree) from exposure to products that ranged from 0.5% to 20% HF. HF concentration might have a greater effect on burn severity than the affected total body surface area burned. Eight workers (17%) received a median of 21 days (range = 2–40 days) in time-loss compensation.

* Whether this ingestion was intentional, inadvertent, or attempted self-harm is unknown.

Medical and contextual case details are summarized for the seven hospitalized workers (Table 1). Two required operative intervention, including burn debridement (case 1), split thickness skin graft (case 1), and escharotomy (case 3). Five injuries involved the fingers and hands. At the time of injury, workers wore improper gloves (e.g., cotton gloves) (case 2) or compromised gloves (with holes) (case 3). Two workers (cases 4 and 7) wore no gloves, one of whom manually washed a truck with an HF saturated washing mitt. One worker (case 6) had chemically resistant gloves and a face shield, but while scrubbing carwash walls overhead, the solution dripped down the brush handle and onto the worker's arm and body. Delay in recognizing the exposure and in seeking medical attention occurred among nearly all hospitalized workers. Although immediate calcium gluconate administration can minimize the local and potential systemic effects of HF, no injured worker received calcium gluconate at their workplace. (Although the federal Occupational Safety and Health Administration (OSHA) and WA-DOSH require employers to provide a safe workplace, no regulation specifies that calcium gluconate be kept at the worksite.) With the exception of one worker (aged 15 years), all hospitalized workers returned to work; two (cases 1 and 7) received time-loss compensation, and two (cases 1 and 3) received permanent partial disability awards.

As a case example, one worker (case 1) splashed his left leg while transferring a cleaning solution of HF and sulfuric acid between containers. He did not irrigate the area and continued to work for approximately 1.5 hours with soaked pants and shoe until he developed an uncomfortable burning sensation. Upon evaluation, the patient was reported to have a quarter-sized brown necrotic area on the anterior left ankle and burn to the anterior left lower leg. Emergency medical technicians irrigated the area with calcium gluconate and transported him to a burn unit, where he received a calcium gluconate injection. He sustained a small area of full-thickness skin loss requiring excision and debridement with a skin graft. The worker received outpatient burn therapy and returned to part-time work 6 weeks after the injury. A foot paresthesia developed, and the worker received a permanent partial disability payment.

Body regions involved in the 41 nonhospitalized burn patients were upper extremity (16 patients, including hands and fingers [14]), head (14 patients, including eyes [14]), lower extremity (seven), multiple body regions (three), and trunk (one).

The exposed population includes workers in 16 industries (Table 2), with nearly half (n = 24) occurring in car washes (North American Industry Classification System [NAICS] no. 811192), which includes truck, van and trailer washing as well as auto detailing (*7*). HF burn injury also commonly occurred in new car dealers (NAICS no. 441110) (n = seven). Truck drivers (n = five) are at risk; three of the seven hospitalized cases were in truck drivers.

Workers apply HF-based solutions to vehicles with handheld sprayers, pressurized metered sprayers, and open wash buckets. In addition to ready-to-use products, car and truck washes dilute concentrated HF-based products with water onsite to create the 'use dilution' solution, and exposure can occur during dilution and product transfer. Eight products were named in association with the 17 HF burn patients (Table 3). HF-based products often include additional chemicals that can burn, including sulfuric acid and phosphoric acid. Two products contained ammonium bifluoride (NH_4HF_2, CAS no. 1341-49-7), a chemical that dissociates into HF when dissolved in water and therefore has similar toxicity.

Discussion

During 2001–2013, one fatal HF ingestion and 48 chemical burns from exposure to HF associated with car and truck washing were reported in Washington State. Although an estimated 134,000 workers are employed in the car wash industry (NAICS no. 811192) in the United States (*8*), few case reports of HF exposure in car and truck wash workers have been published. In a study that examined nine fatal unintentional occupational HF poisonings investigated by OSHA, none

TABLE 1. Summary of cases of hydrofluoric acid exposure occurring during commercial car and truck washing — Washington, 2001–2013

Date of incident	Age*	Assigned task	Burn location	Burn classification (degree)†	Time loss (days)
Dec 2012	38	Wash truck	Systemic ingestion	—	Patient died
Feb 2001	23	Transfer solution	Left ankle, leg	3rd	40
Dec 2002	62	Wash trailer	Bilateral hands	2nd	0
Sep 2003	45	Wash truck	Right fingers (4 and 5)	3rd	0
Aug 2006	53	Wash wheels	Bilateral hands	Not reported	0
Jan 2007	15	Clean aluminum truck surfaces	Right thigh	3rd	0
May 2012	21	Wash walls and ceiling	Hands, legs, abdomen	1st	0
Mar 2013	32	Clean truck	Right thumb	2nd	16

* The fatality and all cases requiring hospitalization occurred in male workers.
† As reported by the physician in the medical record.

TABLE 2. Industry and job titles associated with all hydrofluoric acid burns — Washington, 2001–2013

NAICS no.	Industry description	Job title* (no. of workers affected)	No. of cases
811192	Car washes	Auto detailer (5), auto detail manager (1), car washer (5), car wash manager (4), truck washer (7), truck wash manager (1), washer (1)	24
441110	New car dealers	Auto detailer (6), dealership lot attendant (1)	7
238990	All other specialty trade contractors	Trucking manager, unknown	2
327320	Ready mix concrete manufacturing	Truck driver, mixer driver	2
561790	Other services to buildings and dwellings	Truck washer, cleaner	2
811310	Commercial and industrial machine and equipment (except auto and electronic) repair and maintenance	Mechanic, truck washer	2
111219	Other vegetable and melon farming	Unknown	1
113310	Logging	Truck driver	1
423830	Industrial machinery and equipment merchant wholesalers	Car washer	1
484121	General freight trucking, long distance, truckload	Mechanic	1
484210	Used household and office goods moving	Truck washer	1
484220	Specialized freight (except used goods) trucking, local	Truck driver	1
532111	Passenger car rental	Auto detailer	1
561320	Temporary help services	Mechanic	1
561431	Private mail centers	Truck driver	1
611512	Flight training	Truck washer	1
Total no. of cases, including fatality			**49**

Abbreviation: NAICS: North American Industry Classification System.
* Job title as given on the workers' compensation Report of Accident form (free text).

TABLE 3. Car and truck wash products associated with 17 hydrofluoric acid (HF) burns — Washington, 2001–2013

Product	Manufacturer	No. of cases	HF% concentrate*	HF% dilute solution†
Zep-A-Lume	Zep, Inc.	6	5–10	4.2–8.3
Aluma Brite	—	3	—	—
Aluma-Kleen 1000	Wesmar Co., Inc.	2	10–20§	—
Fast Bright	NW Chemical, LLC	2	<12	0.65
A-Wall	CH_2O, Inc.	1	—	0.5
Lume Brite Aluminum Cleaner and Brightener	—	1	<12	—
TC-303 Acid Aluminum Truck Brightener	Malco Products, Inc.	1	<5+ <4¶	—
Wheel Bright	Armor Chemical, Co.	1	—	7

* HF% concentrate is that reported on the product's Safety Data Sheet.
† HF% dilute solution is self-reported by the worker or their employer in the medical record or during inspection by Washington's Division of Occupational Safety and Health.
§ Product does not contain HF. It contains 10%–20% ammonium bifluoride (Chemical Abstracts Service no. 1341-49-7 [NH_4HF_2]), which dissociates into HF when dissolved in water.
¶ Product contains <5% HF and <4% ammonium bifluoride.

were found to be associated with car or truck washing (*9*). An Oregon-OSHA hazard alert† on HF exposure describes two car wash workers with HF burns, one of whom sustained a finger amputation (*10*). The broad distribution of HF burns associated with vehicle washing but occurring outside of the car wash industry suggests a large population of at-risk workers.

Less hazardous alternatives to HF-based wash products are available, and product substitution could have averted the HF burn injuries described in this report (*3*). When HF-based products are used, workplaces must use engineering and administrative controls to limit exposure. Product Safety Data Sheets reflect the hazardous nature of the product, and employers are faced with the challenge of managing exposure through worker training and use of personal protective equipment (PPE). However, appropriate PPE does not ensure protection; approximately nine of the cases described in this report involved failure of PPE, when product dripped inside rubber boots or gloves, permeated torn resistant gloves, or was sprayed up under safety glasses. Additionally, injury prevention efforts should include education and training with chemical manufacturers and distributors of HF-based products as well as the end users. Among the six identified products, one (made by Zep, Inc.) was produced internationally, and the rest were manufactured and distributed locally.

† Available at http://www.orosha.org/pdf/hazards/2993-22.pdf.

Summary

What is already known on this topic?

Hydrofluoric acid (HF) causes chemical burns and is a serious systemic poison by all routes of exposure. HF is a chemical component in car and truck wash products, such as rust removers, aluminum brighteners, and wash formulations, because it is inexpensive and highly effective.

What is added by this report?

During 2001–2013, one death and 48 chemical burns from exposure to HF-based products used during car and truck washing, including auto detailing, were reported in Washington. The burns resulted in hospitalization, time lost from work, and disability. Reported diluted-use concentrations were <1% HF, and reported concentrated formulations contained up to 20% HF; both concentrations are hazardous to workers.

What are the implications for public health practice?

Because exposure to HF is toxic and can result in severe health outcomes, efforts to identify less hazardous alternatives to HF-based wash products are warranted. Further characterization of chemical burns from exposure to HF in auto detailers, car and truck wash workers, and truck drivers from other data sources or states would elucidate the magnitude and severity of this occupational health hazard.

The findings in this report are subject to at least two limitations. First, groups exempted from Washington's mandatory workers' compensation law, including self-insured qualified employers, large employers, and sole proprietors, are not represented in the findings. Second, workers who have workers' compensation coverage but do not file a claim would not be included. Barriers to accessing the workers' compensation system include a lack of knowledge of the system, language other than English, beliefs about eligibility, and fear of job loss or retribution (*10*).

Occupational exposure to HF-based wash solutions can result in chemical burns, disability, and death. HF's potential to cause severe injury combined with the inherent challenge of relying on PPE to protect workers warrants efforts to identify less hazardous alternatives, which would provide the most effective means of prevention.

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Progress Toward Poliomyelitis Eradication — Nigeria, January 2014–July 2015

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Since the 1988 launch of global poliomyelitis eradication efforts, four of the six World Health Organization (WHO) regions have been certified polio-free (*1*). Nigeria is one of only three countries, along with Afghanistan and Pakistan, where transmission of wild poliovirus (WPV) has never been interrupted. During 2003–2013, northern Nigeria served as a reservoir for WPV reintroduction into 26 previously polio-free countries (*2*). In 2012, the Nigerian government launched a national polio eradication emergency plan (*3*) to intensify efforts to interrupt WPV transmission. This report describes polio eradication activities and progress in Nigeria during January 2014–July 2015 and updates previous reports (*2–4*). No WPV cases have been reported to date in 2015, compared with a total of six cases reported during 2014. Onset of paralysis in the latest reported WPV type 1 (WPV1) case was July 24, 2014. Only one case of circulating vaccine-derived poliovirus type 2 (cVDPV2) has been reported to date in 2015, compared with 20 cVDPV2 cases during the same period in 2014. Pending final laboratory testing of 218 remaining specimens of 16,617 specimens collected since January 2015, Nigeria could be removed from the WHO list of polio-endemic countries in September 2015. Major remaining challenges to the national polio eradication program include sustaining political support and program funding in the absence of active WPV transmission, maintaining high levels of population immunity in hard-to-reach areas, and accessing children in security-compromised areas of the northeastern states.

Vaccination Activities

Nigeria's routine immunization program includes vaccination with trivalent (types 1, 2, and 3) oral poliovirus vaccine (tOPV) at birth and ages 6, 10, and 14 weeks. In 2014, WHO and the United Nations Children's Fund estimated national 3-dose tOPV coverage (tOPV3)* among children aged <12 months to be 66% (*5*). In February 2015, inactivated polio vaccine (IPV) was introduced into the routine immunization program and is being rolled out in phases that initially prioritized eleven polio high-risk states† (*6*), and as of July, had been introduced in 35 of Nigeria's 36 states as well as the Federal Capital Territory. This is part of a global plan to provide immunity to type 2 poliovirus (the most common type of cVDPV) in all OPV-using countries, before a synchronized switch from tOPV to bivalent OPV (bOPV), which contains OPV types 1 and 3 (*7*).

During January 2014–July 2015, 14 supplemental immunization activities (SIAs)§ were conducted in Nigeria. The majority of the 10 subnational SIAs used bOPV, although some local government areas (LGAs) (equivalent to districts) at increased risk for cVDPV2 emergence used tOPV. Of the four national SIAs conducted during this period, one used tOPV, one used bOPV, and two used bOPV in some states and tOPV in others, depending upon polio risk profiles. During SIAs using both tOPV and IPV in selected high-risk states and LGAs from June 2014 through May 2015, approximately 4.4 million IPV doses were administered in high-risk communities.

A number of strategies were implemented during January 2014–July 2015 to enhance the quality of SIAs and to further engage communities, including continued use of an accountability dashboard tool,¶ directly observed polio vaccination,** health camps,†† and social mobilization by volunteer community mobilizers, religious and traditional leaders, and polio survivors, who continue to assist in reducing noncompliance. Although areas of inaccessibility caused by political insurgency increased in places such as Borno, Yobe, and northern Adamawa states (Figure 1), additional innovative strategies continue to be implemented, including permanent health teams made up of women who deliver OPV to households within their communities, transit-point vaccination, vaccination in camps for internally displaced persons, short-interval SIAs that take advantage of intermittent access to normally inaccessible areas, and vaccination of children attending malnutrition treatment centers.

* Coverage with the third dose of diphtheria-tetanus-pertussis vaccine is used as a surrogate for routine immunization coverage because reported OPV coverage can include doses given during SIAs.

† Polio high-risk states in northern Nigeria: Bauchi, Borno, Jigawa, Kaduna, Kano, Katsina, Kebbi, Niger, Sokoto, Yobe, and Zamfara.

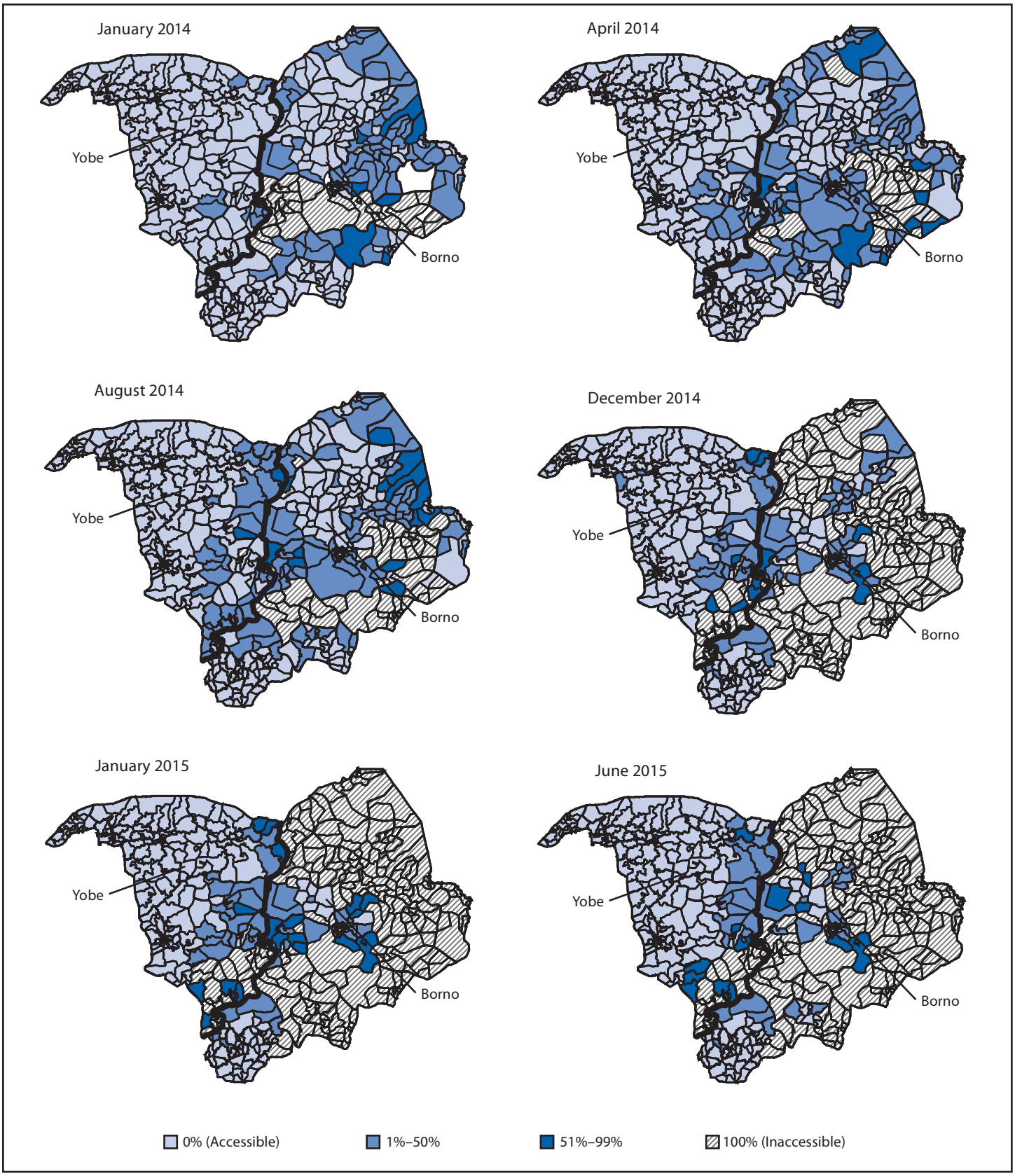
§ Mass campaigns conducted for a few days, during which 1 dose of OPV is administered to all children aged <5 years, regardless of vaccination history. Campaigns can be conducted nationally or subnationally.

¶ Monitors SIA preparations and execution at the LGA level.

** Outside household vaccination in areas with a high proportion of missed children that features entertainers to promote positive vaccination experiences.

†† Community level fixed-point vaccination centers providing various primary health care services during SIAs.

FIGURE 1. Areas inaccessible to vaccination teams, by proportion of inaccessible settlements — Borno and Yobe states, northern Nigeria, January 2014–June 2015



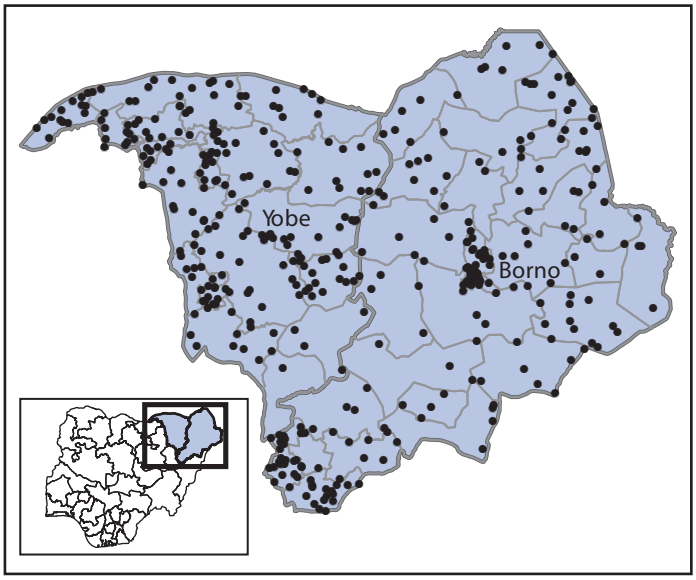
SIA quality is assessed using lot quality assurance sampling (LQAS)[§§] surveys to estimate whether OPV coverage in the surveyed area is at or above a threshold of 90%. During January 2014–July 2015, the number of LGAs conducting LQAS surveys in the 11 high-risk states increased from 207 to 226. During the same period, the proportion of LGAs passing at or above the 90% threshold increased from 47% to 75%, the proportion of LGAs at the 80%–89% level decreased from 34% to 22%, and the proportion of LGAs below the 80% level decreased from 18% to 3%.

Poliovirus Surveillance

Acute flaccid paralysis surveillance. Polio surveillance relies on laboratory-supported acute flaccid paralysis (AFP) case detection and confirmation. Two indicators are used to assess the quality of AFP surveillance: documentation of a nonpolio AFP (NPAFP) rate of two or more cases per 100,000 population aged <15 years (indicating satisfactory sensitivity) and collection of adequate stool specimens from ≥80% of persons with AFP (*1*). Nigeria's NPAFP rate for 2014 was 14.8 per 100,000,[¶¶] and 97% of AFP cases had adequate stool specimen collection. For 2015, the annualized NPAFP rate was 13 cases per 100,000, and adequate stool specimens were collected for 99% of AFP cases. All 11 high-risk states exceeded both indicator standards in 2014 and continue to do so in 2015. The proportion of reporting LGAs within these states that met both standards was 98% in 2014 and remains 98% to date in 2015. Efforts have been made to enhance surveillance in insecure areas within Borno and Yobe states by adding reporting sites, increasing the number of community informants, and monitoring the performance of surveillance weekly at the national level. As a result, the 2015 NPAFP rate per 100,000 population <15 years was 17.0 for Borno and 27.7 for Yobe (Figure 2).

Environmental surveillance. AFP surveillance is supplemented by environmental surveillance; samples are taken from effluent sewage sites every 2–4 weeks for poliovirus testing. By July 2015, environmental surveillance was being conducted in 38 sites, mostly in northern Nigeria: Borno (four sites), Kaduna (three), Kano (five), Lagos (five), Sokoto (four), the Federal Capital Territory (two), Kebbi (three), Katsina (three), Jigawa (three), Yobe (three), and Adamawa (three). In 2014, WPV1 was detected in one sewage sample collected in May in Kaduna, and cVDPV2 was detected in 54 sewage samples: 14 from Kano (last detected in July 2014); 13 from Borno (June); 12 from Sokoto (August); 11 from Kaduna (October); two from Katsina (October); and one each from Jigawa and Yobe (November). Borno had no further positive environmental samples after mid-2014, following the introduction of IPV and use of tOPV in SIAs in the state. During January–July 2015, cVDPV2 was identified in one sewage sample collected from Kaduna (March).

FIGURE 2. Cases of nonpolio acute flaccid paralysis reported (N = 435)* — Borno and Yobe states, northeast Nigeria, January–July 2015



* Each dot represents one case.

Polio Incidence

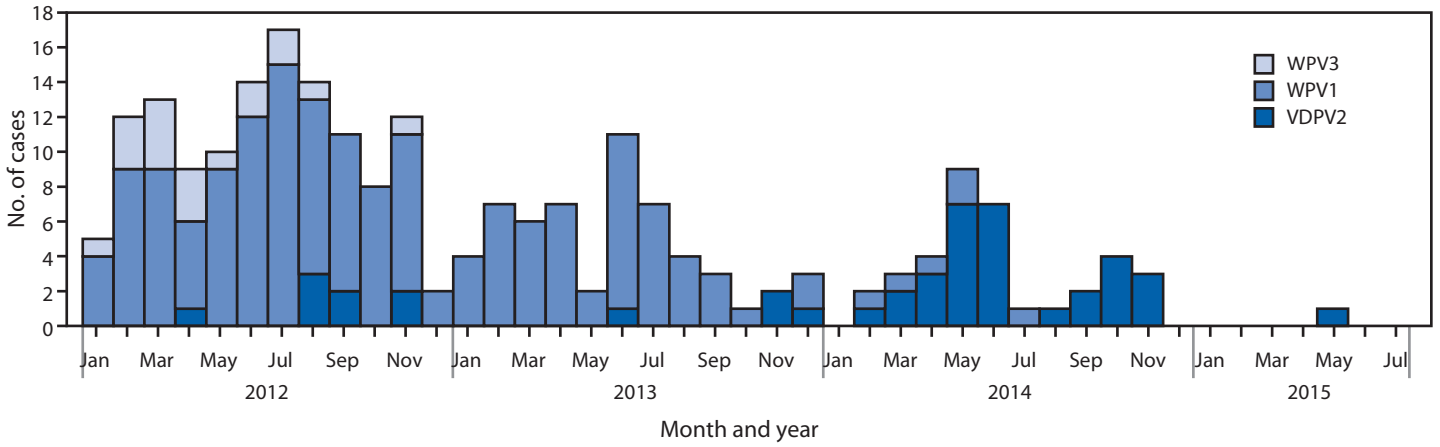
WPV and cVDPV polio cases. No WPV1 cases have been reported in Nigeria to date in 2015. During 2014, six WPV1 cases were reported, 53 were reported during 2013, and 122 were reported during 2012 (Figure 3). The six WPV1 cases in 2014 were geographically limited to five in Kano and one in Yobe state; onset of paralysis in the last reported WPV1 case was July 24, 2014. The last WPV type 3 case was reported in November 2012. One cVDPV2 case has been reported to date in 2015 in the Federal Capital Territory, with a paralysis onset date of May 16. During 2014, 30 cVDPV2 cases were reported, compared with four cases in 2013. Six polio-compatible[***]

[§§] A clustered LQAS methodology is used to assess SIA quality by sampling the target population of children at the LGA level and documenting finger markings indicative of OPV receipt. A sample is drawn from six wards (geopolitical subunits) within the LGA, with 10 children in a single settlement selected at random from each sampled ward. This yields a total sample of 60 children per LGA. LGAs are classified into one of four classifications based on the number of unmarked children found: 0–3 high pass (dark green); 4–8 pass (light green); 9–19 unacceptable (yellow); and >19 fail (red). A detailed description of the methodology is available at http://www.polioeradication.org/Portals/0/Document/Research/OPVDelivery/LQAS.pdf.

[¶¶] Calculated using WHO African Region population estimates.

[***] A case in which two adequate stool specimens were not collected from an AFP case within 2 weeks of the onset of paralysis, for which a panel of experts considers the clinical presentation to be compatible with polio and 1) an acute paralytic illness is reported with polio-compatible residual paralysis at 60 days; 2) death takes place within 60 days; or 3) the case is lost to follow-up. Case definitions are available at http://www1.paho.org/english/HVP/HVI/hvp_fg_pol.pdf.

FIGURE 3. Number of cases of wild poliovirus type 1 (WPV1), wild poliovirus type 3 (WPV3), and vaccine-derived poliovirus type 2 (VDPV2), by month — Nigeria, January 2012–July 2015



cases have been reported in 2015 thus far, compared with 21 during the same period in 2014. Overall in 2014, 35 compatible cases were reported.

Genomic sequence analysis. Since 2012, the genetic diversity of WPV in Nigeria has declined. Among eight genetic clusters of poliovirus detected in 2012, four were identified in 2013; among these, two active clusters were found in 2014. Genomic sequence analysis can also be used to identify AFP surveillance gaps not otherwise shown by surveillance performance indicators. In areas with good surveillance, isolates from environmental sampling are usually closely related, having >98.5% nucleotide sequence identity in the coding region of the major capsid protein, VP1. Poliovirus isolates with a nucleotide difference of ≥1.5% in the VP1 coding region indicate undetected chains of transmission. During 2012, 2013, and 2014, VP1 nucleotide differences of ≥1.5% were found in 10 of 103, 10 of 53, and two of six sequenced WPV1 isolates, respectively. During 2014, the proportion of cVDPV2 isolates with a VP1 nucleotide difference of ≥1.5% (7.8%) was similar to that in 2013 (6.8%). The isolate from the single 2015 cVDPV2 case is genetically linked to viruses that were first detected in Kaduna in 2014. For 2015, a VP1 nucleotide difference of ≥1.5% was found in one isolate (of seven sequenced isolates) from an environmental sample taken during March in Kaduna state; it was genetically linked to Nigerian viruses associated with the major cVDPV2 lineage group that first emerged in 2005 (*8*).

Discussion

Since establishing a polio emergency operations center and implementing a national emergency polio eradication action plan supported with global partners in 2012, Nigeria has experienced a progressive decrease in WPV1 cases. The success of strategies implemented to improve SIA quality and increase access to hard-to-reach children is reflected in improved LQAS survey data. Despite a decline in genetic diversity of WPV1 during 2012–2014 and achievement of surveillance performance indicators at the national level, virologic data indicated persistent gaps in AFP surveillance quality even in 2014. Nonetheless, allowing for delays in obtaining results from the remaining 218 laboratory specimens, if no WPV is identified in AFP cases or environmental samples, Nigeria stands poised for imminent removal from the WHO list of polio-endemic countries.

For the African region to be certified polio-free, all countries in the region will have to maintain a zero WPV1 case incidence for ≥36 months with high-quality surveillance. Continued strengthening of surveillance is required, including active case finding and close monitoring of polio-compatible cases, which might indicate missed transmission.

Nigeria is at risk for persistent cVDPV2 transmission because of low routine immunization coverage (*9*) and predominant use of bOPV in SIAs, which could lead to gaps in immunity to type 2 viruses. Efforts to strengthen routine immunization are ongoing in polio high-risk LGAs with existing polio infrastructure; these include building capacity and increasing accountability for routine immunization service provision at the health facility level. Interrupting cVDPV2 transmission will also require increased use of tOPV in SIAs, boosting immunity to type 2 polioviruses with IPV, and strengthening outbreak response to any newly identified VDPV. Five of the next six planned SIAs will use tOPV.

The national polio program will need to continue to manage the challenges posed by the insecurity in areas of northeastern Nigeria where many children remain inaccessible to vaccination services. Innovative strategies, including use of permanent health teams, transit-point vaccination, short interval SIAs, and vaccination of children who access point of care sites, in

addition to monthly security risk assessments, will be key to achieving consistent coverage in these areas. Nigeria's polio program, in collaboration with international partners, will need to continue to advocate for its eradication priorities, to ensure sustained support during the post-transmission period and after changes in national political leadership.

Polio program legacy planning in Nigeria has begun. Documentation of lessons learned during the challenging fight to eradicate polio is critical because this knowledge can shape future approaches to global health (*10*). This process includes evaluation of current programs, planning for post-certification transition of polio assets and further use of polio eradication infrastructure to strengthen routine immunization and other national public health priorities. Continued partner and government support will be essential for creating the polio eradication legacy in Nigeria, and for maintaining a polio-free African region.

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Jean Baptiste Kamgang, Daniel Tom-Aba, Kebba Touray, Rosa C. Norman, Nigeria National Stop Transmission of Polio program, Nigeria Field Epidemiology Training Program.

[1]National Primary Health Care Development Agency, Federal Republic of Nigeria; [2]Global Immunization Division, Center for Global Health, CDC; [3]Federal Ministry of Health, Federal Republic of Nigeria; [4]World Health Organization, Nigeria Office; [5]United Nations Children's Fund, Nigeria Office; [6]Division of Viral Diseases, National Center for Immunization and Respiratory Diseases, CDC.

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Summary

What is already known on this topic?

Nigeria is one of only three countries in the world where wild poliovirus (WPV) transmission has never been interrupted. Nigeria's 2012 national polio eradication emergency plan has led to improved quality of vaccination efforts, increased accountability, and a decline in WPV cases from 2013 to 2014.

What is added by this report?

The number of WPV cases decreased from six during 2014 to zero through July 2015. Only one reported case of circulating vaccine-derived poliovirus type 2 (cVDPV2) has been reported to date in 2015; however, the number of reported cVDPV2 cases increased from 2013 to 2014. Although genetic diversity declined during 2012–2014 and surveillance performance indicators have been met, gaps in surveillance persist.

What are the implications for public health practice?

Challenges include maintaining political support and program funding in the absence of active WPV transmission, maintaining high levels of population immunity in hard-to-reach areas, and accessing children in security-compromised parts of the northeastern states. Pending the clearance of the 218 remaining laboratory results, Nigeria is poised to be removed from the World Health Organization's list of polio-endemic countries in September 2015. When this occurs, certification of a polio-free Africa region by the end of 2017 will be achievable. Documenting lessons learned during this fight for polio eradication will allow Nigeria to successfully use existing infrastructure to address other public health problems.

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Notes from the Field

Lead Poisoning and Anemia Associated with Use of Ayurvedic Medications Purchased on the Internet — Wisconsin, 2015

Jon Meiman, MD[1,2]; Robert Thiboldeaux, PhD[2]; Henry Anderson, MD[2]

On April 30, 2015, the Wisconsin Division of Public Health (WDPH) was notified by a local health department of an elevated blood lead level (BLL) in a female patient aged 64 years. All Wisconsin laboratories are required to provide BLL testing results performed on any state resident to WDPH, and WDPH and local health departments are statutorily mandated to investigate any single BLL ≥20 μg/dL or BLLs that are persistently ≥15 μg/dL. Review of medical records revealed that the patient had developed progressive fatigue and shortness of breath during a period of multiple weeks that prompted inpatient medical evaluation. Hemoglobin level was 8.3 g/dL (normal range for age and sex of patient = 12.5–15.0 g/dL), and peripheral blood smear showed normochromic, normocytic red blood cells with basophilic stippling. A BLL was obtained and found to be 85.8 μg/dL. Urine toxic metals tests revealed mercury and aluminum levels in the normal range. Combined methylated and inorganic urine arsenic levels were slightly elevated at 53.3 μg/L (normal = <18.9 μg/L). The patient was discharged for outpatient lead chelation therapy with oral meso-2,3-dimercaptosuccinic acid.

WDPH interviewed the patient to determine possible environmental sources of lead. She did not report any home remodeling that involved paint disturbance or plumbing maintenance, symptoms consistent with pica, use of pottery manufactured outside the United States, or ingestion of wild game, which can contain lead shot fragments (*1*). She reported taking several supplements, including two Ayurvedic (traditional Indian) medications produced in India that she purchased on the Internet: Mahayogaraj Guggulu (MG) (Sri Sri Ayurveda Trust) and Bruhat Vata Chintamani Rasa (BVCR) (Shree Dhootapapeshwar Limited). The patient ingested approximately four tablets of MG and two tablets of BVCR daily during February–April 2015.

The Wisconsin State Laboratory of Hygiene performed metals testing of the patient's well water using graphite furnace atomic absorption, and of both Ayurvedic medications using inductively coupled plasma optical emission spectroscopy. Well water lead level was 4.3 μg/L (Wisconsin public health standards set acceptable levels at ≤15 μg/L), and arsenic was undetectable. BVCR contained 16.4 mg/kg (0.2%) lead, and MG contained 48,700 mg/kg (4.9%) lead. Both supplements also contained trace amounts of cadmium, chromium, and aluminum, as well as substantial amounts of arsenic (3,830 mg/kg in MG) and thallium (14.7 mg/kg in MG and 17.2 mg/kg in BVCR). On the basis of estimated daily MG and BVCR consumption and the patient's body weight, the patient's exposure to arsenic and thallium exceeded thresholds deemed safe for human health, as defined by the U.S. Environmental Protection Agency (*2*). The patient discontinued Ayurvedic medication use and reported improvement in symptoms after 1 month of chelation therapy.

Lead is a highly toxic substance that has no endogenous physiologic role, and no safe level of exposure has been identified. High levels of exposure can cause anemia, cognitive dysfunction, coma, and death (*3*). Although strict regulations have substantially reduced environmental contamination in the United States, lead poisoning continues to occur. This case report confirms earlier reported risk for lead poisoning from Ayurvedic medications produced in India (*4*), and highlights the acute toxicity that can develop from short-term use. Although toxic metals can occur naturally in some Ayurvedic medicines, or result from contamination, metals such as lead are often intentionally added to some preparations because of putative health benefits (e.g., *naga bhasma*, a lead-based herbal medicine used to treat various conditions). Physicians should be aware of possible toxicity caused by these medications and should consider lead poisoning as a cause of unexplained anemia in patients taking Ayurvedic medication. Although this investigation did not reveal health problems caused by other toxic metals, the elevated levels of arsenic and thallium could have presented health risks if these medications had been consumed for prolonged periods. State and local public health departments should consider outreach to educate the public about potential risks of Ayurvedic medications and consider sales restrictions as permitted by statutory and regulatory authority.

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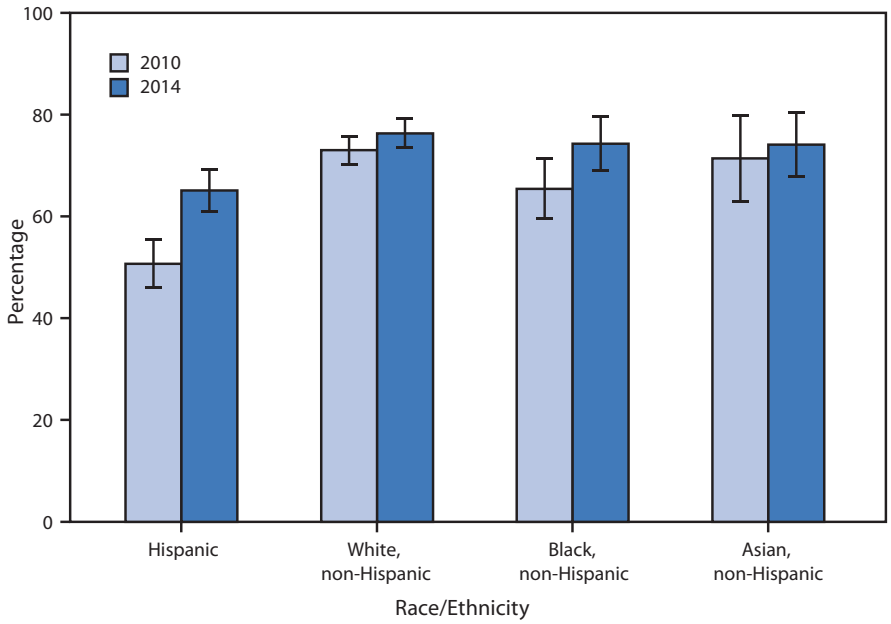
QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage of Adults Aged 19–25 Years with a Usual Place of Care,* by Race/Ethnicity† — National Health Interview Survey, United States, 2010 and 2014§¶



* Based on a question in the Sample Adult section that asked, "Is there a place that you usually go to when you are sick or need advice about your health?" Adults who indicated that the emergency department was their usual place for care were considered not to have a usual place of health care.

† Categories shown are for non-Hispanic respondents who selected one racial group; respondents had the option to select more than one racial group. Hispanic origin refers to persons who are of Hispanic ethnicity and might be of any race or combination of races. Only selected groups shown in graph.

§ Estimates are based on household interviews of a sample of the civilian, noninstitutionalized U.S. population and are derived from the Sample Adult component.

¶ Percentages shown with 95% confidence intervals.

From 2010 to 2014, the percentage of persons aged 19–25 years who had a usual place to go for medical care increased for Hispanics (50.7% to 65.1%) and non-Hispanic blacks (65.4% to 74.3%). In 2010, among persons aged 19–25 years, non-Hispanic blacks (65.4%) were less likely than non-Hispanic whites (73.0%) to have a usual place to go for medical care; however, in 2014, no significant difference between the two groups was found. In 2010 and 2014, Hispanic adults aged 19–25 years were the least likely to have a usual place to go for medical care.

Source: National Health Interview Survey, 2010 and 2014 data. Available at http://www.cdc.gov/nchs/nhis.htm.

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How Do I Handle My Professional Car Wash Wastewater?

Information presented in this publication is intended to provide a general understanding of the statutory and regulatory requirements governing car wash wastewater.. This information is not intended to replace, limit or expand upon the complete statutory and regulatory requirements found in the Illinois Environmental Protection Act and Title 35 of the Illinois Administrative Code. These requirements can be found on line at www.ipcb.state.il.us.

Professional car washes are an easy way for consumers to remove dirt and grime from their vehicles. The dirt washed off vehicles as well as the cleaning materials themselves may be harmful to the environment. As the operator of a professional car wash, what must you do to keep this dirt and the chemicals used in the cleaning process from being released into the environment? This fact sheet provides a description of the types of professional car washes, and explains why car wash activities are a concern to the environment, how to manage and discharge wastewater, how to manage sludge, how to prevent groundwater contamination, and how to become more environmentally friendly and conserve water.

? What Types of Professional Car Washes Are There?

Most professional car washes can be classified as conveyor, in-bay automatic, or self-service systems. These are described below.

- In a conveyor car wash system, the car moves on a conveyor belt while the exterior of the car is washed. The two basic technologies that are available for the conveyor wash cycle are friction and frictionless. The friction wash uses brushes or curtain strips made of cloth or other material to clean the vehicle, while the frictionless uses high-pressure nozzles. In addition, the conveyor car wash is either full service or exterior only. In a full-service conveyor car wash, both the interior and exterior of the car are cleaned. Exterior-only car washes do not clean the interior.
- At an in-bay automatic car wash, the vehicle is parked in a bay and remains stationary while a machine moves back and forth over the vehicle to clean it. A professional in-bay car wash uses brushes made of nylon or other material, soft cloth strips, or automatic washers consisting of high-pressure nozzles.
- In a self-service car wash, the customers wash the vehicles. A wand dispenses water and cleanser at varying amounts and pressures. In addition, a low-pressure brush may be available to assist in the wash cycle.

? Why Are Car Washes a Concern For the Environment?

Professional car wash systems create wash wastewater that can have a great impact on the environment if not properly managed and discharged.

Contaminants in wash wastewater include the following:

- Oil and grease, which contain hazardous materials such as benzene, lead, zinc, chromium, arsenic, pesticides, herbicides, nitrates, and other metals
- Detergents, including biodegradable detergents, that can be poisonous to fish
- Phosphates, which are plant nutrients and can cause excessive growth of nuisance plants in water bodies
- Chemicals, such as hydrofluoric acid and ammonium bifluoride products (ABF), and solvent-based solutions that are harmful to living organisms
- Chemicals and oils used for the maintenance of cleaning machinery (for automatic systems)
- Debris that can clog storm sewer inlets and grates and thereby prevent storm water drainage to the sewer

Washing vehicles on hard, impervious surfaces such as concrete areas can cause wash wastewater flow into storm drains. It is necessary to find out if area storm and sanitary sewers are combined or separate systems. Many storm and sanitary sewers in the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) are combined before the final discharge point; therefore, most wastewater is treated before it is discharged to surface water bodies such as rivers, lakes, and streams. Many newer areas and other cities have separate sewer systems; therefore, wastewater discharged to storm sewers is discharged directly to water bodies without treatment to remove pollutants. Car wash wastewater can be harmful to humans, plants, and animals if released untreated to surface water bodies. Additionally, allowing wash wastewater to soak into the ground can be harmful because the wastewater may contaminate soil and groundwater. More information on how to prevent soil and groundwater contamination is presented later in this fact sheet.

? How Should I Manage and Discharge My Wastewater?

The Clean Water Act requires professional car washes to route car wash wastewater to water treatment facilities or to state-approved drainage facilities designed to protect the environment. Filtration of the wastewater may be conducted before discharge to a sanitary sewer. Filtration is recommended so that fewer solids are present in the wash wastewater stream discharge to the sanitary sewer system. Filtration is mandated by the MWRDGC for wastewater that contains particles greater than 0.5 inch in diameter. Once filtration has taken place, you will be left with a sludge that must be disposed of. Details for proper disposal are discussed below.

? Do I Need a Permit for My Wastewater Discharges?

A National Pollutant Discharge Elimination System permit from the Illinois Environmental Protection Agency (Illinois

EPA) is required for businesses that discharge car wash wastewater directly into a surface water body or to a storm sewer that discharges to a surface water body. If car wash wastewater is discharged directly to a sanitary sewer system, a business owner must apply for a state construction permit and may also need to apply for a state operating permit. Contact the Office of Small Business for more information on Illinois EPA water permits. Because car wash regulations vary from city to city, it is wise to contact the city storm water program or department or water department to determine exact local permit requirements.

How Do I Manage My Sludge?

Sludge can be disposed of wet or dry. The requirements associated with each are described below.

- The sludge can be dried by removing it from the car wash system and allowing the water to evaporate. The sludge may be dried at the site where it is generated without a Bureau of Land permit. If you take the sludge somewhere else to dry, the drying site must have a Bureau of Land permit. You must transport the sludge under manifest as special waste unless the sludge is certified as non-special. Sludge which is certified as non-special waste can be disposed of with your general refuse. Refer to the fact sheet "Do I Have A Special Waste?" for more information on special waste and certifying your waste as non-special.
- Special waste must be handled and disposed of in accordance with specific Illinois EPA regulations. For more information on special waste, refer to the fact sheet "Do I Have A Special Waste?" You must determine if the amount of special waste that you have generated requires you to obtain a generator identification number. For more information on this determination, refer to the fact sheet "Does My Business Need Generator Identification Numbers And Manifests?" Also, special waste must be disposed of in a licensed, special waste disposal facility and must be transported by a licensed special waste hauler using a special waste manifest. Disposal of sludge as special waste may significantly increase disposal cost. Drying and disposing of the sludge as general refuse may reduce these costs.

How Can I Prevent Soil and Groundwater Contamination?

Soil and groundwater contamination is a serious hazard to human health. Therefore, steps must be taken to prevent discharge of car wash wastewater to soil and groundwater. The steps below should be taken.

- Discharge to sewer systems or to holding tanks when applicable and in compliance with state and local regulations.
- Capture and recycle as much wastewater as possible using filters, oil-water separators, reclamation systems, and other appropriate technologies.
- Hire a licensed special waste transporter to dispose of wet sludge and other nonrecyclable special wastes.
- Comply with state and local solid and liquid waste disposal regulations.
- Dry the sludge in containers and dispose of it as general refuse.

How Can I Make My Professional Car Wash System More Environmentally Friendly?

As discussed above, the toxic materials associated with a professional car wash system include detergents, phosphates, chemicals such as hydrofluoric acid, and ABFs. The amount of toxic materials in a professional car wash system can be reduced by taking the measures below.

- Use biodegradable soaps and chemicals instead of solvent-based solutions.
- Reduce the amount of detergent used in the system. Using less detergent produces less suds and reduces the amount of discharge to the sewer system.
- Water softeners and filtration can lower the amount of total suspended solids in water and reduce spotting on vehicles. If there is less spotting on the vehicles, less detergent will be needed.

How Can I Make My Car Wash System More Water Efficient?

Over the past 10 years, professional car washes have implemented and improved water conservation practices. Professional car washes can become even more water efficient by taking the general measures below.

- Detect and repair all leaks in the system.
- Install lower flow nozzles and run at lower pressure; adjust flow in nozzles, sprays, and other lines to meet minimum quality requirements.
- Maintain all water-using devices to original or improved specifications for the conservation of water, and replace worn equipment with water-saving models.
- Replace brass or plastic nozzles, which erode more quickly, with stainless-steel or hard ceramic nozzles.
- Check alignment of nozzles, and inspect nozzles for clogging on a regular basis.
- Install positive shut-off valves on all hoses and valves and in extractor sinks.
- Turn off all flows during shutdowns. Use solenoid valves to stop the flow of water when production stops.
- When washing towels or rags, use front-loading washing machines and reduce the amount of laundry by doing fewer but fuller loads.
- Identify discharges that can be reused and implement reuse practices.

In addition, there are specific measures that can be taken for each type of car wash. For a conveyor system, water can be greatly conserved by reducing conveyor time. Also, nozzles should be timed to turn on as the vehicle enters the arch and shut off as it moves out of range. For an in-bay automatic car wash, adjusting nozzle alignment, flow rates, and timing can conserve water.

How Do I Obtain More Information?

For more information on professional car wash environmental requirements, please call the Office of Small Business at 1-888-EPA-1996. All calls are considered confidential, and the caller can remain anonymous. You can also visit the Illinois EPA website at www.epa.state.il.us. All fact sheets mentioned in this document are available through the Illinois EPA website.

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United States
Environmental Protection Agency

Office of
Ground Water and
Drinking Water

CLASS V UIC STUDY FACT SHEET
CARWASH WELLS WITHOUT UNDERCARRIAGE WASHING OR ENGINE CLEANING

What is a carwash well?	Carwash wells are Class V underground injection control (UIC) wells used to dispose of washwater at facilities that wash only the exterior of vehicles (sometimes called "wand washes"). These are typically located at coin-operated, manual carwashes where people use hand-held hoses to wash vehicles. Even though the term "carwash" is used, the category includes wells that receive used washwater at facilities designed for washing all kinds of vehicles, including cars, vans, trucks, buses, boats on trailers, etc.
What types of fluids are injected into carwash wells?	Fluids that primarily contain detergents, road salts, sediments, and incidental contaminants that may be washed from a vehicle's exterior.
Do injectate constituents exceed drinking water standards at the point of injection?	Available sampling data indicate that the concentrations of antimony, arsenic, beryllium, cadmium, lead, and thallium in the injectate typically exceed primary drinking water standards and health advisory levels. Available data also show that ethylene glycol, methylene chloride, naphthalene, and tetrachloroethene also have exceeded primary drinking water standards or health advisory levels, indicating that degreasers may be working their way into the washwater at some facilities. The pH, aluminum, iron, and manganese levels in the injectate have exceeded secondary drinking water standards.
What are the characteristics of the injection zone of a carwash well?	Carwash wells are used in a variety of geological settings.
Are there any contamination incidents associated with carwash wells?	Two possible contamination incidents involving carwash wells have been reported in HI. The nature and extent of contamination are unknown, but both wells were closed.
Are carwash wells vulnerable to spills or illicit discharges?	Although there are only two reported contamination incidents associated with carwash wells, there is concern over the potential for such wells to be vulnerable to spills or illicit discharges. Because an attendant is not usually on site, individuals may wash their engines or undercarriages using degreasers, wash the exterior of their vehicles with chemicals other than common soap solutions, or may pour used oil, antifreeze, or other hazardous materials down these drains.
How many carwash wells exist in the United States?	There are up to 4,651 documented carwash wells and approximately 7,200 estimated carwash wells in the United States. However, there is significant uncertainty regarding these estimates because, in some cases, it is difficult to distinguish carwash wells from other kinds of commercial or industrial wells.
Where are carwash wells located within the United States?	Although carwash wells are documented in 14 states, 99 percent of the documented wells and 98 percent of the estimated wells are located in 9 states: AL, MS, NY, WA, MD, IA, WV, CA, and ME.
How are carwash wells regulated in states with the largest number of this type of well?	*Permit by rule*: WV *Report discharge*: CA *Individual permit*: AL, MS, NY, WA, MD, NH, and ME *Ban*: IA
Where can I obtain additional information on carwash wells?	For general information, contact the Safe Drinking Water Hotline, toll-free 800-426-4791. The Safe Drinking Water Hotline is open Monday through Friday, excluding federal holidays, from 9:00 a.m. to 5:30 p.m. Eastern Standard Time. For technical inquiries, contact Amber Moreen, Underground Injection Control Program, Office of Ground Water and Drinking Water (mail code 4606), EPA, 401 M Street, SW, Washington, D.C., 20460. Phone: 202-260-4891. E-mail: moreen.amber@epa.gov. The complete Class V UIC Study (EPA/816-R-99-014, September 1999), which includes a volume addressing carwash wells without undercarriage washing or engine cleaning (Volume 4), can be found at http://www.epa.gov/OGWDW/uic/cl5study.html.

Dangerous Waste Guidance for Gas Stations

Gas stations across the state produce dangerous wastes such as:

- Gas-soaked kitty litter or other absorbent from leaks or spills.
- Gas and water mixtures (from well testing, spill buckets, sumps, and stormwater runoff).
- Sludges from the catch basin and oil water separators.
- Contaminated wastewater from car washes.

If not managed properly, these wastes can damage the environment and put employees, your property, and the community at risk.

As a single gas station, you may think the small amounts of these wastes you generate are not such a big deal. However, when you multiply these small wastes by the number of gas stations across the state, they become a much larger problem.

Dangerous wastes pollute drinking water supplies and cause health concerns. They can be toxic, flammable, and sometimes caustic. They don't belong on the ground, down the drain, or in the dumpster.

Good dangerous waste management and safety practices:

- Ensures that you comply with the dangerous waste regulations and avoid costly penalties.
- Reduces risks to your employees, your property, and your community.
- Shows that you are helping to maintain a clean and healthy environment in Washington State.

Why it Matters

Clean, abundant water was once taken for granted in Washington State as a free, unlimited resource. Today, after more than a century of dramatic population growth and climate change we know our water resources are not unlimited and certainly not free.

Population growth and associated development increase the demand for clean, abundant water and increase pollution problems.

The Washington State Department of Ecology (Ecology) is committed to ensuring the state has clean, adequate water supplies that meet current and future drinking water needs, commercial and agricultural uses, and to sustain fish and the natural environment.

Special accommodations

If you need this document in a format for the visually impaired, call the Hazardous Waste and Toxics Reduction Program at 360-407-6700.

Persons with hearing loss, call 711 for Washington Relay Service. Persons with a speech disability, call 877-833-6341.

Properly manage dangerous waste

- Store ignitable waste in fireproof containers.
- Ship waste according to the United States Department of Transportation regulations.
- Make sure containers and wastes are compatible.
- Manage contact water or water from testing wells as dangerous waste, or test and designate each drum.
- Check spill buckets before and after every delivery. Remove any debris, liquid, and ice.

Only rain down the drain

- When power-washing, prevent wash water from flowing into storm drains and ditches.
  - Block storm drains with mats.
  - Use sand bags to direct water to the collection area.
  - Use sump pump and hose(s) to direct water to sewer.

- Do not put liquid from spill buckets down the drain. Remove the liquid and dispose of it properly.
- Do not allow soapy water into the storm drain.
- Know where your drains go. It is vital in case of a fire, spill, or other emergency. Get maps showing where they lead. Contact your public utility for assistance.
- Know if your site has pretreatment. Is your pretreatment inspected? How often? Where are records kept?

See Ecology's Storm Water Manual for Western Washington IV or Storm Water Manual for Eastern Washington for more information.

Underground storage tanks

Training

Ecology requires training for persons who own, manage, or work at gas stations that have underground storage tanks (USTs). The training ensures familiarity with preventative maintenance, leak detection requirements, and that proper safety and emergency procedures are followed. The types of operators are defined in WAC 173-360-730 and are briefly described below.

- **Tank operators (usually the owner or manager) require Class A/B training**. Training is in-depth and covers the general requirements, operation, and maintenance of UST systems.
- **Cashier (or other designated on-site individual) who is responsible for responding to emergencies and spills when a Class A or B operator is not on site requires Class C training**. At all times a facility is in use someone **must** have at least a Class C certification.

Class A/B and Class C operator trainings are provided by approved trainers. Class C operators may also be trained by the Class A/B operator. For more information on operator training, see 173-360-730 WAC (requirements), -760 (records and retention), or -120 (definitions). To find a list of approved trainers, call the UST inspector in your area or visit www.ecy.wa.gov/programs/tcp/ust-lust/OperatorTraining/OperatorTraining.html.

Emergencies

Each UST facility must have signage posted that provides emergency response information.

Emergency signs *must* be visible to anyone dispensing or delivering fuel. Sign(s) should be installed prominently on the building nearest the dispensers. A minimum of one sign is required per facility, but if it cannot be easily located due to the size of the facility, it is advisable to post extra signs. In some situations, Ecology may require more signs.

An emergency sign should identify the location of the emergency shut-off device, a fire extinguisher, and instructions in case of an emergency. An example might look like:

EMERGENCY: FIRE, SPILL, OR RELEASE

- Use Emergency Shut-off (next to front door).
- Call the Fire Department _____ or 911.
- Call the facility operator _____.
- Fire extinguisher is located inside building.

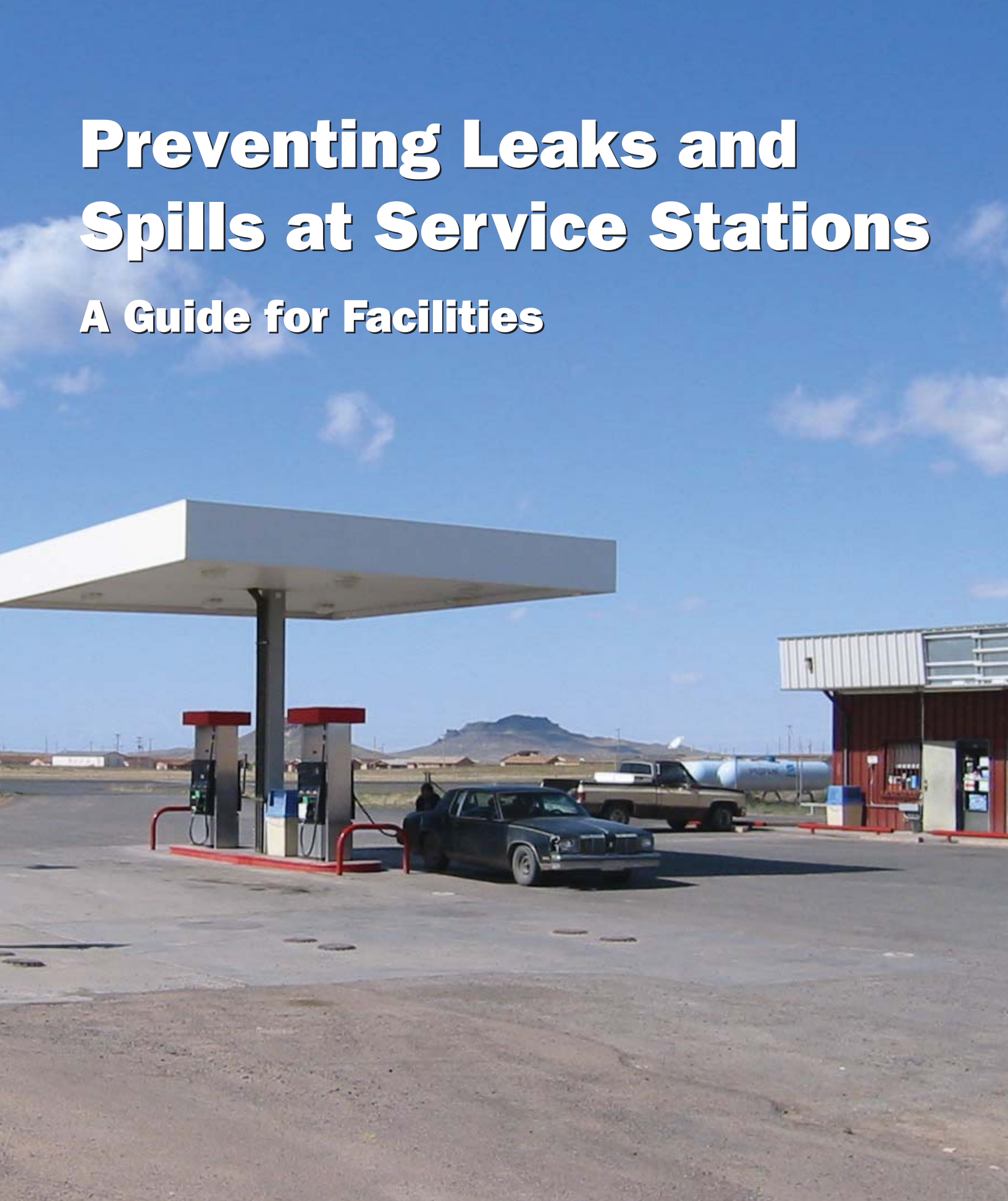
John Doe Service Station
1234 Service Station Road
Seattle WA 99999
Business phone:_____

- Owners, managers, and employees must know what to do in the event of a spill.
- Operators must keep a spills log.
- Create and maintain a written spill plan.
- Consult your ATG alarm flowchart in case of a spill.
- There should be a spill kit within 25 feet of all fueling stations. Spill kits should include:
  - Absorbent pads capable of containing 15 gallons of fuel.
  - Storm drain plug.
  - A non-water boom ten feet or more with a capacity of 12 gallons.
  - A non-metallic shovel.

For more information about signage, see Ecology's *Focus on Emergency Signage Required for UST Sites*, publication #12-09-240.

Preventing Leaks and Spills at Service Stations

A Guide for Facilities



United States Environmental Protection Agency
Pacific Southwest/Region 9
EPA-909-K-03-001/October 2003

Contents

Introduction

In recent years, leaking fuel tanks and spills at gas stations have contaminated drinking water sources for nearby communities, and have become costly for owners to clean up. This handbook provides guidance for owners and operators of gas stations on how to protect the environment, comply with federal environmental regulations, and save money by preventing the need for costly cleanups and payment of legal penalties. This guide is especially useful for facilities on tribal lands and in U.S. territories, where federal regulations are sometimes the only environmental rules in effect.

This handbook highlights five major areas of environmental management at gas stations: underground storage tanks, aboveground storage tanks, used oil, vehicle waste disposal wells, air conditioning units, and emergency spill response. Each section includes a brief introduction, suggests good management practices, provides a checklist for compliance, and lists EPA contacts for additional assistance.

If your facility does auto repair, you may also be interested in *The Pollution Prevention Toolkit: Best Environmental Practices for Auto Repair*. This is a series of fact sheets plus a video, available free of charge from EPA, showing the best ways for auto repair shops and fleet maintenance facilities to prevent pollution. To order the free package, call 1-800-490-9198. More information can be found at: **www.epa.gov/region09/p2/autofleet**

This publication is intended to provide guidance on the federal regulations and should not be used to meet all owner/operator responsibilities. It is not a substitute for U.S. Environmental Protection Agency regulations, nor is it a regulation itself. It does not impose legally binding requirements. It does provide information on compliance with important federal requirements applicable at gasoline service stations. For a comprehensive understanding, please refer to the Code of Federal Regulations, and note that local regulations may be more stringent than the federal regulations. Check with your local regulatory authority. If you are not sure who your regulatory authority is, you can find out by calling EPA's toll free hotline at 1-800-424-9346.

EPA does not endorse any companies or names that are mentioned or shown in this workbook or poster. Many of these pictures were taken on the Navajo Nation.

Underground Storage Tanks

Upper left: Installation of new USTs.

Upper right: A UST inspection in progress.

Lower right: Removal of leaking UST and contaminated soil.

An underground storage tank (UST) is a tank and any connected underground piping that has at least 10 percent of its combined volume underground. **Federal regulations require** owners/operators of USTs to have proper **corrosion protection**, **spill and overfill protection**, a **leak detection system** and **financial assurance** for liability.

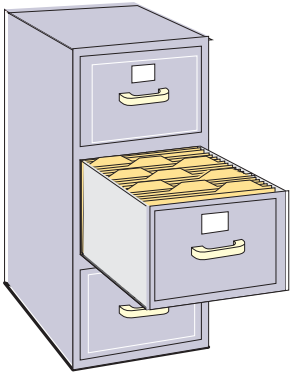
Upper left: Keep your sumps empty and clean.

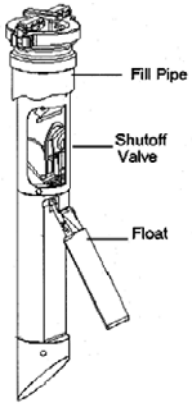
Upper center: Keep your spill buckets empty and clean.

Upper right: Test your Automatic Tank Gauge (ATG) to make sure it is calibrated and working properly.

Lower left: Organize and maintain your records and documents.

Lower right: Example of overfill protection and automatic shutoff device used during deliveries.





Good Management Practices:

- Organize and maintain necessary documents at your facility that include the following records:
  - Financial assurance
  - Valid tank and piping leak detection results
  - Repairs and upgrades to tanks and piping system
  - Installation of overfill protection (such as flapper valve, ball float, or high level alarm)
  - Installation of corrosion-protected tanks and piping, if applicable
  - Records of cathodic protection testing, if applicable
  - Records of internal inspection for steel tanks, if applicable
- Keep spill buckets free of liquids and dirt. Check to see if your spill bucket is leak-free and operational.
- Check all metal piping in contact with soil and water for corrosion protection.
- Check dispenser area and piping sumps for leaks. If any water or gasoline is present, remove it and dispose of it properly. Make any necessary repairs.
- Test your ATG system, if installed, to make sure it is properly calibrated and working.
- On-site staff should know how to operate the ATG and emergency shutoff valve.
- Facility should have a tank specifications chart available during deliveries.

Checklist For Compliance

The following checklist will help you manage your USTs. Always contact your local authority for further compliance.

- ☐ Submit a signed Notification Form 7530-1 for Underground Storage Tanks to EPA and tribal/local environmental agencies (where applicable) **30 days** prior to a new tank installation or changes in tanks or piping.
- ☐ You must have passing **leak detection results for your tanks** at least **every 30 days.** Common leak detection methods for tanks include automatic tank gauging, statistical inventory reconciliation (SIR), and inventory control with tank tightness testing. Maintain monthly records for the **previous 12 months.**
- ☐ You must also have **leak detection results for your piping.** For pressurized piping systems, this includes an annual operation test of the automatic line leak detector **and** either an annual line tightness test or leak detection tests at least every 30 days. Remember to keep these test results as records.
- ☐ Demonstrate that each tank has spill and overfill protection that is in good working order.
- ☐ All metallic components (such as tanks, piping, joints) in contact with soil must have corrosion protection. Remember to keep records of cathodic protection testing and internal lining inspections (if you use these methods for corrosion protection).

Steel tank with sacrificial anode (bottom) as corrosion protection.

- ☐ You must have **financial assurance** to cover cleanup costs of potential soil and groundwater contamination.
- ☐ During temporary or permanent closure of USTs, tanks must follow proper closure requirements. Notify EPA and tribal/local authorities at least 30 days in advance if you plan on permanently closing your tanks.

For general UST information refer to: www.epa.gov/oust or contact EPA's Call Center at 1-800-424-9346. You may also contact the EPA Region 9 UST program staff at 415-972-3367.

Aboveground Storage Tanks

Another common method for storing fuels at service stations is the use of aboveground storage tanks (ASTs). Any AST holding petroleum products or used oil may be regulated under the Clean Water Act because releases can contaminate surface waters. Single tanks with an aboveground storage capacity of more than 1,320 gallons or combined aggregate storage in containers of 55 gallons or greater totaling more than 1,320 gallons are subject to the federal Oil Spill Prevention, Control and Countermeasure (SPCC) regulations.

Upper left: Good example of secondary containment.

Upper right: Good example of security fencing.

Lower right: Routinely check tank, valves, hoses, and piping for any leaks.

Good Management Practices

- Provide corrosion protection for ASTs and any buried piping. Options include elevating tanks, resting tanks on continuous concrete slabs, installing double-walled tanks, or cathodically protecting the tanks and piping.
- To prevent rainwater from filling containment areas, you may need to cover the tank with a roof structure.
- To prevent evaporative losses and moisture condensation, you may want to paint tanks a reflective color, as shown in the above photos.
- Regularly check the dispenser hoses and piping for any leaks (a common problem).
- On-site staff should be trained to handle emergencies, such as leaks or explosions.

Checklist For Compliance

The following checklist will help you manage your aboveground storage tanks. Always contact your local authority for further compliance.

- ☐ **Develop and implement a Spill Prevention, Control and Countermeasure (SPCC) Plan** if the combined capacity of your ASTs is greater than 1,320 gallons. The SPCC Plan must be certified by a Professional Engineer.
- ☐ All ASTs should have a **secondary means of containment** capable of holding 100% of the largest tank capacity plus sufficient room to hold stormwater/rain water. Options include either having double-walled tanks; berms, dikes, or vaults; or leak-proof retention ponds or holding basins.
- ☐ If a loading "rack" is present, tank loading and unloading procedures must have some form of secondary containment sufficient to account for the largest compartment of the delivery truck. If there is no "rack" present, there must be general drainage control to prevent a release during delivery.
- ☐ Buried piping must be protectively wrapped and/or coated to prevent corrosion, and periodically tested for structural integrity.
- ☐ Routinely **monitor ASTs** to ensure they are not leaking. Areas to inspect include tank foundations, connections, coatings, tank walls, and piping systems. The new SPCC rule requires combining tank inspection with integrity testing based on industry standards.

Wrong: This AST has inadequate secondary containment, and no way to prevent vehicles from hitting it.

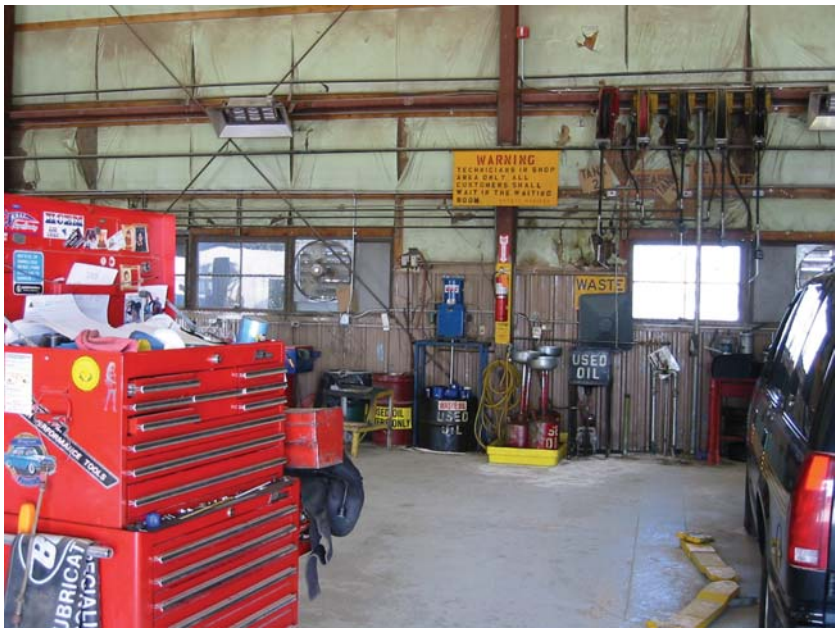
- ☐ **Control drainage from diked containment areas** with manually controlled valves. Any discharge should be inspected for petroleum and chemicals prior to disposal.
- ☐ **Provide adequate security** including fencing and lighting. Tank valves must be closed and locked when not operating. Starter controls must be closed and locked when not operating, and accessible only to authorized personnel.
- ☐ **Oil handling employees must be trained** in proper handling of oil and applicable pollution control laws, rules and regulations. Training records must be maintained for at least three years.

For general AST and SPCC information refer to: www.epa.gov/oilspill or contact EPA's Call Center at 1-800-424-9346. You may also refer to the EPA Region 9 Web site: www.epa.gov/region09/waste/sfund/oilpp

Used Oil

Containers for used oil should be clearly labeled, as shown here. Extra care should be taken to avoid spillage shown by floor stains.

If your facility changes oil on vehicles or accepts used oil from your community, you must follow the federal standards for the management of used oil. These standards require your shop to comply with basic storage requirements. Used oil should be stored only in containers and tanks that are in **good condition** (free of any visible leaks, structural damage, or deterioration). Containers, aboveground tanks, and fill pipes that transfer used oil into underground storage tanks all need to be clearly marked with the words **"USED OIL"** to prevent mixing of used oil with other materials.



Containers must be in good condition and clearly labeled.

Good Management Practices

- When changing oil, set up equipment—such as a drip table or screen table with a used oil collection bucket—to collect oil dripping off parts. Place drip pans underneath vehicles that leak fluids.
- Used oil filters should be drained, crushed, and stored in a container that is labeled "Used Oil Filters." Most oil filters can be recycled. This process exempts filters from being considered hazardous waste.
- If your facility is storing used oil destined for recycling in underground storage tanks (USTs), you must follow UST regulations. Refer to the UST section, p 2–4.

Checklist For Compliance

The following checklist will help you manage your used oil. Always contact your local authority for further compliance.

- ☐ Keep used oil storage tanks and containers in good condition; label tanks and containers with the words **"USED OIL."**
- ☐ When changing oil, set up equipment, such as a drip table or screen table, to collect oil dripping off parts.
- ☐ Oil filters should be drained (for 24 hours) and crushed prior to recycling or disposal. It is good practice to label storage containers as **"USED OIL FILTERS."**
- ☐ Immediately clean up any oil spills or leaks to the environment.
- ☐ **Do not mix used oil with hazardous waste** (such as gasoline or solvents), or else it will have to be managed as hazardous waste, which is more costly and cannot be recycled. Used oil should be separated from other wastes and stored in leak-free containers labeled "USED OIL."
- ☐ Used oil generated by a shop may be burned on site in a commercial space heater. Also, used oil may be sent to a burner for energy recovery.

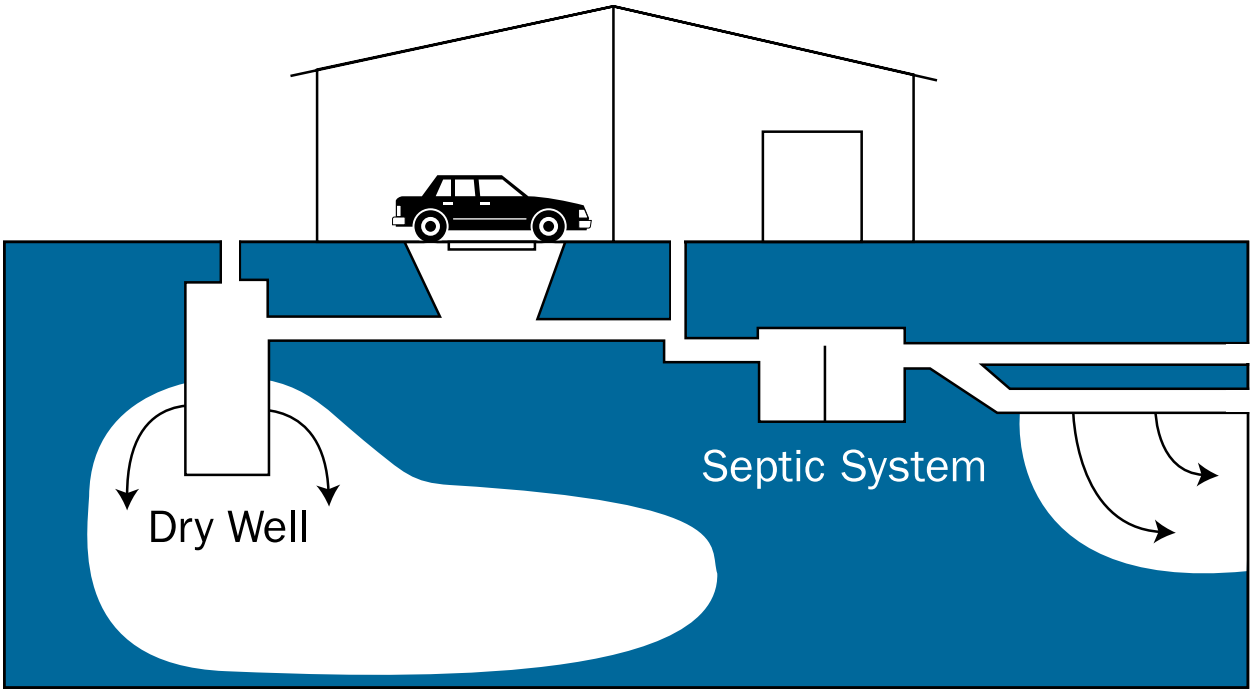
- ☐ Contact local authorities to determine requirements and obtain necessary permits.
- ☐ If shipping used oil off site to be burned, you must obtain an EPA identification number by calling the EPA Region 9 RCRA Notification Switchboard at 415-495-8895.

Contact EPA's Call Center toll-free at 1-800-424-9346 for additional information about used oil management

Class V Motor Vehicle Waste Disposal Wells

Floor drains in service bays might lead to a Class V (Five) Motor Vehicle Waste Disposal Well.

Your facility may be using a Class V Motor Vehicle Waste Disposal Well if there is a floor drain on site. Floor drains that are not connected to a sewer line are considered Class V Motor Vehicle Waste Disposal Wells if used to receive fluids from vehicle repair or maintenance activities (this includes drainage from car wash stations). In order to protect drinking water, **federal requirements prohibit using existing motor vehicle waste disposal wells, unless the owner and operator seeks a waiver and obtains a permit** from EPA and local authorities, if applicable. Constructing new motor vehicle waste disposal wells is prohibited nationwide, due to the risk of polluting groundwater.



Use of dry wells should be avoided, due to the risk of contaminating groundwater.

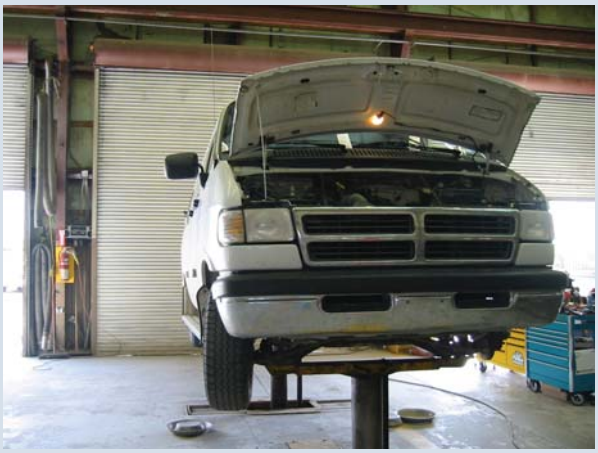
Good Management Practices

- Facility managers should know if floor drains lead to a municipal sewer line, to a surface discharge, to a leakproof sump, or to a shallow injection well. Facility managers should obtain the diagrams for all the existing underground construction at their facility to track the transport of these fluids.
- Facility managers should know all sources of fluids that flow onto or originate from their property, including rain, snow, fuel, motor vehicle fluids, and wastewater from bathrooms and sinks.
- "Dry shop" practices minimize the risk of polluting water. For more information, go to: **www.epa.gov/region09/p2/autofleet/** or **www.ccar-greenlink.org/**
- Facility managers should use best management practices, such as dry shop technologies, waste minimization, and employee education. These activities are described more fully in the EPA publication, *Small Entity Compliance Guide: How the New Motor Vehicle Waste Disposal Well Rule Affects Your Business.* This can be found at **www.epa.gov/sbrefa4u/documents/2778secg.pdf**

Checklist For Compliance

The following checklist will help you manage your motor vehicle waste disposal wells. Always contact your local authority for further compliance.

- ☐ All owners and operators of Class V motor vehicle waste disposal wells must **provide to the EPA Underground Injection (UIC) program the following inventory information:**
  - Facility name and location
  - Legal contact
  - Nature of injection activity
  - Operating status of injection well
- ☐ Class V wells must not endanger or contaminate any underground source of drinking water.
- ☐ Establishment of new motor vehicle waste disposal wells is prohibited.
- ☐ Use of existing motor vehicle waste disposal wells is banned unless a **permit** is obtained.
- ☐ Owners and operators must **notify** the UIC Program Director at the applicable regulatory agency at least 30 days before closing an existing motor vehicle waste disposal well.



For more information:

Contact the Safe Drinking Water Hotline at 1-800-426-4791. You can also get well-specific fact sheets and other information on Class V injection wells, including information on the Class V Rule from the EPA Web site: **www.epa.gov/safewater/uic/classv.html**

Air Conditioning Units

When air conditioning units are repaired, they must be serviced by an EPA-certified technician.

If your facility services motor vehicle air conditioning units, you may be subject to Clean Air Act regulations. Many motor vehicle air conditioners (MVACs) contain refrigerants with chlorofluorocarbons (CFCs) and similar chemicals, which damage the Earth's protective stratospheric ozone layer if released to the air. **Regulations require that refrigerants be removed from motor vehicles using U.S. EPA-registered equipment. Technicians must be certified** to service air conditioning units. You must sell the refrigerant you collect to a reclamation facility so that it can be purified for reuse.

Upper: Follow accepted procedures for changing fittings and labeling refrigerants in AC units that have been retrofitted.

Lower: Facilities must use EPA-approved recycling equipment.

Good Management Practices

- Leaky air conditioners should be repaired rather than just "topped off" with additional refrigerant. Such repairs prolong system life, reduce emissions, and conserve existing supplies of CFCs, which can no longer be legally manufactured or imported.

Checklist For Compliance

The following checklist will help you manage motor vehicle air conditioning units. Always contact your local authority for further compliance.

- ☐ **It is illegal to vent and release CFCs, HCFCs, HFCs, and any R-12 replacement to the atmosphere.** These chemicals must be recovered during servicing.
- ☐ If performing maintenance on motor vehicle air conditioning equipment, you must **have documentation proving that you and your facility are certified** by an EPA-approved testing organization.
- ☐ Recovery equipment must be registered with EPA.
- ☐ **Recover and/or recycle refrigerants** during the servicing and disposal of motor vehicle air conditioners and refrigeration equipment.
- ☐ After removal and collection, refrigerant must be sold to a reclamation facility so that it can be purified, unless your facility has the capacity to recycle the refrigerant back into the original vehicle or into another serviced vehicle.
- ☐ If refrigerants are recovered and sent to a reclamation facility, the name and address of that facility must be kept on file.
- ☐ In addition, when servicing units that use alternative non-ozone-depleting substances, you are still required to use certified equipment and be a certified technician.

Additional information is available through the toll-free Stratospheric Ozone Information Hotline: 1-800-296-1996. You may also go to www.epa.gov/ozone

Emergency Spill Response

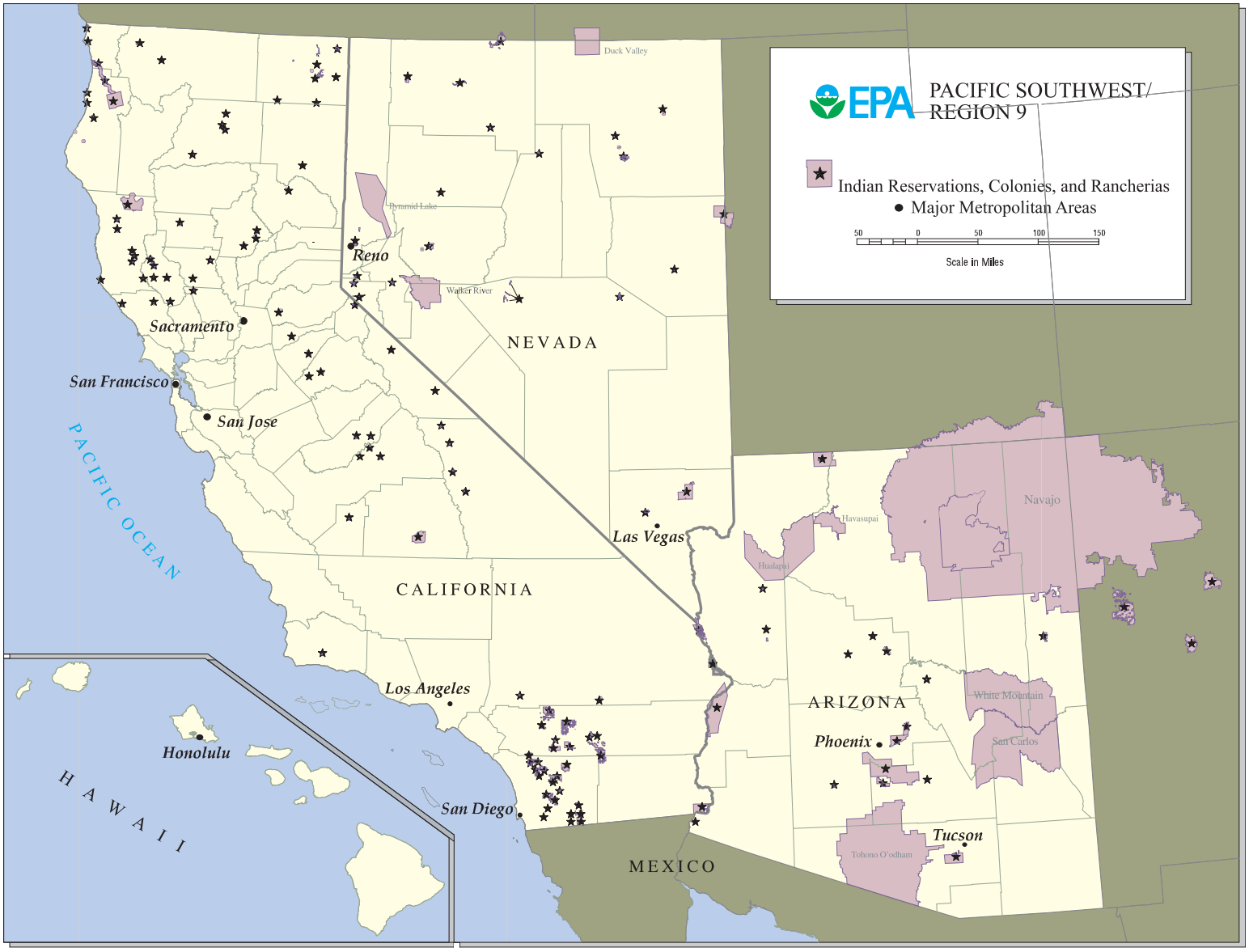
For any explosions or major petroleum spills, immediately contact the National Response Center at 800-424-8802.

If any release from an underground storage tank (UST) or aboveground storage tank (AST) is suspected, the owner or operator must report the release within 24 hours. Short-term actions should also be taken immediately to stop the release and ensure that there is no threat to public safety, human health, or the environment.

Short-Term Actions

- Take immediate action to safely stop and contain the release.
- Report the release to the National Response Center, EPA and your local regulatory authority within 24 hours.
- Make sure the release poses no immediate hazard to human health and safety by removing explosive vapors and fire hazards. Your fire department should be able to help or advise you with this task. You must also make sure you handle and dispose of contaminated soil properly so that it poses no hazard (for example, from vapors or direct contact).
- Remove petroleum from the UST or AST system to prevent further release into the environment.
- Find out how far the petroleum has moved and begin to recover the leaked petroleum (such as product floating on the water table). Report your progress and any information you have collected to EPA and your local regulatory authority no later than 20 days after confirming a release.
- Investigate if the release has impacted the soil and subsurface environment. This investigation must determine the extent of contamination both in soils and groundwater. You must report to EPA and your local regulatory authority what you have learned from an investigation of your site according to the schedule established by the regulatory authority. At the same time, you must also submit a Corrective Action Plan explaining how you plan to clean up the site.

National Response Center: 800-424-8802



EPA's Pacific Southwest Region includes the states of Arizona, California, Hawaii and Nevada; 147 tribal nations and communities; and Pacific islands that are U.S. territories or to which the U.S. has ongoing commitments. Map shows boundaries of states, counties, and tribal lands.

U.S. Environmental Protection Agency
Pacific Southwest/Region 9 Contacts

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San Francisco, CA 94105

Phone inquiries: 415-947-8000 or 866-EPA-WEST (toll free)

Email inquiries: r9.info@epa.gov

EPA Web site: www.epa.gov

For Pacific Southwest issues: www.epa.gov/region09