

EXECUTIVE SUMMARY

Workers employed in the aircraft maintenance industry face many hazards that can lead to serious injury, illness and death. Exposure to toxic metals, solvents and noise are hazards routinely faced by workers in this industry.

The intent of this renewed Local Emphasis Program is to encourage employers to take steps to address these hazards, ensure work sites are evaluated to determine if the employer is in compliance with all relevant OSHA requirements, and to help employers correct hazards, thereby reducing potential injuries, illnesses and death for their workers.

The Englewood Area Office proposes to accomplish this through outreach and enforcement activities. Outreach activities have and will continue to include training and information sharing with industry associations and other stakeholders. Enforcement activities will include, but not be limited to, the comprehensive inspection of aircraft support and maintenance operations, such as chemical and noise exposures and the use of personal protective equipment, to identify and obtain corrections of workplace hazards at all applicable inspection sites.

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- I. Purpose:** This Notice renews policies and procedures for implementing a Local Emphasis Program (LEP) for conducting programmed inspections of Aircraft Support and Maintenance Industries. The inspection program will focus on establishments within the NAICS codes listed below.

This LEP consists primarily of two elements. The first element is an outreach component that will raise awareness of the hazards associated with exposure to high levels of noise and toxic chemicals. Outreach will continue throughout the duration of this LEP. The second element is an inspection targeting initiative designed to reduce employee exposure to noise and toxic chemicals, focusing primarily on assessing employees' exposures to chemical and physical hazards, evaluating the use of personal protective equipment, and reviewing the employer's safety and health programs.

- II. Scope:** This Notice applies to the Aircraft Support and Maintenance Industries within the Englewood Area Office's jurisdiction under the following NAICS codes:

NAICS	Description
336411	This U.S. industry comprises establishments primarily engaged in one or more of the following: (1) manufacturing or assembling complete aircraft; (2) developing and making aircraft prototypes; (3) aircraft conversion; and (4) complete aircraft overhaul and rebuilding.
336412	This U.S. industry comprises establishments primarily engaged in one or more of the following: (1) manufacturing aircraft engines and engine parts; (2) developing and making prototypes of aircraft engines and engine parts; (3) aircraft propulsion system conversion; and (4) aircraft propulsion systems overhaul and rebuilding.
441228	Used Aircraft Dealers and Aircraft Dealers.
488190	Testing Services, Inspection Services, and Maintenance and Repair Services (except factory conversion, factory overhaul, factory rebuilding)
611512	Flight Training Schools

III. References:

- A. OSHA Instruction CPL 02-00-160, Field Operations Manual (FOM), August 2, 2016, or the most recent version at the time of the inspection opening conference.
- B. OSHA Instruction CPL 04-00-001, Procedures for Approval of Local Emphasis Program (LEPs), November 10, 1999.
- C. OSHA Instruction CPL 02-00-025, Scheduling System for Programmed Inspections, January 4, 1995.
- D. OSHA Instruction CSP 03-02-003, OSHA Strategic Partnership Program for Worker Safety and Health, November 6, 2013.

- E. October 18, 2002, OSHA Memorandum: Annual Evaluation of Local Emphasis Programs
- F. November 12, 2014, OSHA Memorandum: Establishments – Targeting Lists for Emphasis Programs.
- G. Title 29 Code of Federal Regulations, Part 1910.
- H. December 3, 2014, OSHA Memorandum: Procedures for Local and Regional Emphasis Programs.
- I. OSHA Instruction CPL 02-00-051, Enforcement Exemptions and Limitations under the Appropriations Act, May 28, 1998; Appendix A, April 25, 2018, or the most recent version at date of inspection opening conference.
- J. Chen L., Eisenberg J. Exposures to Lead and Other Metals at an Aircraft Repair and Flight School Facility. U.S. Department of Health and Human Services Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, July 2013. Report No. 2012-0115-3186.
- K. Grace Kawas Lemasters, Gordon K. Livingston, James E. Lockey, Donna M. Olsen, Rakesh Shukla, George New, Sherry G. Selevan and James H. Yiin. Genotoxic changes after low-level solvent and fuel exposure on aircraft maintenance personnel. *Mutagenesis*. 1997 Jul; 12(4):237-43.
- L. Smedje G, Lunden M, Gärtner L, Lundgren H, Lindgren T. Hearing status among aircraft maintenance personnel in a commercial airline company. *Noise Health*. 2011 Sep-Oct; 13(54):364-70.
- M. Kim J, Park H, Ha E, Jung T, Paik N, Yang S. Combined effects of noise and mixed solvents exposure on the hearing function among workers in the aviation industry. *Ind. Health*. 2005 Jul; 43(3):567-73.
- N. Federal Aviation Administration Fact Sheet, Leaded Aviation Fuel and the Environment, June 19, 2013.
- O. Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, 2016-17 Edition, Aircraft and Avionics Equipment Mechanics and Technicians. December 17, 2015.
- P. Bureau of Labor Statistics; “*Incidence rate and number of nonfatal occupational injuries by industry and ownership, 2016.*”
- Q. Bureau of Labor Statistics; “*Numbers of nonfatal occupational illnesses by industry and category of illness, 2016.*”
- R. OSHA CPL 02-02-076, National Emphasis Program - Hexavalent Chromium 02/23/2010.
- S. OSHA CPL 03-00-009, National Emphasis Program on Lead 08/14/2008.

- IV. **Cancellation:** 18-10 (CPL04-05) Local Emphasis Program for Aircraft Support and Maintenance
- V. **Expiration Date:** This LEP expires on September 30, 2019.
- VI. **Action:** OSHA compliance personnel shall follow the procedures contained in this instruction when conducting outreach and enforcement activities.
- VII. **Background:** The Bureau of Labor Statistics estimates there are approximately 137,000 aircraft and avionics mechanics and technicians in the United States (BLS, 2015). Of those workers, approximately 87% are aircraft mechanics. The Bureau of Labor Statistics Outlook Handbook for Aircraft and Avionics Equipment Mechanics and Technicians states, “Aircraft and avionics equipment mechanics and technicians experience rates of injuries and illnesses that are higher than the national average. Mechanics and technicians often lift heavy objects, handle dangerous chemicals, or operate large power tools. They may work on scaffolds or ladders, and noise and vibrations are common, especially when engines are being tested.” (BLS, 2016).

Toxic metals, solvents, and other chemicals are a health hazard to those workers exposed to them. Occupational noise resulting in hearing loss has been recorded in aircraft mechanics. A study of 327 Swedish aircraft maintenance workers exposed to noise levels ranging from 70-91 dBA noted that 41% of workers suffered hearing loss of 20 dB or more. (Lindgren et. al, 2011). Incidence rates among aircraft workers are higher than private industry rates for 2012 – 2014. (See Table 1.1 below) There is also evidence that when combined with ototoxic solvents such as methyl ethyl ketone or toluene, exposure to high noise levels can lead to greater degrees of hearing loss. Results of a study of 542 aircraft workers showed that workers exposed to ototoxic solvents and noise had a higher prevalence of hearing loss than those exposed to either noise or solvents alone (Kim et. al., 2005).

The National Institute for Occupational Safety and Health (NIOSH) published a Health Hazard Evaluation of aircraft maintenance workers, including the child of one worker, who spent time in an aircraft repair and flight school in Colorado. While workers were asymptomatic for lead related illness, blood levels of lead in workers and the child were elevated, and air sampling results for spark plug cleaning were close to the OSHA PEL for lead. Lead surface levels were also elevated. Aircraft fuel containing tetraethyl lead is still widely used in small airplanes.

Occupational exposure to methylene chloride and other solvents in aircraft painting operations has been measured and shown to be elevated in aircraft workers (Vincent et. al.)

According to the U.S. Department of Labor/Bureau of Labor Statistics (BLS), there were a combined total of 2,800 occupational illnesses reported in aircraft support workers under NAICS 336411, 336412, and 4881 in 2016. Occupational injuries in NAICS 336411, 366412, 4412, 4881 and 6115 totaled nearly 20,100.

Incidence rates for specific illnesses in the NAICS identified in the scope of this EP are

summarized in Table 1.1

Table 1.1 Incidence rates per 10,000 full time workers

Year	NAICS	Total Cases	Skin Diseases	Respiratory Conditions	Poisonings	Hearing Loss	All other illness
2013	336411	101.7	3.7	-	-	12.2	84.8
	336412	27	4.2	-	-	5.6	15.1
	44122	5.4	-	-	-	-	5.4
	4881	23.1	-	1.4	-	6.9	7.2
	6115	-	-	-	-	-	-
	Private Industry	16.6	2.8	1.4	.2	2.0	10.2
2014	33641	61.0	5.4	.8	.4	6.9	47.6
	336412	25	4.6	-	-	4	15.8
	44122	-	-	-	-	-	-
	4881	20.8	1.1	3.6	-	8.1	7.9
	6115	-	-	-	-	-	-
	Private Industry	15.3	2.3	1.3	.2	1.9	9.6
2015	336411	107.2	3.5	0.7	-	14.3	88.6
	336412	18.7	2.1	-	-	3.3	12.8
	44122	-	-	-	-	-	1.9
	4881	12.4	1.5	-	-	1.3	7.7
	6115	-	-	-	-	-	-
	Private Industry	14.6	2.3	1.3	0.2	1.8	9.2
2016	336411	95.2	2.2	-	-	10.3	82.3
	336412	17.4	2.0	-	-	3.7	11.0
	44122	-	-	-	-	-	-
	4881	29.6	1.3	1.6	-	4.4	-
	6115	-	-	-	-	-	-
	Private Industry	14.1	2.2	1.1	0.2	1.7	10.5

Reference: www.bls.gov

Between January 1, 2013 and September 26, 2018 Area Offices in Region VIII conducted 17 inspections of aircraft manufacturing facilities, flight schools, and maintenance shops under the NAICS defined in the scope of this Notice. Twelve serious and twenty one other-than-serious citations were issued for violations of OSHA standards, including but not limited to, respiratory protection, lead surface contamination, and overexposure to hexavalent chromium and methylene chloride.

VIII. Inspection Scheduling and Site Selection: The procedures and the site randomization protocols outlined in the November 12, 2014, OSHA Memorandum: Establishments – Targeting Lists for Emphasis Programs will be followed. The Office of Statistical Analysis (OSA) will provide the master list and the area office will make deletions as outlined in sections A and B, below.

- A. Establishments that have received a comprehensive inspection within the previous 60 months of the creation of the current inspection cycle will be deleted from the list.
- B. The Area Office may delete an establishment if it is determined that:
 - 1. The establishment is a residence.
 - 2. The establishment is not in the scope of the LEP (e.g., the establishment is clearly conducting business other than that covered by the LEP).
 - 3. There is no evidence that the facility exists (e.g., no phone or internet listing; no registration with the Secretary of State; Google Earth or Street View shows conclusively that the business is non-existent.)

The criteria used to delete any establishment must be fully documented by the Area Office.

- C. In the event a cycle is not completed on or before expiration of this Notice, the cycle will be extended into the new fiscal year, provided this Notice is renewed. The outstanding cycle will be completed by each Area Office before establishments are selected from the new master list. If the Notice is not renewed, the outstanding cycle is effectively cancelled and the Area Office will not conduct inspections on the remaining establishments within the cycle.

IX. Inspection Procedures: The conduct of inspections shall adhere to the following:

- A. **Scope:** Inspections under this LEP will be classified as a “Health” Inspection and focus on the health hazards outlined in this notice. Inspections will be conducted by appropriately trained CSHOs. Apparent safety violations noted during a health inspection of an establishment exempted from programmed safety inspections shall not be cited or referred for later inspection unless the violations create an imminent danger. Inspection procedures outlined in the FOM, OSHA Instruction CPL 02-00-160, will be followed.
- B. **Safety and Health Considerations for CSHOs:** Inspections under this LEP are to be conducted by CSHOs who have received the necessary training on the LEP and the hazards associated with the Aircraft Support and Maintenance Industries. The Area Director will ensure that appropriate training is provided to the CSHOs. Prior to commencing the walk around portion of the inspection, the CSHO shall request a safety briefing of the facility. Personal protective equipment such as respirators, gloves, eye protection, hearing protection, steel-toed shoes, etc., will be

utilized based on the information given.

- C. Coverage: At the opening conference, the CSHO will determine if the employer performs operations as covered in this LEP and as described under the applicable NAICS code.
- X. Outreach:** The Area Office has conducted and will continue to provide outreach to raise awareness of the hazards associated with aircraft maintenance and repair operations and to inform stakeholders and employers of the elements of the LEP. The Area Office will encourage the stakeholders to participate in training, assist in the dissemination of information from this LEP, and participate in any other outreach activity where stakeholder participation would benefit the program. Stakeholders may include aircraft repair shops, body shops, testing and inspection services, dealers, flight schools, hangar and airport operations, engine and aircraft overhaul shops, manufacturer's representatives, industry periodical publishers, safety and health consultants, safety councils, and the Aircraft Mechanics Fraternal Association.
- XI. Partnerships:** Partnerships may be developed with the covered employers in accordance with OSHA Instruction CSP 03-02-003, OSHA Strategic Partnership Program for Worker Safety and Health, November 6, 2013.
- XII. OIS Coding:** The following will address only the changes or additions to OSHA Information System (OIS) coding procedures for inspections conducted under this LEP:
- A. The OIS Inspection Form shall be coded as "AIRCRAFT" in the Local Emphasis Program block and as "Programmed Planned" in the Initiating Type block. Inspections under this LEP will be coded as "Health" inspections in the "Inspection Category" blocks unless a safety inspection referral is made, in which case the inspection shall be coded as "Safety."
- B. Inspections which are initiated as a result of a complaint, referral, or fatality/catastrophe shall be coded as "AIRCRAFT" in the Local Emphasis Program block and as the appropriate "unprogrammed" activity in the Initiating Type block, regardless of whether they are listed on the current cycle.
- C. Inspections that fall within any regional or national emphasis programs or other national initiatives should be coded in OIS.
- XIII. Program Report:** No later than October 31, 2019, the Area Office will provide a report of this LEP to the Regional Office. The Regional Office will provide the National Office with one report of this LEP. At a minimum, the report should respond to the requirements of CPL 04-00-001, Section D, Appendix A, as well as the Directorate of Enforcement Programs memorandum dated October 18, 2002 for Annual Evaluations of Local Emphasis Programs (LEPs). In addition, the following factors should also be included:

- A. The number of inspections where aircraft maintenance operations were evaluated, the number of citations issued, and the percentage of violations designated as serious, willful, or repeat.
- B. Annual number of fatalities related to aircraft maintenance operations.
- C. The number of complaint inspections concerning aircraft maintenance operations conducted annually.
- D. The number of employees covered.
- E. Abatement measures implemented, if novel and innovative.

DISTRIBUTION: Directorate of Enforcement Programs
Regional Office of the Solicitor

APPENDIX A

Dear Employer:

The Occupational Safety and Health Administration (OSHA) is developing a Local Emphasis Program (LEP) focusing on health hazards related to aircraft maintenance and repair in the following NAICS codes within the jurisdiction of the Englewood Area Office:

- 336411 Aircraft Overhauling
- 336412 Aircraft Engine Overhauling and Aircraft Engine Rebuilding
- 441228 Used Aircraft Dealers and Aircraft Dealers
- 488190 Testing Services, Inspection Services, Maintenance and Repair Services
(except factory conversion, factory overhaul, factory rebuilding)
- 611512 Flight Training Schools

Workers engaged in maintenance, repair, rebuilding, or painting of aircraft or aircraft parts may be exposed to harmful levels of toxic metals, including lead, arsenic, and cadmium. Other hazards include exposure to various solvents such as bromopropane and methylene chloride, isocyanates during painting, hexavalent chromium during paint removal, and exposure to hazardous noise levels. Employees exposed to harmful levels of these chemicals may experience health effects including, but not limited to, nausea, fatigue, central nervous system dysfunction, neuropathy, organ failure, asthma, anemia, and cancer. Exposure to hazardous noise levels in the workplace may result in tinnitus and hearing loss. The goal of this LEP is to reduce or eliminate harmful exposures to workers during aircraft maintenance operations.

As a result of this LEP, the Englewood OSHA office will be conducting inspections of workplaces involved in activities defined by any of the above-listed NAICS codes, including flight schools and aircraft maintenance and repair shops. We are notifying you of our intent to conduct these inspections because your company may be covered by this LEP.

OSHA continues to emphasize compliance assistance and to focus on prevention of occupational injuries and illnesses. OSHA has several guidance documents to assist employers in controlling exposures to hazardous chemicals and noise.

The following documents may be of assistance in evaluating and controlling these hazards:

- <https://www.osha.gov/Publications/OSHA3680.pdf> OSHA Quick Card on Take-Home Lead
- <https://www.osha.gov/SLTC/metalsheavy/> OSHA's Toxic Metals Safety and Health Topics Page
- <https://www.osha.gov/SLTC/hexavalentchromium/index.html> OSHA's Hexavalent Chromium Safety and Health Topics Page
- https://www.osha.gov/dts/hazardalerts/1bromopropane_hazard_alert.html OSHA Hazard Alert Letter on 1-Bromopropane

- <https://www.osha.gov/SLTC/methylenechloride/> OSHA's Safety and Health Topics Page for Methylene Chloride
- <https://www.osha.gov/SLTC/isocyanates/> OSHA's Safety and Health Topics Page for Isocyanates.
- <https://www.osha.gov/SLTC/noisehearingconservation/> OSHA's Safety and Health Topics Page for Occupational Noise Exposure

In addition to protecting employees from potential exposure to hazardous chemicals and noise, OSHA strongly encourages all employers to develop a comprehensive safety and health program to identify and control all other potential hazards at the work site. You can find information on this topic at the following website address:

<https://www.osha.gov/shpguidelines/> .

OSHA's On-site Consultation Program offers free and confidential safety and occupational health advice to small and medium-sized businesses in all states across the country, with priority given to high-hazard worksites. On-site Consultation services are separate from enforcement and do not result in penalties or citations. To find out more about OSHA's Consultation Program, visit the [web page](#) or call (970) 491-6151.

If you have questions about any of the referenced resources or need assistance locating additional information on the OSHA web site, please feel free to contact our office at (303) 843-4500. Your commitment to employee safety and health is appreciated.

Sincerely,

Dave Nelson
Area Director, Englewood Area Office