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Report of Inquiry

Prepared by

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Concerning Mr. Daniel Nelson

4 April 2000

PURPOSE OF INQUIRY: This inquiry was initiated pursuant to Section 1213(c) of Title 5 of the United States Code, upon receipt of allegations from Mr. Daniel Nelson, transmitted by the Office of Special Counsel (OSC). Mr. Nelson alleged that violations of law, rule or regulation, gross mismanagement, and abuse of authority have occurred, and that a substantial and specific danger to public health and/or safety exists at the Department of the Air Force, McClellan Air Force Base, California.

CONDUCT OF THE INQUIRY: Documentation provided by Mr. Nelson to OSC was reviewed by the Office of the Inspector General, the Office of the Air Force General Counsel, and the Office of the Deputy Assistant Secretary of the Air Force for Environment, Safety, and Occupational Health (DASAF (ESOH)). Additional documentation was requested from the McClellan AFB Inspector General (IG) and Bioenvironmental Engineering Services (BES) offices.

Two investigating officers conducted the inquiry: Lt Col Timothy M. Russell from the Office of the Inspector General and Lt Col M. Kelli Ballengee from the Office of the DASAF (ESOH). Lt Col Russell is an aircraft maintenance officer with over 20 years experience. Lt Col Ballengee is a bioenvironmental engineer with over 20 years experience, including previous IG experience.

Interviews were conducted under oath with 21 individuals, including Mr. Nelson, Col Lloyd (subject of allegation of abuse of authority), 7 workers from the F-111 ReSeal/DeSeal unit (hereinafter, F-111 unit), 5 individuals who started as workers and later became supervisors of the F-111 unit, 3 supervisors of the F-111 unit, and 4 personnel from Safety/BES offices. The workers interviewed all had worked in the F-111 unit over ten years, with the exception of one worker with only 5 years experience. A standard set of questions was used for the supervisors and workers (Atch 1). Potential witnesses were initially identified through review of Mr. Nelson's documentation and interview. Locating individuals to be interviewed was complicated by the fact that the F-111 unit was shut down in November 1997, a number of the personnel interviewed are now retired, and several have moved on to other installations. The McClellan AFB Civilian Personnel office and the Office of Personnel Management assisted the investigating officers with locating and providing addresses for personnel. The investigating officers then used internet searches to obtain phone numbers. For some individuals, no phone numbers were available and overnight letters were mailed to their last known address in order to make contact. All personnel contacted agreed to speak with the investigating officers, even though the retired personnel were under no obligation to do so.

ALLEGATIONS AND RESPONSES:

For the sake of completeness, we will address below each allegation referred to in OSC's transmittal letter, 25 May 1999.

1. Allegation: The OSC transmittal letter stated that "Mr. Nelson alleged that for a period of approximately twelve years, he and his co-workers worked with hazardous chemicals without appropriate protective equipment and for periods longer than allowed under standards established by the Occupational Safety and Health Administration

(OSHA) and the Air Force, including, but not limited to, 29 CFR 1926.28; 29 CFR 1910.146, and Air Force Occupational Safety and Health (AFOSH) Standard 161-21.”

Response: The standards cited by Mr. Nelson do not establish allowable periods of exposure. First, 29 CFR 1926.28 does not apply to Mr. Nelson’s workplace. It is a construction standard, and the F-111 unit where Mr. Nelson worked is within the general industry definition of OSHA and is governed by the 29 CFR 1910-series standards.

29 CFR 1910.146 did apply to the F-111 unit. However, this standard establishes the procedures to follow for entry into confined spaces where the potential for a hazardous atmosphere exists (defined as a toxic chemical hazard or lower flammable limit (LFL) exceeding 10%). The standard does not prohibit entry if atmospheres exceed 10% LFL (AKA LEL, lower explosive limit) (Atch 2), nor does it establish any time standard for exposures.

AFOSH Standard 161-21 does not establish allowable periods of exposure, either. AFOSH Standard 161-21 lays out the Hazard Communication program for the Air Force. It implements 29 CFR 1910.1200, commonly referred to as the "Worker Right-to-Know" law. It establishes employer responsibilities for ensuring workers have access to Material Safety Data Sheets (MSDS), which provide information on the chemical constituents, their potential effects, protective measures, and emergency response procedures. AFOSH Standard 161-21 also establishes the requirement and responsibilities for all individuals to receive training (referred to as HAZCOM) on the hazards of chemicals. Mr. Nelson stated in his interview that he did receive HAZCOM training. One other worker did not recall receiving HAZCOM training, however there is documentation available that he did receive training on hazards (Atch 3). All other workers interviewed acknowledged receiving HAZCOM training. Mr. Nelson and one other worker interviewed alleged they were not told of the hazards of the materials they worked with. However, all supervisors and workers interviewed identified that MSDSs were available in the sealant room. Some supervisors also stated they maintained extra copies of the MSDSs in their offices to have them ready in case of emergency. In addition, training on the hazards of their workplace was provided on a routine basis by the Public Health section of the Medical Group (Atch 3). Examples of the material covered in this training over the years are shown in Atch 4. Workers and supervisors interviewed stated health and safety requirements, specifically protective equipment requirements, were discussed with the workers at least monthly (some said weekly) at safety briefings. The technical order which governs the procedures workers must follow in performing the operation also includes warnings regarding the chemical hazards (Atch 5). Based on these identified methods of information dissemination from interviews and documentation, it appears information on hazards was regularly presented and readily available.

Time limits for exposure may be established in order to maintain compliance with allowable exposure standards set by OSHA under other 29 CFR standards. OSHA establishes allowable concentrations (permissible exposure levels (PEL)) of various chemicals to which workers may be exposed for 8 hours per day, 5 days per week (29 CFR 1910.1000). This is calculated as a concentration averaged over the course of the

workday. In addition, the Air Force uses the exposure levels (threshold limit values (TLV)) established by the American Conference of Governmental Industrial Hygienists (ACGIH) (a professional organization which establishes recommended exposure levels used widely throughout the country). ACGIH TLVs are available for some chemicals for which OSHA has not published a PEL. To be as protective of the health of Air Force workers as possible, Air Force policy (AFOSH Standard 48-8, "Controlling Exposures to Hazardous Materials") is to use the lower of the TLV or PEL. In some cases, a time limit may be imposed on an operation in order not to exceed the OSHA PEL or ACGIH TLV. In fact, this did apply to the F-111 unit for the chromate primer spraying operation. The BES office recommended limiting primer spraying operations to one hour. This recommendation was based on their calculations of the air sampling results for strontium chromate, the protective capabilities of the respirator, and extrapolating to possible exposures for greater periods. This time limit was to keep exposures below the ACGIH TLV for strontium chromate of 0.0005 mg/m³. The OSHA PEL for strontium chromate is 0.1 mg/m³. Interviews with workers indicated the spray priming operation normally lasted from 15 minutes to 1 hour. However, since the OSHA PEL is 200 times the ACGIH TLV, exposures would not exceed OSHA levels even if primer spraying operations lasted all day. No other time limits applied to this unit.

With regard to protective equipment, in 1991, an OSHA inspection did reveal several deficiencies in the use of protective equipment; specifically the use of cotton coveralls in some operations where impermeable coveralls were needed (Atch 6). In response, the BES office worked with management to establish a protective equipment plan that specified the protective equipment requirements (Atch 7). This included the use of two layers of Saranex suits, an impermeable coverall. We will address further details on protective equipment in responses to the remaining allegations.

2. Allegation: "He alleged that officials in the Air Force perpetuated a danger to public health and safety and engaged in gross mismanagement when they instructed workers to enter confined spaces with no protective equipment or with faulty or inadequate equipment."

Response: In support of this allegation, Mr. Nelson provides only one example of being directed to work with what he believed to be faulty equipment. This incident was previously handled through grievance channels and Mr. Nelson's claim was not upheld. Mr. Nelson does not provide any additional information that would question the results of the grievance.

In 1991, OSHA inspected the workplace as a result of complaints that included this allegation (Atch 8). Although OSHA did cite the unit for some problems, they did not cite the F-111 unit for a willful violation of the type alleged by Mr. Nelson.

One other worker interviewed identified one instance where the proper size facemask was not available when he had to enter the tank to reconnect plumbing. This was on a project that had to be completed quickly and the supervisor asked him to go ahead, even though the proper facemask was not available. The worker told us he agreed

to do this and did not file a grievance because "I didn't think that much of it anyway." However, all supervisors and workers interviewed identified that operations in the fuel cell that did not involve chemicals could be performed without respiratory protection. Several workers and supervisors specifically identified plumbing as an operation which did not require respiratory protection. So, although the worker attempted to find protective equipment, the operation itself apparently did not require it.

This same worker also stated that on infrequent occasions, gloves were not available when needed. However, all other supervisors and workers interviewed indicated gloves were, in general, readily available and new gloves could be obtained whenever the gloves being used started deteriorating.

Two workers stated they were tasked to perform tank entries when no cooling suit was available. However, the cooling suits were not necessary to protect the workers. Cooling suits are addressed further in response to Allegation 8.

No other workers identified any instances where they, or someone they had direct knowledge of, were directed or allowed to work without proper protective equipment.

On 17 Mar 2000, OSC provided additional documentation from Mr. Nelson. This included e-mails and letters he had sent to other co-workers requesting they verify they had witnessed an individual being ordered to "suitup and spray" or the individual would be arrested. Even if this incident did occur, we note the direction was to "suitup and spray" (emphasis added). Thus, the supervisor was apparently directing the worker to get his protective equipment on and go to work.

All supervisors interviewed were very emphatic that they had never instructed a worker to perform work with inadequate protective equipment. Most supervisors stated they had taken administrative action in cases where workers were willfully or repeatedly not wearing the proper gear.

3. Allegation: "Mr. Nelson also alleged that an official in his supervisory chain of command engaged in an abuse of authority when she directed the amendment of an Occupational Illness/Injury Report (Form 190) that was damaging to the Air Force, in order to cast doubt on Mr. Nelson's claims of overexposure to hazardous substances."

Response: By way of background, Form 190s are initiated by an Air Force physician when he/she suspects, or the individual has expressed a concern, that an illness in a patient may be related to the workplace. After the doctor refers the question to the BES office, they investigate what potential exposures the individual may have had as a part of their duties. These reports are to specify what the person worked with and include any specific data available from air sampling or other methods that could quantify the exposure. All personnel involved with preparing the Form 190 are within the chain of command of the Medical Group commander. Mr. Nelson's supervisory chain went up to Col Lloyd and then to the Aircraft Maintenance Director (LA) and has no authority to direct an amendment to a Form 190.

All interviews with personnel involved with the discussions regarding the AF Form 190 (including Col Lloyd, herself) provided a consistent view of these discussions. From the interviews, Col Lloyd reportedly expressed a concern that the original Form 190 statement in paragraph 4a, "LA supervisors and management did not firmly enforce health and safety control requirements" was not accurate. She was also concerned that if the statement was accurate, she needed to take action to correct the situation and make sure her personnel were enforcing safety and health requirements. Col Lloyd met with personnel from the BES office, the F-111 unit, labor relations, and Safety to discuss the AF Form 190. In the meeting, BES personnel agreed the statement in the AF Form 190 regarding LA management enforcement of safety was not correct. Accordingly, the BES office agreed to prepare an addendum to the AF Form 190. The original AF Form 190 was not changed in any way.

Col Lloyd was entirely within her authority to request a meeting to discuss what she believed to be an inaccurate document. Based on the interviews, there was no direction to the BES office about what they should say in the addendum. More importantly, there was certainly no indication that the BES office was directed to falsify data.

4. Allegation: "Mr. Nelson worked as a Metal Tank Sealer from 1986 to 1998 in the F-111 Mod Center (ReSeal/DeSeal Section). His duties included de-sealing and re-sealing the insides of the fuel tanks of F-111 aircraft. Mr. Nelson stated that he entered the fuel tanks an average of two to three times each week for approximately two hours at a time. Mr. Nelson alleged that, from 1990-1996, he and his co-workers sprayed chemicals such as methyl ethyl ketone (MEK), a known carcinogen, on the insides of tanks to clean them."

Response: We agree that MEK was used on the insides of tanks to clean them. However, MEK is not listed as a carcinogen by OSHA, ACGIH, or the National Toxicology Program's (NTP) Report on Carcinogens.

5. Allegation: "He alleged that he performed this MEK spray-down five days a week for several hours at a time, using only air purifying half-face cartridge respirators. Full-face air-supplied respirators are indicated for these conditions by OSHA regulations and Air Force technical order 1F-111A-3-20, dated January 1, 1990."

Response: While this allegation is inconsistent with Mr. Nelson's previous allegation that he entered the fuel tanks an average of "two to three times per week," OSHA regulations do not specify a particular respirator to use for confined space entries or for MEK. All other workers and supervisors interviewed stated full-face respirators were available and were directed for use for operations using chemicals in the fuel tanks. In addition, all other workers and supervisors interviewed stated that information on what protective equipment was required for which operations was readily available and routinely reinforced. This information was briefed at least monthly at safety meetings. Workers are required to comply with "technical order direction" and follow health and

safety requirements. That Mr. Nelson was aware of this is evidenced by his grievance, in which he states he “has been told before that if caught not following safety procedures, he could be subject to a reprimand or suspension.” Mr. Nelson does not state why he allegedly chose to wear the half-face respirator, in violation of the technical order and established procedures. Interviews indicated half-face respirators were authorized for MEK use in the "saddle" tanks, as these tanks did not require entry. Half-face respirators were also authorized for cleaning the spray guns and pumps. Documentation from the BES office indicates that since these operations were not confined and oxygen deficiency was not a concern, half-face respirators (with appropriate goggles/face shield and protective clothing) provided adequate protection.

6. Allegation: “Mr. Nelson maintains that these respirators (full-face air supplied) are still not sufficient to protect workers from inhaling MEK vapors when the seal is loose, or absorbing the chemical through the skin. He also claims that he and his co-workers would wipe the facemasks down with MEK so that the duct tape they used to seal the masks would stick.”

Response: Based on interviews and documentation (Atch 9), we conclude that Mr. Nelson and his co-workers did in fact receive respiratory protection training and fit-testing on an annual basis. This training included information on how to wear the respirator, the capabilities and limitations of the respirator, and proper procedures for caring for and cleaning the respirator. This training also included how to properly fit the facemask to ensure a good seal. This training and fit-testing helped ensure personnel could appropriately use their respiratory protection to prevent overexposure to the MEK vapors. In addition, Mr. Nelson’s assertion regarding the loose seal is inaccurate because with an air-supplied respirator, if the seal is loose the leakage of air will be from the air supply to the *outside* of the mask. OSHA recognizes air-supplied respirators as providing a high level of protection (protection factor of 1000) due to this characteristic. More importantly, other workers interviewed indicated that when the mask seal would fail on occasion (e.g. when a hose got caught on something within the tank and pulled the mask off as the person moved), they would immediately exit the tank.

Mr. Nelson’s allegation that they wiped the facemask with MEK may be correct. However, wiping the facemask with MEK where the tape is to stick puts MEK on the outside of the mask. Generally, tape is used to attach the hood of the protective suit to the outside of the mask. This does not seal the mask, as Mr. Nelson states. It simply keeps the hood from getting pushed back off the head. The mask is sealed by proper adjustment of the headstraps. Wiping the outside of the mask would not create an exposure. However, it is not the recommended procedure for caring for the mask, as it will cause the rubber to deteriorate and significantly degrade its useful life.

Regarding Mr. Nelson’s concern about absorbing the chemical through the skin, neither OSHA nor ACGIH has identified MEK as being a skin absorption hazard. Both OSHA and ACGIH use a “skin” notation on their lists of allowable exposure levels to designate chemicals that pose a significant absorption hazard that could lead to systemic health effects. MEK does not have this designation on either list (Atch 10). However,

skin protection was provided to F-111 unit workers due to the MEK potentially causing dermatitis upon prolonged skin exposure.

7. Allegation: “Finally, Mr. Nelson alleged that he and his co-workers brushed and ground to a respiratory dust asbestos-containing paint and structural epoxy, without adequate respiratory protection.”

Response: There is no record of any paint or structural epoxy containing asbestos in the workplace information on the F-111 unit. This workplace information is generated and maintained by the BES office. Every year, the BES office from the Medical Group visited every industrial workplace on the installation. They obtained information on all materials used by that workplace and the processes for which they are used. They researched the constituents of the materials and recorded this information as a chemical listing in a casefile, which is maintained indefinitely. We reviewed these chemical listings for the F-111 unit, and there is no record of any paints or structural epoxy that contained asbestos.

To support his allegation, Mr. Nelson submitted documentation and stated in his interview that he had an MSDS for detergent that contained asbestos, but that this MSDS was “really for the structural epoxy.” However, Mr. Nelson did not provide a copy of this MSDS. This claim is highly unlikely, since MSDSs are issued by the manufacturer of the material and specifically identify the material to which they apply.

The BES office previously investigated the allegation that Mr. Nelson was exposed to asbestos, as well. Mr. Nelson alleged cyanide and asbestos exposure as a cause of his sinus problems in Jun 1996 (Atch 11). The BES office investigated this claim at that time and no exposure to asbestos or cyanide was found.

We interviewed workers and supervisors as well to try to obtain additional information regarding this allegation. One other worker interviewed indicated he had an MSDS for an epoxy they used which contained asbestos. We requested he provide a copy, but have not yet received it. One supervisor recalled an issue involving asbestos arising in the Sheet Metal shop, but not the F-111 unit. The Sheet Metal shop did use small amounts of an adhesive that contained asbestos. Another worker recalled an epoxy 934 that he thought contained asbestos. (The adhesive used by Sheet Metal was designated 934 adhesive.) He believed this epoxy was switched in the late 80's. One worker and one supervisor stated there were epoxies that contained asbestos, but none of them were used in the F-111 unit. Two other workers heard word-of-mouth information that early on the epoxy contained asbestos. All other workers or supervisors interviewed stated they had no knowledge of any materials containing asbestos used by the F-111 unit.

Mr. Nelson's 17 Mar 2000, supplementary documentation includes information from a co-worker that he recalled being instructed to throw an epoxy out because it contained asbestos. Mr. Nelson seems to be alleging this is proof they worked with asbestos. This alone does not demonstrate his point. To the contrary, such an instruction

would indicate the supervisors did not want the workers using an asbestos-containing epoxy. It is possible that if the shop received the wrong epoxy, the supervisor would have instructed the worker to throw it away.

Thus, there is conflicting word-of-mouth data on whether or not there was an epoxy containing asbestos used by the F-111 unit. However, we could not find any documentation to indicate asbestos-containing epoxy or sealant was used by the F-111 unit. Investigation into this question by the BES office in 1996, when the F-111 unit was still in operation and information would have been more easily located, also failed to find any documentation of asbestos use.

Aside from asbestos, the operation Mr. Nelson refers to in this allegation did pose a potential exposure to chromates. From interviews with workers and supervisors, it appears final removal of the sealant using manual methods did occur when personnel were not wearing respiratory protection. This was referred to as the "pick and clean" operation. This was performed prior to switching to the spray sealant operation around 1991. From the description of the operation in the interviews, personnel would use hand tools to remove the areas of sealant requiring removal. After most of the sealant was removed, the tanks would be brushed and wiped down with Turco. It does not appear that the removal of the majority of the sealant would generate dust of a small enough size to be an inhalation hazard. The majority of sealant was removed in chunks. However, the final brushing could have created a dust from what remained in the tank. From the interviews we conducted, all workers and supervisors were clear that respiratory protection was required when using chemicals in the fuel tanks. They evidently did not recognize this would include generating chemical dust inside the fuel tanks. In 1996, the BES office specifically instructed the F-111 unit not to wirewheel or grind out old sealant without respiratory protection. The sealant and paint primers did contain various chromates. With the low concentration of chromate in the primer (20% or less) and minimal amounts remaining in the tank, potential exposures were probably low. However, we cannot determine at this point what the actual exposure was. Potential exposure to chromates was already a matter of record for the workers in the F-111 unit due to their use of the spray primer containing strontium chromate.

8. Allegation: “[Mr. Nelson] also alleged that the two Saranex suits worn by employees are extremely hot, especially in confined spaces such as fuel tanks, and that this causes heat stress. He alleged that cool suits provided for use with the Saranex suits are not always functional.”

Response: Heat buildup from protective equipment is a common problem. The Saranex suits are intended to prevent chemicals from penetrating, but they also prevent heat generated by the body from being dissipated. This can be addressed in one of two ways. First, workers may be authorized to take frequent cooling off breaks. Second, various “cool suits” are available to wear under the protective suits to help eliminate the heat. Both are acceptable practices under OSHA and ACGIH.

Mr. Nelson states there was a study done in approximately 1991 to evaluate the heat problem. This was at the same time the procedures for the F-111 unit were in the process of changing. The F-111 unit switched to a spray sealant process, which required the use of the Saranex suits. Initially, this was an experimental process while the F-111 unit was developing the more permanent procedures. These were subsequently incorporated into the Technical Orders. Supervisors interviewed indicated that the BES office was involved in reviewing the proposed processes prior to their start. Documentation validates this (Atch 12). Although Mr. Nelson alleges the results of this study showed he had a body temperature of 176 degrees, this cannot possibly be correct because death results at a body temperature of 107 degrees. Mr. Nelson stated in his interview that management purchased the cool suits after completion of the study to help minimize the heat problem. We conclude management took appropriate action to evaluate the problem and purchased equipment to help offset the problem.

Two other workers we interviewed expressed concern that supervisors directed them to work in the fuel tanks without cool suits. However, if the cool suits were not available on any particular day, there would not be any restriction to allowing the workers to proceed with their work. OSHA has not established guidelines for preventing heat stress. ACGIH guidance recommends a work-rest cycle associated with high temperatures to prevent heat stress. For the F-111 unit, the workers would simply have to take more frequent rest breaks to cool off if no cool suits were available. The workers who expressed concern regarding working without the cool suits also acknowledged they could exit the tank if they got too hot. Several other workers and supervisors stated the worker in the fuel tank controlled how long they stayed in the tank before taking a break.

No workers interviewed indicated that they or anyone else they knew had ever been treated for heat exhaustion or heat stroke. Workers did state there were times when a worker would exit the fuel tanks profusely sweating and would appear very hot. However, the worker would state they were fine and would rest until they cooled off.

9. Allegation: “By way of example, Mr. Nelson related that on March 6, 1993, he was instructed to enter a “wet” tank (still containing fuel), without proper personal protective equipment. He was unable to find a properly functioning air-supply respirator. When he questioned the safety of using an air-supply respirator with broken air lines and an uncalibrated gauge, Mr. Nelson’s supervisor told him to go to work or go home. Mr. Nelson went home. He later filed a grievance through the agency grievance process, but the grievance was denied. The Grievance Report stated that management did not instruct Mr. Nelson to work in unsafe conditions or disregard safety instructions, and there was no evidence that management threatened Mr. Nelson.”

Response: The grievance channels were the appropriate method for Mr. Nelson to express his concern at the time. The grievance was evaluated and an answer reached promptly. We have no reason to question the validity of that determination or the investigation that preceded it. Mr. Nelson's supplemental information includes a statement signed by a co-worker regarding the incident. However, this statement does not include any information that was not in his original grievance. Moreover, the

specifics of his own grievance tend to suggest that management was concerned with worker safety. Mr. Nelson states that he "has been told before that if caught not following safety procedures, he could be subject to a reprimand or suspension." This tends to refute rather than support his allegations that management was not concerned with enforcing safety procedures. In addition, Mr. Nelson was obviously aware of his right to file a grievance. There is also no documentation to indicate that management took any action against Mr. Nelson for going home. They did not force him to work when he thought conditions were unsafe, even though management had determined the equipment was functioning.

10. Allegation: "Notwithstanding the denial of his grievance, Mr. Nelson asserts that he was regularly expected, and permitted to, enter the fuel tank with faulty or inadequate equipment."

Response: Mr. Nelson provides no documentation to support his allegation. All other workers interviewed stated they had never worked with chemicals in the fuel tanks without protective equipment or with broken protective equipment. Several workers expressed concern that the emphasis was on "getting the job done." However, these same workers all denied ever being directed or ordered to work without proper protective equipment. All supervisors stated that any problems with protective equipment would be corrected on the spot before entry into the fuel tanks. As indicated above, any deliberate or repeated instances of a worker failing to wear the correct protective equipment would result in administrative action. Supervisors did indicate they wanted people to stay productive, but not at the expense of safety and health.

11. Allegation: "Mr. Nelson alleged that he suffers serious health problems as a result of his overexposure to MEK and other hazardous chemicals. He currently has two active workers compensation claims against the Air Force, one of which involves his claim of on-the-job exposure to chemicals."

Response: The workers compensation claims are the appropriate route to establish whether Mr. Nelson's health problems are related to his work exposures. The Office of Workman's Compensation (OWCP), Department of Labor, will make this determination. Their decision is based on whether the individual's specific health problems, symptoms, and diagnosis are consistent with something he worked with. It should be noted that there does not necessarily have to be an "overexposure" for OWCP to find in a worker's favor.

12. Allegation: "In 1998, Mr. Nelson filed a complaint with the Air Force, alleging illness or injury as a result of his overexposure to toxic chemicals from 1986 to 1997. This complaint was investigated and evaluated by officials in the Air Force's Occupational Medicine Services and Bioenvironmental Engineering Flight Division. The investigation included a review of the chemicals used, air sampling, and worker techniques in connection with the tasks performed in the DeSeal/ReSeal Section.

The Air Force Report (Form 190), dated October 27, 1998, concluded that although workers were provided with appropriate respiratory protection, many workers did not use proper or complete protective equipment between 1980 and 1989.”

Response: We do not find this conclusion in the Form 190. The Form 190 states “This worker stated that air supplied respirators were required to enter the fuel tanks, however, **during small processes or short durations, some personnel** would enter the fuel tank with only a half-face air-purifying respirator which was not the proper personal protective equipment for these tasks” (emphasis added) (paragraph 2b(2)). One worker reporting that “some” of his co-workers used half-face respirators for certain limited operations does not necessarily mean this was a widespread practice. The workers and supervisors we interviewed indicated full-face, air-supplied respirators were always used inside the tanks when using chemicals. More importantly, the Form 190 goes on to say that although the air-supplied respirator is the required respirator, “allowing workers to enter the fuel cells with air purifying respirators according to the air sampling performed is adequate protection...” (paragraph 4b). This conclusion is reached by dividing the measured air sampling concentration (which is over the allowable standard) by the protection factor of the respirator to ensure the worker’s actual exposure is less than the allowable standard.

13. Allegation: “In addition, the exposure limits for eight-hour workdays and forty hour workweeks were exceeded on “various occasions” from March 1988 to May 1995. OSHA air sampling results between December 1990 and January 1991 showed chemical concentrations in excess of the OSHA threshold limits.”

Response: This statement refers to the actual air sampling results of the chemical concentration in the air. This is not the concentration workers were exposed to, since they were wearing respirators. OSHA establishes exposure limits that are the concentration a worker can be exposed to *without* use of protective equipment for 40 hours per week. If concentrations exceed this level, OSHA requires the employer to provide and the employee to use respiratory protection until the concentration can be controlled to below the limits (29 CFR 1910.134). As indicated above, workers in the F-111 unit at all times were provided respiratory protection, which provided sufficient protection to limit the actual exposure to the individual to below the OSHA limit. In other words, there is nothing wrong with having air-sampling results exceeding the OSHA limits as long as appropriate respiratory protection is provided. All interviews indicated appropriate respiratory protection was provided.

14. Allegation: “The October 27, 1998 Form 190 also reflects that the lower explosive limit (LEL) was found to be above acceptable limits during tank entry. The Form 190 reflects that safety personnel and management were documented as stating, ‘Overlook/bend the rules to get the job done.’”

Response: The Form 190 inaccurately quotes a memo to file, 27 Feb 97 (Atch 12). The quote in the Form 190 actually combines a statement from the memo with a partial quote in the memo. In addition, the Form 190 takes the statement and quote out of

context. The statement was allegedly made during the course of an angry discussion where representatives from the BES office, LA Safety, LA Management, and Base Safety were trying to determine how to proceed when LEL readings exceeded 20%. From a plain reading of the 27 Feb 97 memo, it appears the Base Safety representative felt he was being accused of being the “safety guy that overlooks or bends the rules to ‘...get the job done...’ ” This statement did not reflect actual policy or practice, nor is there evidence to suggest that safety personnel or management ever directed workers to “overlook/bend the rules to get the job done.” All workers and supervisors interviewed denied ever saying this or hearing anyone say this.

Three workers interviewed did say they thought the quoted statement reflected the underlying attitude of supervisors. However, the workers did not provide any specific information to support this perception. In fact, they all specifically denied ever working without protective equipment or being directed to work without protective equipment. Two of the three stated they did not continue to work when the LEL exceeded 10%.

15. Allegation: “Despite complaints from the Bioenvironmental Engineering personnel to the DeSeal/ReSeal Section Shop Supervisor about the safety hazard associated with exceeding the LEL, the operation continued with the excessive LEL.”

Response: In the Air Force, the controlling authority for safety hazards (which includes the LEL) is the Base Safety office, not the BES office. The F-111 unit supervisor was appropriately following Safety’s recommendations. As seen in Atch 12, both LA Safety and Base Safety personnel were concerned that pulling personnel from the tank every 5 minutes would be a greater safety risk than allowing them to complete their operations. OSHA does not prohibit confined space entries if the LEL exceeds 10% (Atch 2).

High LEL readings came to the attention of the BES office in early 1997 (Atch 14). They brought the problem to the attention of the F-111 unit supervisor. It is not clear how long the problem with high LELs had been occurring. Review of the ventilation system measurements (Atch 15) for the exhaust system indicates the system was apparently wearing out in this time frame. This could have contributed to difficulties keeping the LEL down. Interviews with workers and supervisors who worked in the F-111 unit up through the mid-1990's indicated they had never worked nor allowed anyone else to work when the LEL exceeded 10%. One worker, who was with the F-111 unit for over 10 years until it shut down in November 1997, stated he had never worked when the LEL exceeded 10%. However, three workers stated they did continue to work when levels exceeded 10%. One person we interviewed from Base Safety alleged some workers were deliberately elevating the LELs by using greater amounts of material and splashing it around inside the fuel tank so they could get out of the tanks.

In any case, after recognition of the problem in early 1997, the persons interviewed indicated Safety and the BES office specifically observed all remaining fuel tank operations. At this point in time, there were only 4 aircraft to complete prior to shutdown of the unit. Safety and the BES office reviewed the conditions and the

procedures in use. Safety determined the operations could proceed. As stated earlier, OSHA does not prohibit entry when LELs exceed 10% (Atch 2). Interviews also indicated the LEL levels would go up when the MEK was sprayed, but would return below 10% within minutes. Safety would evaluate the risk of explosion with the other risks associated with continuing or stopping the operation. They evidently determined the risk of explosion was adequately controlled ("acceptable risk") and the risks of stopping the operation and putting people in and out of the tanks were greater. One worker noted when they tried pulling the worker out every 5 minutes; the worker was "beat to death." Several workers noted entering and exiting the tank was a difficult and cumbersome process due to the various braces within the tanks.

16. Allegation: "The Form 190 Summary states: 'LA supervisors and management did not firmly enforce health and safety control requirements.'"

Response: This was the conclusion reached by the author of the Form 190, based on inaccurate interpretation of other documents as noted in Allegation 14. From our interviews, Col Lloyd had requested a meeting to discuss whether this statement was correct. In the meeting, BES personnel agreed the statement in the AF Form 190 regarding LA management enforcement of safety was not correct.

17. Allegation: "Mr. Nelson alleged that in March 1999, in an effort to limit agency liability in his workers compensation claim, an official in Mr. Nelson's supervisory chain of command, Colonel Connie Lloyd, requested a supplementary investigation into the claims addressed by the October 27, 1998 Form 190."

Response: As stated above, Col Lloyd had requested a meeting to discuss whether the AF Form 190 statement "LA supervisors and management did not firmly enforce health and safety control requirements" was correct. In the meeting, BES personnel agreed the statement in the AF Form 190 regarding LA management enforcement of safety was not correct. They agreed to prepare an addendum to the AF Form 190. This is consistent with Col Lloyd's memo (Atch 16).

The request for a meeting and addendum of the Form 190 would not limit liability for workers compensation. The Air Force does not have any decision-making role in workers compensation cases. The Air Force provides the documentation they have on workplace exposures to the OWCP. When the evidence supports that workplace conditions may have contributed to the illness/injury, the Air Force identifies the case as an occupational incident (Atch 17). The worker also provides documentation to support their claim. OWCP is the decision authority. If the worker's symptoms are consistent with the effects of the material(s) worked with, the OWCP approves the claim. Even if Mr. Nelson did not perform tank entries as suggested by the addendum, he still had exposure to MEK through other operations such as cleaning the spray guns. Mr. Nelson is not required to prove he was overexposed in order to receive workers compensation. Personnel have varying sensitivities to chemicals and a small percentage of workers can experience problems even when all operations are within standards.

As stated previously, Col Lloyd was entirely within her authority to request the meeting. All interviews indicated she did not attempt to direct the BES office on what the addendum should say.

18. Allegation: “On March 31, 1999, the Bioenvironmental Engineering Flight Division issued a supplement to the Form 190 in the form of a memorandum to Col Lloyd. The Supplement suggests that Mr. Nelson could not have performed tank entries on the F-111 aircraft, due to his size and physical condition. Mr. Nelson alleges that this Supplement is an attempt by Col Lloyd to “paper” Mr. Nelson’s medical records with false and damaging information to discredit his claims of overexposure.”

Response: From the interviews, it is not clear who raised the issue regarding Mr. Nelson's size. It does not appear to have been Col Lloyd, as she reportedly did not know Mr. Nelson personally. Regardless, the BES office agreed to evaluate Mr. Nelson's exposures (which is the purpose of the AF Form 190) to include whether he actually performed fuel tank entries. From our interviews, there was indeed a basis to question whether Mr. Nelson actually performed tank entries. One of Mr. Nelson's work leaders stated it was obvious when putting Mr. Nelson in his protective equipment that Mr. Nelson was claustrophobic. He stated he would find tasks other than entering the tank for Mr. Nelson to perform in order to accommodate this fear. Another supervisor stated Mr. Nelson performed LEL readings most of the time, and that he was on limited duty at various times during his tenure with the F-111 unit. Thus, it appears that in the minds of some, there may have been a legitimate question as to whether Mr. Nelson performed tank entries. However, the documentation provided by Mr. Nelson indicates that he did enter the tanks. Our interviews with other workers and supervisors confirm these statements.

19. Allegation: “Mr. Nelson asserts there is no question that he performed tank entries, and that his supervisors and co-workers, his performance evaluations and personnel records, confirm this.”

Response: Agree. See above.

20. Allegation: “Mr. Nelson advised this office that he was told by the employee who wrote the Form 190, Doug Harmon, that Col Lloyd asked Mr. Harmon to re-write the Form 190 to make it less damaging to the Air Force.”

Response: As discussed above, our interviews indicated the BES office agreed to supplement the AF Form 190. From the interviews, the instruction to Mr. Harmon to prepare the supplement was from his supervisors in the BES office, not Col Lloyd. His direction was to further evaluate Mr. Nelson’s actual exposures. Interviews indicated there was no direction to reach a particular conclusion or falsify data.

21. Allegation: “Another Air Force memorandum supports Mr. Nelson’s allegations that inadequate personal protective equipment was used. On January 5, 1996, the 77th Aerospace Medicine Squadron at McClellan issued a report on its Annual Industrial

Hygiene Survey of the F-111 ReSeal Unit (DeSeal/ReSeal Section). The report raised concerns about the ‘huge variety of hazardous materials’ employees use, and the excessive and duplicative chemicals authorized for purchase by the DeSeal/ReSeal Section (emphasis in original).”

Response: The memorandum does not support Mr. Nelson’s allegations. The Annual Industrial Hygiene survey stated “employees use and are exposed to a huge variety of hazardous materials...” This is a simple statement of fact, not a concern. There are no standards governing the number of hazardous materials in use. The recommendations to reduce the number of hazardous materials arise from management issues involved with authorizing, tracking, maintaining an accurate chemical inventory and MSDSs, and disposing of the material. (See paragraph 6a. (2) of the report.) If a shop has more types of hazardous materials than is needed, this creates an overburden in managing the materials; for example, keeping the required chemical inventory and MSDSs is more difficult. However, such problems of oversupply do not equate to an increase in the hazard to the employees. For example, a workplace that uses just one chemical (e.g. cyanide) can pose a much greater hazard to the employees than a workplace that uses 100 chemicals (e.g. paints).

Interviews indicated that there was frequent rotation in the personnel managing the Sealant Room. Without continuity of personnel, it is difficult to maintain inventories of materials in an efficient manner. As new materials are introduced into the process, old materials may remain on the shelf. This does not, by itself, constitute a risk of overexposure.

22. Allegation: “The survey found that workers were using inadequate hand and body protection against skin absorbent chemicals, and that the Sealant Room had arbitrarily substituted or augmented two types of gloves meant to provide protection against different solvents. Workers using inadequate gloves for longer than 10 minutes would experience breakthrough and skin absorption of the chemical, especially solvents containing toluene, and MEK. The Air Force report cautions that toluene breaks through Saranex suits, which are the type used by sealers, in 5 or 10 minutes, and MEK breaks through in 20 minutes. The report recommends that other types of coveralls be considered.”

Response: From a technical perspective and to provide background information, the selection of gloves and protective suits appropriate for a particular workplace is a very complicated task. Different materials have different resistance to chemicals. In a shop that uses several different chemicals, such as the F-111 unit, the best protection against one chemical may be the worst protection against another chemical also being used, sometimes within the same compound. Selecting the most appropriate gloves and protective suits is based on the chemicals used, protective material technology at that time, and available information on chemical breakthrough for the specific chemical and material under consideration. In addition, "breakthrough" times are laboratory measurements under specifically defined conditions for liquid on the material to be detectable on the inside. This breakthrough time does not directly apply to a workplace.

It is a measurement that is best used to compare the protective capabilities of one material to another.

Based on the best information available at the time, the BES office recommended in 1991 that the F-111 unit use two Saranex suits (Atch 18). This would provide increased protective capability recognizing the short breakthrough times, as well as guard against the outer suit being torn. The F-111 unit implemented this recommendation. Several workers interviewed stated the suits were exchanged every time they exited the tank (about every 1-2 hours). In 1996, the BES office recommended an improved suit. However, it is not fair to assume that this recommendation implies that the previous recommendation was incorrect and posed a danger to personnel; it indicates the BES office had obtained updated information and was therefore in a position to recommend improved protection.

In reference to the allegation regarding the improper substitution of gloves, the Sealant Room did make an error; the BES office identified and corrected this error. Most workers and supervisors interviewed recalled a problem with the gloves deteriorating rapidly. Selection of gloves is complicated by the need to retain dexterity as well as the factors discussed above. A thicker glove provides better protection, but may not allow the worker to accomplish the task. Attempts to find a suitable glove which would stand up to the chemicals, yet was thin enough to allow workers to accomplish their job, continued over a long period of time (Atch 19). All interviews indicated that workers were authorized to put on a new pair of gloves as often as needed.

The purpose of providing the gloves and suits, as well as other protective equipment, is to prevent adverse health effects, primarily dermatitis, in the workers. In order to ensure the selection and use of protective equipment is indeed protecting the workers, and to identify workers who may be more sensitive to the chemicals than the average worker, the Air Force includes medical exams as part of its occupational health program. The specific medical tests performed are selected based on the potential effects of the chemicals being used (Atch 20*). All workers interviewed acknowledged receiving medical exams on an annual basis. All workers interviewed denied being diagnosed at any time with a work-related condition. A few workers stated they were referred to their private physician for further evaluation of a potential problem, but their private physicians stated they were fine. One worker expressed concern that the clinic would try to discount anything as being work-related. However, there is documentation to show there were instances when the clinic did identify illnesses/injuries as work-related (Atch 17).

In addition to these individual examinations, the Public Health section of the Medical Group reviewed the medical records of the workers on an annual basis to identify any possible trends in the health of the workers. Available documentation shows no trends from chemical exposure were seen (Atch 21). One trend analysis did note a potential trend for Repetitive Trauma Disorders (RTD). These are ergonomic injuries,

* Note: The statement regarding the differential at the bottom of the form at Atch 20 means they have added a differential analysis to the complete blood count (CBC) analysis to enable them to see potential effects on the blood from the potential isocyanate exposure. It does not mean they are adding anything to the worker's blood as Mr. Nelson alleged.

such as carpal tunnel syndrome, potentially resulting from working in the cramped quarters and with various tools. These potential problems were addressed through encouraging regular breaks and training the personnel on ergonomic hazards (Atch 4). All workers were also authorized to go to the Medical Group at any time they believed they had a work-related health problem, independent of when they were scheduled for their annual exam.

Thus, break-through of gloves and suits is a potential problem with any use of chemicals. However, in the F-111 unit, increased incidence of dermatitis, which would be expected if overexposures were occurring, were not identified.

23. Allegation: "The report also noted that periodic air sampling exceeded safety levels during spraying of a primer containing a carcinogenic chemical, strontium chromate. The sampling showed that, on occasion, workers sprayed in the tanks for 50 to 60 minutes. These samples would exceed 2000 times the Occupational Exposure Limit (OEL). Air Force Occupational Safety and Health (AFOSH) Standards state that at 2000 times the OEL, airline respirators do not provide adequate protection. Mr. Nelson alleged that he spent two hours at a time in the tanks during some spraying operations, with only an airline respirator."

Response: As addressed previously, other workers interviewed indicated the primer spraying operation typically lasted 15 minutes to 1 hour. Mr. Nelson's allegation that he spent 2 hours at a time during "spraying" operations does not specify whether this involved spraying the primer, the sealant, or MEK. Only the primer spraying operation had a recommended time limit to maintain exposure levels to below the ACGIH TLV for strontium chromate, which is 200 times less than the OSHA PEL for strontium chromate. If Mr. Nelson did spray primer for 2 hours, his exposure would still be significantly less than the OSHA PEL.

24. Allegation: "Finally, the report states that it is apparent that employees are not informed of the hazards of the hazardous materials they use, as required by AFOSH Standard 161-21."

Response: The report also acknowledged that employees did receive HAZCOM training. Evidently, some workers did not retain the information presented. The report was simply a notice to management that reinforcement of the training was needed. As previously discussed in the response to Allegation 1, interviews and documentation (Atch 3) showed health and safety information was routinely provided and readily available.

25. Allegation: "A report issued by the Air Force Inspector General (IG) on March 31, 1997, in response to Mr. Nelson's complaint of overexposure to toxic chemicals, appears to ignore the findings of the Annual Industrial Hygiene Survey. The IG response states that "investigations revealed no overexposures to the workers." The IG concluded that there should be no impact on workers from prolonged exposure to any of the chemicals that they are using, as long as they are wearing the required personal protective

equipment. This response obviously does not address the questions and concerns raised by Mr. Nelson or the results of other investigations of workplace hazards.”

Response: This allegation assumes the Annual Industrial Hygiene Survey did reveal overexposures to workers. As addressed above, this is not a correct assumption. From the viewpoint of the IG, protective equipment requirements had been established, protective equipment was available, guidelines on limiting exposures was available, so workers should have been completely able to ensure their exposures were within standards.

In addition, the IG conclusions are consistent with the conclusions of this investigation. Our interviews with workers and supervisors indicated a strong emphasis on safety and health requirements. Some workers felt there was more of an emphasis on production than on their health and safety. Yet, they stated they personally had not been directed to work under unsafe conditions, nor did they have personal knowledge of anyone else working under unsafe conditions. It is apparent there were some personality conflicts in the workplace that may have contributed to this perception. For example, one worker stated his supervisor "harassed" him. Asked to define "harassment," he stated the supervisor would ask why he was not done with a job or why it was taking so long. In our view, these appear to be valid questions for a supervisor to ask and do not constitute harassment. Some workers commented that everyone seemed angry and short-tempered. Admittedly, this job was a hot and dirty one, in cramped quarters. However, our investigation determined that all appropriate actions were taken to ensure the safety and health of the workers.

CONCLUSION: The Air Force overall has a very strong, active Occupational Safety and Health Program (Atch 22). As shown in the Air Force Annual Report to OSHA (Atch 23), the Air Force lost time case rate (illnesses and injuries per 100 employees)(AKA Lost Workday Case rate) is 1.76 compared to a nation-wide industry average of 3.1 (Atch 24). This industry average includes financial companies, insurance companies, etc., which have very low rates and bring the average down. The average for manufacturing type companies, which would include operations similar to the F-111 unit, is 4.7. The annual report also discusses the actions the Air Force has on-going to continually improve the health and safety of Air Force workers.

We found the elements of the Air Force Occupational Safety and Health Program to be in operation at the F-111 unit. Any problems with safety and health which were identified over the years were appropriately addressed by management with technical support from the BES office and Base Safety. We found a very strong commitment to safety and health in all of the supervisors interviewed.

MANAGEMENT ACTIONS: Prior to receiving this complaint, the Air Force requested the Air Force Audit Agency (AFAA) review the confined spaces program. The Air Force recognizes the significant potential risks associated with confined space operations. Informal feedback had indicated there were problems with the program, and the request to the AFAA was initiated to define the problem areas and provide recommended solutions. The AFAA report is attached (Atch 25). They did find problems in several areas and provided three recommendations to correct those problems.

1) As recommended by AFAA, the Chief of Safety of the Air Force issued a message (Atch 26) to all major commands, field operating agencies, and direct reporting units outlining the problems found by the audit. The message emphasized the importance of the program and requested command attention to ensure appropriate priority was given to implementation.

2) The Air Force is currently processing a Special Interest Item for the Inspector General to evaluate the confined space program during all inspections to maintain emphasis on the program and evaluate progress (Atch 27).

3) The re-write of the AFOSH Std to incorporate the AFAA recommendations is underway and projected to be complete by 1 Jun 2000.

27 Attachments:

1. Interview Questions
2. OSHA Standards Interpretation
3. Training Rosters
4. Occupational Health Education Material
5. Excerpt from T.O. 1F-111A-3-20
6. OSHA Citations
7. Spray Sealant Personnel Protective Plan
8. Hazards Alleged to OSHA
9. Fit Test Report
10. OSHA and ACGIH Limits
11. AF Form 190, Mr. Nelson, 960625
12. Sealant Procedures
13. Memo to File, 27 Feb 97
14. Memos regarding LEL
15. Ventilation Surveys, AF Form 2764
16. SMALC/LA Memo, 21 Jan 99
17. AF Form 190, 960626; AF Form 190, 940103
18. Manufacturer's Information on Saranex Suit
19. Glove correspondence
20. Clinical Occupational Health Examination Requirements

21. Medical records/medical worksite visit review
22. AF Policies and Instruction Regarding OSH
23. Fiscal Year 1999, Annual Report on Occupational Safety and Health
24. Safety and Health Statistics, Bureau of Labor Statistics
25. Air Force Audit Agency Report, "Safety of Life in Confined Spaces"
26. HQ Air Force Chief of Safety Message
27. Request for IG Special Interest Item

Kelli Ballengee

M. KELLI BALLENGEE, Lt Col, USAF, BSC
Deputy for Occupational Health
Office of the Deputy Assistant Secretary
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Timothy M. Russell

TIMOTHY M. RUSSELL, Lt Col, USAF
Chief, Policy and Task Analysis Division
Office of the Inspector General

2

Questions for Supervisors:

1) When did you work in the F-111 ReSeal/DeSeal unit at McClellan AFB?

2) Did you know Mr. Daniel Nelson?

Was he assigned to the ReSeal/DeSeal unit at the same time you were?

What duties did he perform?

Was he detailed to other sections?

To your knowledge, was he ever on restricted duty?

When was the last time you personally know of that he entered a tank prior to the ReSeal unit shutting down?

3) How often were operations performed in the fuel tanks?

How long did an individual stay in the tank at a time?

4) How long did priming operations take?

a) Were you aware of time limitation?

5) What protective equipment was available?

Was information available on what protective equipment was required for which operations?

In what form?

6) Did any workers ever identify problems with protective equipment to you? What action did you take?

7) Were you aware of a problem with the gloves deteriorating rapidly?

Were workers allowed to change gloves as they needed to?

8) Were there any operations authorized to use half-face respirators? Which ones?

9) Were there any operations authorized to be performed inside the tanks without any respirator? Which operation?

10) Did any workers ever request you provide an MSDS for any material?

Where were MSDSs available?

11) Did you see copies of BE reports?

Did you provide workers access to the reports or brief them on the results?

12) To your knowledge, did any of the materials the unit used or worked with contain asbestos?

If so, how do you know and what material was it? Do you have any documentation?

If so, did you object? Did you file a grievance? Why or why not? What was the outcome?

16) Did you ever sand or grind paint or epoxy inside the fuel tanks?
What respiratory protection was required?

Did you wear it? If not, why not?

17) Were cool suits provided for working in the tanks?
Were there any problems with the suits?

If an operational cool suit was not available, were you allowed to take breaks if you started feeling too hot?

Did you, or anyone to your knowledge, ever have to be treated for heat exhaustion or heat stroke?
Specifics.

18) Did you ever hear safety personnel or management say to overlook or bend the rules to get the job done? When and in what context?

19) Did you ever work in the tanks when the LEL exceeded 10%? Why?

Was anything done to try to control the levels to below 10%?

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OSHA Standards Interpretation and Compliance Letters

09/04/1996 - Entry into a confined space when the lower flammable limit is greater than ten percent.

[◀ OSHA Standard Interpretation and Compliance Letters - Table of Contents](#)

- **Record Type:** Interpretation
- **Standard Number:** [1910.134](#); [1910.146](#)
- **Subject:** Entry into a confined space when the lower flammable limit is greater than ten percent.
- **Information Date:** 09/04/1996

September 4, 1996

Mr. Macon Jones
Blasting Cleaning Products LTD.
2180 Speers Road
Oakville, Ontario
Canada L6L2X8

Dear Mr. Jones:

This is response to your request of April 10, requesting clarification of the 29 CFR 1910.146 standard. Please accept our apology for the delay. Responses to your questions follow:

Question 1. If an enclosed space is a "permit required confined space" (PRCS) and all of the proper procedures are implemented, can entry be made and work performed (or continued) if the measured lower flammable limit (LFL) is greater than 10%?

Answer Yes. The permit-required confined spaces standard (29 CFR 1910.146) does not prohibit working in a permit-required space where the atmosphere is above 10% of the LFL. Once the atmosphere is above 10% of the LFL, all of the requirements of the standard must be met.

Question 2. Regarding the above question (question 1) are there particular procedures or precautions that are required under these conditions?

Answer Since PRCS is a performance standard, it does not specify procedures for conditions where the permit-required space has a hazardous flammable atmosphere. However, what the standard does specify in paragraph (d) is that the employer must identify and evaluate each hazard to which the entering employees will be exposed. Based on the hazard analysis, the employer must develop and implement the means, procedures, and practices necessary for safe permit space entry operations.

Although the PRCS standard may not specify or necessarily apply to specific precautions an employer must take regarding a hazardous flammable atmosphere, other OSHA standards could apply. For example, if the flammable atmosphere also

presented a respiratory hazard requiring protection, 29 CFR 1910.134 specifies precautions relative to the selection and use of respirators. If the flammable atmosphere is the result of a process involving equipment, there may be precautions with regard to the equipment that an employer would be required to follow.

Question 3. Have OSHA or any other government agencies made specific studies regarding the difficulties of accurately calibrating (LFL) monitoring devices, when multiple solvent coatings are used in a spray coating?

Answer OSHA is not aware of any specific studies that have been conducted in this area. However, we understand that most manufacturers of this type of testing equipment have addressed this issue. Manufacturers setup and calibrate their equipment using a single calibration gas (usually menthane) and then provide their end users with conversion tables or factors for determining the percentage of the LFL for other gases. Where the finish being applied is a mixture, the manufacturer of the coating, through the Material Safety Data Sheet or other product information, is able to advise the employer of the individual solvent characteristics.

Question 4. Have OSHA or any other government agencies made specific studies as to minimum and maximum distances LFL monitoring equipment may be located from the spray process, without adversely affecting worker safety? (Or adversely affecting monitoring equipment reliability?) Where can copies of these study results be obtained?

Per your conversation with Don Kallstrom of my staff, the root question is, Where and how often is monitoring required under 29 CFR 1910.146(d)(5)(ii) to meet the intent of the standard for a spray painting operation within a railroad tank car?

Answer The standard does not specify frequency rates because of the performance oriented nature of the standard and the unique hazards of each space. However, there will always be, to some degree, testing or monitoring during the entry operations which is reflective of the atmospheric hazard.

The employer must determine the degree and the frequency of testing or monitoring. Some of the factors that affect frequency are results of test allowing entry, the regularity of entry (daily, weekly, or monthly), the uniformity of the permit space (the extent to which the configuration, use, and contents vary), the documented history of previous monitoring activities, and knowledge of the hazards which affect the permit space as well as the historical experience gained from monitoring results of previous entries.

Knowledge and recorded data gained from successive entries (such as ventilation required to maintain acceptable entry conditions) may also be used to document changes in the frequency of monitoring.

The placement of the testing or monitoring instrument in relation to the employee performing spray coating operations is also not specified in the standard. The intent of this paragraph is to ensure that the predetermined acceptable entry conditions established by the employer are being maintained during the entry. Where the employer can demonstrate that the hazard concentration to which the employee is being exposed is uniform throughout the tank car being sprayed, then the placement of the instrument is not critical.

Should you have further questions on this correspondence please contact Mr. Don Kallstrom of my Office of Safety Compliance Assistance staff (202)219-8031 x 109.

John B. Miles, Jr., Director
Directorate of Compliance Programs

◀ OSHA Standard Interpretation and Compliance Letters - Table of Contents

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F-111 (Use this space for mechanical imprint)

WG-8801-08

Mining: Benzene, Butyl, Ergo, Ethyl Ac, formal, Isob. Derm, Fsoxy, MEK, NOISE, Solvents, Stron. Chromate Toluene, Xylene

OCCUPATIONAL HEALTH TRAINING & PROTECTIVE EQUIPMENT FIT TESTING

WORKPLACE IDENTIFIER 01117 DADO 113A BASE McClellan
 ORGANIZATION LAPFFE WORKPLACE F-111 Fuel / Wg-8801 Bldg 251 ROOM/AREA

DATE (YYMMDD)	NAME (Last, First, MI)	RECORD ACTION				COMMENTS
		RESPIRATOR TRAIN	HAZ. NOISE TRAIN	HAZ. NOISE FIT TEST	OTHER	
9/6/07/12	BINFORD, HERBERT					<i>Herbert Binford</i>
9/6/07/12	BERNATENE, BENNETH					<i>Benneth Bernatene</i>
9/6/07/12	BRIDGES, DONALD					<i>Donald Bridges</i>
9/6/07/12	GABIANO, ALAN					<i>Alan Gabiano</i>
9/6/07/12	IRIARTE, ANTONIO					<i>Antonio Iriarte</i>
9/6/07/12	JIMENEZ, ROGELIO					<i>Rogelio Jimenez</i>
9/6/07/12	MERGAÑO, XAVIER					<i>Xavier Mergaño</i>
9/6/07/12	NELSON, DANIEL					<i>Daniel Nelson</i>
9/6/07/12	SALVADOR, JOSEPH					<i>Jose S. Salvador</i>
9/6/07/12	SWEET, JERRY					<i>Jerry Sweet</i>
9/6/07/12	WILLIAMS, DAVID					<i>David Williams</i>
9/6/07/12	HAMMETT, LUCILLE					<i>Lucille Hammett</i>
9/6/07/12	O'BRIEN, MARK					<i>Mark O'Brien</i>
9/6/07/12	SIMMONDS, JAMES					<i>James Simmonds</i>
9/6/07/12	TACCANI, James					<i>James Taccani</i>
9/6/07/12	ELLIS, HARMOUD					<i>Harmon D. Ellis</i>
9/6/07/12	DUNCAN, ROBERT A.					<i>Robert A. Duncan</i>

F-111 Fuel WS-8801-08

(Use this space for mechanical imprint)
 Maining: Benzene, Butyl, Ergo, Ethyl/Acc,
 formal, D.D. perm, F.socyl, MEK, NOISE,
 Solvents, Stron. Chromate Toluene,
 Xylene

OCCUPATIONAL HEALTH TRAINING & PROTECTIVE EQUIPMENT FIT TESTING

WORKPLACE IDENTIFIER 0117 DADO 113A BASE McClellan
 ORGANIZATION LAPFFE WORKPLACE F-111 Fuel / WS-8801 BLDG NO / LOCATION Bldg 251 ROOM / AREA -

DATE (YYMMDD)	NAME (Last, First, MI)	RECORD ACTION				COMMENTS
		RESPIRATOR TRAIN	HAZ. NOISE TRAIN	HAZ. NOISE FIT TEST	OTHER	
961017112	BINFORD, HERBERT					<i>Herbert Binford</i>
961017115	BEANAIENE, KENNETH					<i>Kenneth Beanaiene</i>
961017112	BRIDGES, DONALD					<i>Donald Bridges</i>
961017115	GARIANO, ALAN					<i>Antonio Gariante</i>
961017112	IRIARTE, ANTONIO					<i>Antonio Gariante</i>
961017112	JIMENEZ, RAFAEL					<i>Rafael Jimenez</i>
961017115	MERVA DO, XAVIER					<i>Xavier Mervado</i>
961017112	NELSON, DANIEL					<i>Daniel A. Nelson</i>
961017115	SALVADOR, JOSEPH					<i>Jose S. Salvador</i>
961017112	SWEET, JERRY					<i>Jerry Sweet</i>
961017115	WILLIAMS, DAVID					<i>David Williams</i>
961017112	HAMMETT, LUCILLE					<i>Lucille Hammett</i>
961017115	O'BRIEN, MARK					<i>Mark O'Brien</i>
961017112	SIMMONDS, JAMES					<i>James Simmonds</i>
961017112	TACCANT, JAMES					<i>James Taccant</i>
961017112	ELLS, HARMOND					<i>Harmund E.L.L.S.</i>
961017112	DUNCAN, ROBERT A.					<i>Robert A. Duncan</i>

DATE (YYMMDD)	NAME (Last, First, MI)	SSAN	RECORD ACTION					COMMENTS
			RESPIRATOR TRAIN	FIT TEST	HAZ. NOISE TRAIN	FIT TEST	OTHER	
9/10/107	MUSTAIN, GARY							Gary Z Mustain
	BLUFORD, HERBERT							Herbert Bluford
	BLACK, CHARLES							Charles Black
	BONHAM, LESTER							Lester J Bonham
	BRIDGES, DONALD							Donald Bridges
	BRYANT, JAMES							Bryan
	DIETZ, GLENN							
	HIGGINS, JAMES							James J Higgins
	JIMINEZ, ROGERLO							Roger Jimenez
	JONES, PERCIVAL							Perceval Jones
	KEITT, LINDA							Linda Keitt
	LICHTENBERG, ROBERT							
	LOVEJOY, WILLIE							Willie Lovejoy
	MCELROY, JERRY							Jerry McElroy
	NELSON, DANIEL							Daniel Nelson
	SMITH, JACK							Jack Smith
	SWETT, JERRY							Jerry Swett
	THORNTON, DAVID							David Thornton
	TODD, ED							Ed Todd
	TOMPKINS, HORACE							Horace Tompkins

AF FORM 2767 JAN 82

NAME: M. Beck
 TITLE: (Swing Shift)
 POSITION: (Swing Shift)

WORKPLACE IDENTIFIER: DAD0113A
 ORGANIZATION: LAC PFA
 BLDG NO./LOCATION: 113A
 ROOM/AREA: McClellan

DATE (YYMMDD):
 NAME (Last, First, MI):
 (Last, First, MI)

DATE (YYMMDD)	NAME (Last, First, MI)	RECORD ACTION				COMMENTS
		RESPIRATOR TEST	HAZ. NOISE TEST	OTHER TEST	OTHER	
94104104	LIMA EDWARD A					
94104104	BLACKWELL JOHN					
94104104	SAVADOK JOE					
94104104	BERNARDI AN					
94104104	BARBEREY JAMES					
94104104	COBLE BRADY					
94104104	SEBASTIAN GARY					
94104104	BENSON LLOYD					
94104104	NERE ABEL					
94104104	SLADE RICK					
94104104	ANDERSON GARY					
94104104	ARMSTRONG REYNOLD					
94104104	BYERS JIMMIE					
94104104	LEE CLARENCE					
94104104	PEREZ RAMON					
94104104	BRACKLE WAYNE					

AF FORM 2767 JAN 82

Please return to ~~SMC~~

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OCCUPATIONAL HEALTH TRAINING & PROTECTIVE EQUIPMENT FIT TESTING

F-111 Reseal Unit

WORKPLACE IDENTIFIER: DADO 113A
 ORGANIZATION: SMC
 BLDG NO./LOCATION: BAS McCellan
 ROOM / AREA:

DATE (YYMMDD)	NAME (Last, First, MI)	SSAN	RECORD ACTION			OTHER COMMENTS
			RESPIRATOR TRAIN TEST	HAZ. NOISE TRAIN TEST	FIT TEST	
9/3/05 12:4	MICELURE, Lloyd				<input checked="" type="checkbox"/>	3858
9/3/05 12:4	CANE, D				<input checked="" type="checkbox"/>	3858
9/3/05 12:4	THORNTON, D				<input checked="" type="checkbox"/>	3858
9/3/05 12:4	MICELER, A				<input checked="" type="checkbox"/>	3858
9/3/05 12:4	MSELROY, J				<input type="checkbox"/>	
9/3/05 12:4	BAILES, LEO				<input type="checkbox"/>	
9/3/05 12:4	MIKE BECK				<input type="checkbox"/>	
9/3/05 12:4	ED LIMB				<input checked="" type="checkbox"/>	3858
9/3/05 12:4	Rafael Torres				<input checked="" type="checkbox"/>	8852
9/3/05 12:4	JONES, PERCIVAL O.				<input checked="" type="checkbox"/>	3858
9/3/05 12:4	Williams David L				<input checked="" type="checkbox"/>	3858
9/3/05 12:4	Bryant, Donald				<input type="checkbox"/>	
9/3/05 12:4	Temple, Herb L.				<input checked="" type="checkbox"/>	
9/3/05 12:4	SALVADORI				<input type="checkbox"/>	
9/3/05 12:4	Mark P. Brown				<input checked="" type="checkbox"/>	3858
9/3/05 12:4	Herb Beck				<input checked="" type="checkbox"/>	3806
9/3/05 12:4	C. Anderson				<input checked="" type="checkbox"/>	3852
9/3/05 12:4					<input checked="" type="checkbox"/>	3858

(YYMMDD)	NAME (Last, First, MI)	RECORD ACTION				OTHER	COMMENTS
		RESPIRATOR TRAIN	FIT TEST	HAZ. NOISE TRAIN	FIT TEST		
5124193	MERCADO X ANTON					✓	3858
913105124	SWIFT JERRY					✓	8801
913105124	IRIMETE ROY					✓	8801
913105124	Coble, GARY					✓	3858
913124185	ARMSTRONG R.C.H.					✓	3858
241025193	DECEGROIO JAMES A					✓	8858
241025193	PELLAN Jeffrey A					✓	3806
241025193	lopez, Anthony					✓	3858
241025193	JayPA Mark					✓	3806
241025193	PEREZ RAMON					✓	3858
241025193	POOK GARY					✓	3858
241025193	J. BARNETT					✓	3858
241025193	Donald Bridges					✓	3858
241025193	Charles Black					✓	3858
251025193	Jimenez, Regilio					✓	8801
251025193	JAMES KEIRT H					✓	8858
251025193	James Keith					✓	3858
251025193	James Keith					✓	8852
251025193	Robert Lawrence					✓	8806

Bryant
Bridges
Black

Job series

SSAN

2

(Use this space for mechanical imprint)

OCCUPATIONAL HEALTH TRAINING & PROTECTIVE EQUIPMENT FIT TESTING

Occupational Education

WORKPLACE IDENTIFIER
ORGANIZATION

WORKPLACE F-111 Reseal Unit
D A D O I 1 3 A
BLDG NO./LOCATION
ROOM/AREA

BASE McClellan

DATE (YYMMDD)	NAME (Last, First, MI)	SSAN	RECORD ACTION						COMMENTS
			RESPIRATOR TRAIN	FIT TEST	HAZ. NOISE TRAIN	HAZ. NOISE FIT TEST	OTHER		
9 1 0 1 0 4	MADEIRA, HERMAN								Herman Madeira
9 1 0 1 0 4	MARQUETTE, MICHAEL								Michael Marquette
9 1 0 1 0 4	MCCLURE, LLOYD								Lloyd R. McClure JAN 10, 91
9 1 0 1 0 4	MERCADO, XAVIER								Albert Trice
9 1 0 1 0 4	MILLER, ALBERT D								Albert D. Miller
9 1 0 1 0 4	NELSON, DANIEL								Greg Stone
9 1 0 1 0 4	NERI, ABLE								Ramon Neri Disqualifies and Equal
9 1 0 1 0 4	PEREZ, RAMON								Greg Stone
9 1 0 1 0 4	PETERSON, TIMOTHY								Greg Stone
9 1 0 1 0 4	POOL, GARY								Greg Stone
9 1 0 1 0 4	RAYBURN, CHAUNCEY								Greg Stone
9 1 0 1 0 4	ROBERSON, STEVE								Disqualified on COM1
9 1 0 1 0 4	ROGERS, CLIFTON								Disqualified on COM1
9 1 0 1 0 4	SALVADOR, JOE								Disqualified on COM1
9 1 0 1 0 4	SCHMITT, GLEN								Disqualified on COM1
9 1 0 1 0 4	SEEBAND, GARY								Disqualified on COM1
9 1 0 1 0 4	SLADE, RICHARDO								Disqualified on COM1

Atch 2

DATE (YYMMDD)	NAME (Last, First, MI)	SSAN	RECORD ACTION				COMMENTS
			RESPIRATOR TRAIN	FIT TEST	HAZ. NOISE TRAIN	FIT TEST		OTHER
9 1 0 1 0 4	FORD, DONNIE						ON EXTENDED LEAVE, SENT HOME BY CMS
9 1 0 1 0 4	GARCIA, JOE						<i>John</i>
9 1 0 1 0 4	GARTANO, ALAN						<i>Alan G. Gargano</i>
9 1 0 1 0 4	HEASLEY, STEVEN						<i>Steven Heasley</i>
9 1 0 1 0 4	HERNANDEZ, STEVEN						DISQUALIFIED ON CLEAN TO MABPFY
9 1 0 1 0 4	HOLQUIN, ARTHUR						<i>Arthur Holquin</i>
9 1 0 1 0 4	HORN, BRUCE						<i>Bruce Horn</i>
9 1 0 1 0 4	IRIATE, ANTONIO						TEMPORARILY DISQUALIFIED, ON CLEAN TO MABPFM
9 1 0 1 0 4	JIMINEZ, ROGELIO						<i>Rogelio Jimenez</i>
9 1 0 1 0 4	JONES, KENT						<i>Kent Jones</i>
9 1 0 1 0 4	JONES, PERCIVAL						<i>Percival Jones</i>
9 1 0 1 0 4	JUAREZ, JOSEPH						<i>Joseph Juarez</i>
9 1 0 1 0 4	KEITT, LINDA						<i>Linda Keitt</i>
9 1 0 1 0 4	KLINE, MARK						<i>Mark Kline</i>
9 1 0 1 0 4	KOPASEK, JAMES						<i>James Kopasek</i>
9 1 0 1 0 4	LEE, CLARENCE						<i>Clarence Lee</i>
9 1 0 1 0 4	LIMA, EDMUND						<i>Edmund Lima</i>
9 1 0 1 0 4	LOPEZ, ANTHONY						<i>Anthony Lopez</i>
9 1 0 1 0 4	LUCERO, DONALD						<i>Donald Lucero</i>
9 1 0 1 0 4	MACKAY, RICHARD P						<i>Richard P. Mackay</i>

5

BENZENE

PREPARED FOR: LACFFC F-111 Reseal Unit 113A

25-Jun-96

SYNONYMS: Benzol, coal tar naphtha, phenyl hydride

DESCRIPTION: Colorless flammable liquid

OCCUPATIONAL EXPOSURE: Chemical synthesis, detergents, dyes and paints, explosives, fumigants, insecticides, intermediates, lacquers and dope, leather, linoleum, phenol, rotogravure printing, rubber, solvent

TOXICITY: HIGHLY TOXIC. May cause death.

ROUTES OF ENTRY: Inhalation, skin, ingestion

HEALTH HAZARDS: Benzene is changed in the body to a phenolic compound which may alter the genetic material in bone marrow with injury to blood forming tissue; may cause leukemia in certain individuals; central nervous system (brain) depression.

SIGN AND SYMPTOMS:

ACUTE: Euphoria (a high), excitement, headache, dizziness, incoherent speech, narcosis(sleepiness); Stimulation of central nervous system, then depression, with death via respiratory paralysis; Respiratory irritation and fluid in the lungs; Gastrointestinal irritation with vomiting and colic; Skin irritation, redness and blistering

CHRONIC: Loss of appetite and nausea, loss of weight, fatigue and weakness, headache, dizziness, nervousness and irritability

Hemorrhagic (bleeding disorders) manifestations: Paleness, nosebleed, purplish spots or blotches in the skin, menstrual disturbances

Hematological (blood system) changes: Anemia, breakdown of blood cells, abnormal size and number of blood cells; Acute leukemia may occur when exposures have been high for 3-5 years or longer

FIRST AID:

EYE EXPOSURE: Immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids for 15 minutes. Get medical attention immediately.

SKIN EXPOSURE: Wash the contaminated skin with soap or mild detergent and water for 15 minutes. If this chemical soaks through the clothing, promptly remove the clothing and wash with soap or mild detergent and water for 15 minutes. Get medical attention promptly.

INHALATION: Move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention ASAP.

INGESTION: DO NOT induce vomiting. Get medical attention immediately.

DISABILITY: Recovery from acute exposure is usually prompt and complete; Permanent disability from acute exposure is rare.

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25-Jun-96

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INHALATION: Move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention ASAP.

INGESTION: DO NOT induce vomiting. Get medical attention immediately.

DISABILITY: Recovery from acute exposure is usually prompt and complete; Permanent disability from acute exposure is rare.

PREVENTIVE MEASURES: Adequate ventilation with down-draft local exhaust when possible; Rotate exposed personnel; Use of a proper respirator; Rubber Protective Clothing; Individuals with history or evidence of chronic blood diseases should not be exposed to benzene unless authorized by Occupational Medicine. Refer to the latest Bioenvironmental Engineering survey for specific preventive measures for your shop.

IMPORTANT: It's important to remember if an accident or injury does occur seek medical attention at the Occupational Medicine Clinic.

BUTYL CELLOSOLVE

Prepared for: F-111 Reseal Unit

SYNONYMS: 2-Butoxy ethanol; ethylene glycol monobutyl ether; Dowanol EB

DESCRIPTION: Found in liquid form

OCCUPATIONAL EXPOSURE: Used as a solvent

TOXICITY:

ROUTES OF ENTRY: Inhalation, percutaneous

HEALTH HAZARD: Irritant

SIGNS AND SYMPTOMS: Irritation to the eyes, nose and throat

DISABILITY: Severe exposure may cause hemolytic anemia.

PREVENTIVE MEASURES: Avoid contact with skin and eyes. Gloves and goggles should be worn. Wash hands after use. Educate workers on hazards. Refer to the latest Bioenvironmental Engineering survey for specific preventive measures for your shop.

ERGONOMICS FACTS SHEET

PREPARED FOR: F-111 Reseal Unit LACFFC

25/06/96

ERGONOMICS The science of fitting the work environment to the individual to minimize biomechanical stress and strain

RTDS Repetitive Trauma Disorders and injuries to the tendons, muscles, and nerves of the hand, wrist, arm, elbow, shoulder, neck, back, legs, and knees (e.g. tendonitis, and carpal tunnel syndrome). AKA - Cumulative Trauma Disorders, Repetitive Motion Injuries

SIGNS AND SYMPTOMS Pain, numbness, weakness, swelling, burning of the hands, wrists, elbows, shoulders or other joints, or inability to grip objects

TREATMENT Rest, splinting, drugs, physical therapy and/or surgery, depending on the type and extent of injury

RISK FACTORS - Repetitive and/or prolonged activities such as gripping, twisting and pinching
- Forceful exertions, usually of the hand
- Prolonged standing or sitting
- Awkward postures such as reaching above the shoulders
- Excessive vibrations from power tools
- Cold temperatures
- Inappropriate or inadequate hand tools

PREVENTION **ENGINEERING CONTROLS:**
Recognize deficiencies and intervene to change work method design, tool design, work station design

ADMINISTRATIVE CONTROLS:
Recognize the possible need for work/rest cycles, task rotation, personnel rotation, hand, wrist and back exercises, preventative maintenance, effective housekeeping, **PROMPT REPORTING OF OCCUPATIONAL ILLNESSES AND INJURIES, ERGONOMICS TRAINING PROGRAM FOR SUPERVISORS AND EMPLOYEES**

MEDICAL CONTROLS:
Supportive therapy, limited duty

FOR ADDITIONAL INFORMATION CONTACT PUBLIC HEALTH AT EXTENSION 3-8448.

ETHYL ACETATE

Prepared for: LACFFC F-111 Reseal Unit 113A

25-Jun-96

SYNONYMS: Acetic ester, acetate ether, ethyl ethanoate, vinegar napta

PHYSICAL DESCRIPTION: Clean liquid, fruity odor

OCCUPATIONAL EXPOSURES: Artificial silks, chemical manufacturing, dry cleaning, flavorings, lacquers, perfumes, pharmaceuticals, photography, solvent, varnishes

ROUTES OF ENTRY: Inhalation

HEALTH HAZARDS: Irritant, excess of blood in kidneys and spleen, depressant for central nervous system

SIGN AND SYMPTOMS: Conjunctivitis (Eye lid irritation), "Polisher's keratitis" (Sores of the cornea), Irritation of respiratory tract, Skin problems, Narcosis (stupor).

PREVENTIVE MEASURES: Adequate ventilation, chemical goggles, chemical cartridge respirator, rubber gloves and protective clothing

FORMALDEHYDE

Prepared for: LACFFC F-111 Reseal Unit 113A

25-Jun-96

SYNONYMS: Formalin, formic aldehyde, methanol, methyl aldehyde, oxymethylene

PHYSICAL DESCRIPTION: Colorless gas, pungent odor

OCCUPATIONAL EXPOSURE: Agriculture, brewing, disinfectant, dyes, explosives, glass etching, inks, lacquers, paper, photography, plastics, rubber, tanning, textiles, preservative

TOXICITY: HIGHLY TOXIC. May cause death.

ROUTES OF ENTRY: Ingestion, inhalation

HEALTH HAZARDS: Irritant, local necrosis, sensitizer

SIGN AND SYMPTOMS:

ACUTE: Eye irritation, Corneal burns, brownish discoloration of skin, inflammation of the skin, and hives.

INHALATION: Throat irritation and irritation of the mucous membranes in the sinuses, loss of sense of smell, lung irritation, pulmonary edema (liquid in the lungs), cough, constriction in chest, difficulty breathing, headache, weakness, palpitation, gastroenteritis, and asthmatic symptoms in sensitized individuals.

INGESTION: Burning in mouth and esophagus, nausea and vomiting, abdominal pain, diarrhea, vertigo, unconsciousness, jaundice, albuminuria, bloody urine, anuria, acidosis, convulsions

FIRST AID: Irrigate eyes with water for at least 15 minutes. Wash contaminated areas of body with soap and water. Transport to a medical facility.

PREVENTIVE MEASURES: Adequate ventilation, chemical goggles, chemical cartridge respirator or airline mask, rubber protective clothing. Frequent examination of exposed personnel for early signs of skin irritation. Remove from further exposure those who become sensitized.

HEARING CONSERVATION

PREPARED FOR: LACFFC F-111 Reseal Unit

25-Jun-96

-What is sound? It is the sensation produced by stimulation of the ear by vibrations transmitted through the air or another medium. In other words, a wave of air strikes the eardrum, it moves the bones of the middle ear, which in turn causes a flow of fluid within the inner ear. Inside the inner ear are tiny nerve endings called hair cells which are moved by this fluid. They pick up the vibration and transmit it to the brain. The brain then interprets familiar sounds such as speech.

What is noise? Noise is commonly defined as unwanted sound or loud, harsh, or confused sound. Noise is part of our everyday life. Unfortunately, noise, like many things, can damage the body if there is excessive exposure. The Air Force defines hazardous noise as noise intensities greater than 84 decibels.

The hair cells in the inner ear are much like blades of grass. When walked on infrequently or lightly, they will spring back within a few hours. However, if walked on continuously they will eventually die and leave a trail. The difference is that once dead, the hair cells will not grow back. The ability for sound to "kill" the hair cells is dependent on the length of exposure and the intensity. Studies have shown that by limiting the time and/or the intensity of sound, hearing can be preserved. Remember, time of exposure is not just at work. When many of us get off work we listen to the stereo, ride motorcycles, mow lawns, etc. The intensity of the sound can be reduced by the use of hearing protection devices such as ear plugs and/or muffs.

Hearing protection devices should be worn when in a hazardous noise area or around any device which produces enough noise so that you have to shout to communicate with someone at a distance of three feet. Noise muffs reduce sound by about 20 decibels. Properly fitted ear plugs are slightly more effective. By using plugs and muffs the reduction can be increased by about 30 decibels.

While the advantage of hearing protection devices is to prevent hearing loss, there are a couple of disadvantages. Use of these requires forethought, e.g., you need to insert plugs before going to the flight line, etc. Also, they may be unsightly or bulky to some users. Nevertheless, the advantages far outweigh the disadvantages.

There is a myth that if you wear ear protectors you will not be able to hear warnings or speech. Ear plugs actually make it easier to hear in the presence of noise. They serve as low-pass filters by reducing the high frequencies (noise) more than the low frequencies (speech).

So why is all this important? Well, as hair cells die, your hearing capacity decreases. Because of the anatomy of the ear, the first cells to die when overexposed are those in the high frequency range. If allowed to progress, the damage will creep into the lower frequencies (speech). Losses in the speech frequencies could make it difficult or impossible to understand what people are saying. You will receive hearing exams to monitor your hearing capacity to ensure you do not lose the ability to understand speech. Your first exam should be done before working in hazardous noise areas. Then, each year you will receive an exam if you remain in hazardous noise duties.

If you miss words in conversation or have to turn the volume on your TV or radio higher you may be losing your hearing. If you think you are losing your hearing make an appointment with Audiology, extension 3-8451.

If you use muffs in your shop, your supervisor will order those through supply channels. If you need ear plugs, stop by Audiology, 2nd Floor of the clinic; they are free! We will fit you with the proper size and type. You must keep your plugs clean. Wash them often using warm soapy water. Dry them off before returning them to their storage case. When they become hard, cracked or do not muffle noise, it's time for a replacement.

INDUSTRIAL DERMATITIS

Prepared for: LACFFC F-111 Reseal Unit

25-Jun-96

Industrial dermatitis is one of the most common occupational diseases. Dermatitis is the general term applied to all diseases of the skin including rashes, inflammation, rawness, and similar disorders.

The skin is the largest organ of the body, and that which comes into direct contact with the environment. As a result it often suffers the greatest stress. The skin is a fantastic complex system, and is surprisingly tough; however, it can be injured through ignorance and lack of attention.

The skin consists of three layers, the epidermis, the corium, and the subcutaneous tissue. The epidermis consists of dead cells pushed to the surface and acting as a protective layer. Frequent exposure to emulsifying agents can actually remove the protective layer exposing the sensitive cells below and act to destroy the living tissue.

Any solvent or detergent which can cut grease and oil, can also deplete the natural oils from the skin. Since this natural oil secretion is the life's blood to the skin tissue, excessive detergents can disrupt and injure the normal growth process and may result in irritation and rashes.

Mechanics, painters, photographers, solvent handlers and many others may find a characteristic dryness or sensitivity of the skin which can lead to a very painful condition. Many people are completely unable to continue work because of such conditions.

Some people have a natural sensitivity to certain elements which cause dermatitis infections, while others develop sensitivities to chemicals after long term exposure. After such sensitivities occur, even small exposure may cause an onset of symptoms.

Personal protective equipment is a must, therefore, you must insure that the proper type of protective gear is available and that you use it. If you need assistance or information concerning protective equipment, contact Bioenvironmental Engineering, extension 3-0311.

ISOCYANATES

Prepared for: LACFFC F-111 Reseal Unit 113A

25-Jun-96

Synonyms: 4, 4 Diphenylmethane diisocyanate (MDI), Hexamethylene diisocyanate (HDI), Methyl isocyanate (MIC), 1, 5-Naphthalene diisocyanate (NDI), Toluene diisocyanate (TDI), Many others

Description: Liquids and solids

Occupational Exposure: Foam resins, Plastic coatings, Synthetic rubber, Varnishes and lacquers

Toxicity:

Route of Entry: Inhalation, absorbed through the skin

Mode of Action: Irritant, Corrosive, Sensitizer

Signs and Symptoms. Irritation of eyes, dehydration of tissues, and corneal damage. Irritation of skin and burns; darkening and hardening may occur after repeated exposures. Vessels and nerve disorder, irritation of pharynx, difficulty breathing, headache, cough, chest tightness, asthma, Bronchitis, excessive amounts of fluids in the lungs.

Disability: Sensitization may be permanent

Preventive Measures: Adequate ventilation with regular monitoring of work environment. Chemical goggles or face shield. Chemical cartridge respirator or airline mask. Butyl rubber gloves, aprons, and boots. Individuals with allergies and chronic diseases of skin, nose, throat, and lungs should not be exposed to isocyanates unless authorized by Occupational Medicine. Remove from exposure those who become sensitized. See the latest Bioenvironmental Engineering survey for specific preventive measures for your shop.

METHYL ETHYL KETONE

PREPARED FOR: F-111 Reseal Unit

Synonyms: 2-Butanone, MEK

Description: Colorless liquid; acetone-like odor

Occupational Exposure: Chemical manufacturing, cosmetics, dopes, lacquers, paint removers, pharmaceuticals, rubber, solvent, varnishes

Toxicity:

Route of Entry: Inhalation

Mode of Action: Irritant, depressant for central nervous system

Signs and Symptoms: Irritation of eye and respiratory tract, headache, dizziness, nausea and vomiting, dermatitis

Disability: No permanent effects reported

Preventive Measures: Adequate ventilation, chemical goggles, chemical cartridge respirator, rubber gloves. Refer to the latest Bioenvironmental Engineering survey for specific preventive measures for your shop.

SOLVENTS

PREPARED FOR: LACFFC F-111 Reseal Unit

25-Jun-96

1. GENERAL: These are mixtures of primarily aliphatic hydrocarbons, with some naphthene and benzene derivatives, which is used extensively in degreasing operations and as a paint thinner. They can be clear, colorless liquids with a kerosene-like odor. They are often flammable and insoluble in water. They are usually toxic with effects similar to gasoline.

2. SYNONYMS: Safety Solvent, Mineral Spirits, PD-680, Petroleum distillate, dry cleaning solvent, white spirits, varnoline, Stoddard Solvent.

3. OCCUPATIONAL EXPOSURE: Used extensively for dry cleaning and degreasing, and as thinners for paints and other finishes.

4. ROUTES OF ENTRY. Inhalation of vapor, skin or eye contact, or ingestion.

5. TARGET ORGANS: Skin, Eyes, Respiratory System, Central Nervous System.

6. MODE OF ACTION: Irritant, mild depressant for central nervous system, damage to the brain, liver, and kidney can occur in severe intoxication, sensitization to additives may occur.

7. PERSONAL PROTECTIVE EQUIPMENT.

a. Eye Protection. In operations where there is danger of contact with eyes, splash-proof safety goggles should be worn.

b. Skin Protection. Impervious clothing and gloves should be worn to prevent repeated or prolonged skin contact.

c. Respiratory Protection. This should be worn in areas where exposure exceeds Federal Standards. A chemical cartridge respirator with a full facepiece and an organic vapor cartridge should be used.

8. WORK PRACTICES.

a. Local exhaust ventilation, enclosure, etc. should be used to limit airborne concentrations when feasible.

b. If a spill should occur, follow your work area spill plan.

c. First Aid Procedures:

Eye Exposure: Immediately wash eyes with large amounts of water, occasionally lifting the lower and upper lids for 15 minutes. Get medical attention immediately.

Skin Exposure: Wash the contaminated skin with soap or mild detergent and water for 15 minutes. If this chemical soaks through the clothing, promptly remove the clothing and wash the skin with soap or mild detergent and water for 15 minutes. Get medical attention promptly.

Breathing in Large Amounts of Chemical: Move the exposed person to fresh air at once. If breathing has stopped, perform CPR. Keep the affected person warm and at rest. Get medical attention ASAP.

Swallow: DO NOT induce vomiting. Get medical attention immediately.

9. HEALTH EFFECTS.

a. Local. This is a defatting agent and causes dryness, scaling and dermatitis of the skin. Irritation of the eyes, nose and throat is also possible.

b. Systemic. This agent may cause dizziness and in very high concentrations, unconsciousness and death.

c. Disability: Recovery usually complete in several days.

STRONTIUM CHROMATE

PREPARED FOR: LACFFC F-111 Reseal Unit

25-Jun-96

Strontium Chromate is a light yellow powder used as a metal protective coating to prevent corrosion, colorant in polyvinyl chloride resins and pyrotechnics.

Chromium compounds are highly irritating to eyes, skin, and mucous membranes. Direct contact may burn the eyes and skin. The vapor or dust may irritate the nose, mouth and air passages. These are considered the acute or short-term health effects of Strontium Chromate exposure. The chronic or long-term health effects are potential damage to the lungs, heart, liver, kidneys, and the nervous system. Strontium Chromate is a carcinogen (cancer-causing agent). It has been shown to cause lung cancer.

Engineering controls are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. A regulated, marked area should be established where Strontium Chromate is handled, used, or stored.

The following good work practices can help to reduce hazardous exposures:

- Work clothing that becomes contaminated with Strontium Chromate should be changed promptly.

- Contaminated work clothing must not be taken home. Family members could be exposed. Individuals who have been informed of the hazards of Strontium Chromate should be responsible for the laundering of the contaminated clothing.

- Emergency shower facilities should be provided if there is a possibility of skin exposure. Wash or shower immediately if there is skin contact.

- Use a vacuum or dust method to reduce dust during clean-up. DO NOT DRY SWEEP! When vacuuming, a high efficiency particulate absolute (HEPA) filter should be used; NOT a standard shop vacuum.

- DO NOT EAT, SMOKE, OR DRINK where Strontium Chromate is handled, processed, or stored. Wash hands carefully after smoking or eating, since the chemical could be swallowed.

- Good personal hygiene is always one of the best ways to protect your health from possible chemical exposures.

Respiratory protection is recommended. Protective gloves, clothing, and eye wear are required, depending on the type of work processes that take place in your work area. Always check the MSDS's for information regarding any chemical you use.

TOLUENE

Prepared for: LACFFC F-111 Reseal Unit 113A

25-Jun-96

Synonyms: Methylbenzene, phenylmethane, toluol

Description: Colorless flammable distillate from coal tar

Occupational Exposure: Chemical manufacturing, dyes, fuels, lacquers, paints, solvent, varnishes

Toxicity:

Route of Entry: Inhalation, Skin Absorption

Mode of Action: Some commercial toluene contains benzene; Irritant, central nervous system depressant; Liver damage, bone marrow suppression

Signs and Symptoms: Irritation of the eyes and eyelids; burns of the cornea; "Polisher's keratitis" - sores of the cornea; defatting dermatitis (skin irritation); bronchitis and lung inflammation; loss of appetite, nausea, vomiting, fatigue, weakness, headache, dizziness, incoordination, irritability; enlarged liver; ringing of the ears, abnormal sensation of the extremities, muscle twitching and tremors, euphoria(a high), mental confusion, stupor; long term inhalation has lead to serious neurological problems. Note that the levels required to produce narcosis (stupor) can exist without associated irritation of eyes and respiratory system.

Disability: Permanent central nervous system changes can occur

Preventive Measures: Find out about the benzene content of all toluene used. Adequate ventilation, chemical goggles, chemical cartridge respirator, rubber gloves. Individuals with diseases of central nervous system and liver should not be exposed to Toluene unless authorized by the Occupational Medicine Clinic. Refer to the latest Bioenvironmental Engineering survey for specific preventive measures for your shop.

XYLENE

PREPARED FOR: LACFFC F-111 Reseal Unit 113A

25-Jun-96

Synonyms: Dimethylbenzene, three isomers, ortho-, meta-, para, Xylol

Description: Clear colorless liquid, aromatic odor

Occupational Exposure: Aviation, chemical synthesis, degreasing, dyes, fuel, inks, insecticides, lacquers, leather, paints, photography, plastics, printing, rubber cements, solvent, synthetic resins

Toxicity:

Route of Entry: Inhalation, through the skin

Mode of Action: Commercial xylene may contain benzene; Irritant; Depressant for central nervous system; Possible damage to liver and kidneys

Signs and Symptoms: Eye lining inflammation, dermatitis, irritation of the respiratory tract, difficult or labored breathing, loss of appetite, nausea, vomiting, fatigue, headache, dizziness, incoordination, irritability, mental confusion, deficiency in red blood cells, irritation of the cornea, numbness, creeping, tingling or prickling sensation of hands and feet.

Disability: No permanent effects reported

Preventive Measures: Adequate ventilation, chemical goggles, chemical cartridge respirator, rubber gloves. Individuals with diseases of central nervous system, liver, kidneys, and blood should not be exposed to xylene unless authorized by Occupational Medicine. See the latest Bioenvironmental Engineering survey for specific preventive measures for your shop.

HEARING CONSERVATION

PREPARED FOR : LA/F-111 RESEAL

What is sound? It is the sensation produced by stimulation of the ear by vibrations transmitted through the air or another medium. In other words, a wave of air strikes the eardrum, it moves the bones of the middle ear, which in turn causes a flow of fluid within the inner ear. Inside the inner ear are tiny nerve endings called hair cells which are moved by this fluid. They pick up the vibration and transmit it to the brain. The brain then interprets familiar sounds such as speech.

What is noise? Noise is commonly defined as unwanted sound or loud, harsh, or confused sound. Noise is part of our everyday life. Unfortunately, noise, like many things, can damage the body if there is excessive exposure. The Air Force defines hazardous noise as noise intensities greater than 84 decibels.

The hair cells in the inner ear are much like blades of grass. When walked on infrequently or lightly, they will spring back within a few hours. However, if walked on continuously they will eventually die and leave a trail. The difference is that once dead, the hair cells won't grow back. The ability for sound to "kill" the hair cells is dependent on the length of exposure and the intensity. Studies have shown that by limiting the time and/or the intensity of sound, hearing can be preserved. Remember, time of exposure is not just at work. When many of us get off work we listen to the stereo, ride motorcycles, mow lawns, etc. The intensity of the sound can be reduced by the use of hearing protection devices such as ear plugs and/or muffs.

Hearing protection devices should be worn when in a hazardous noise area or around any device which produces enough noise so that you have to shout to communicate with someone at a distance of three feet. Noise muffs reduce sound by about 20 decibels. Properly fitted ear plugs are slightly more effective. By using plugs and muffs the reduction can be increased by about 30 decibels.

While the advantage of hearing protection devices is to prevent hearing loss, there are a couple of disadvantages. Use of these requires forethought, eg you need to insert plugs before going to the flight line, etc. Also, they may be unsightly or bulky to some users. Nevertheless, the advantages far outweigh the disadvantages.

There is a myth that if you wear ear protectors you won't be able to hear warnings or speech. Ear plugs actually make it easier to hear in the presence of noise. They serve as low-pass filters by reducing the high frequencies (noise) more than the low frequencies (speech).

So why is all this important? Well, as hair cells die, your hearing capacity decreases. Because of the anatomy of the ear, the first cells to die when overexposed are those in the high frequency range. If allowed to progress, the damage will creep into the lower frequencies (speech). Losses in the speech frequencies could make it difficult or impossible to understand what people are saying. You will receive hearing exams to monitor your

INDUSTRIAL DERMATITIS

Prepared for: LA/F-111 RESEAL

Industrial dermatitis is one of the most common occupational diseases. Dermatitis is the general term applied to all diseases of the skin including rashes, inflammation, rawness, and similar disorders.

The skin is the largest organ of the body, and that which comes into direct contact with the environment. As a result it often suffers the greatest stress. The skin is a fantastic complex system, and is surprisingly tough; however, it can be injured through ignorance and lack of attention.

The skin consists of three layers, the epidermis, the corium, and the subcutaneous tissue. The epidermis consists of dead cells pushed to the surface and acting as a protective layer. Frequent exposure to emulsifying agents can actually remove the protective layer exposing the sensitive cells below and act to destroy the living tissue.

Any solvent or detergent which can cut grease and oil, can also deplete the natural oils from the skin. Since this natural oil secretion is the life's blood to the skin tissue, excessive detergents can disrupt and injure the normal growth process and may result in irritation and rashes.

Mechanics, painters, photographers, solvent handlers and many others may find a characteristic dryness or sensitivity of the skin which can lead to a very painful condition. Many people are completely unable to continue work because of such conditions.

Some people have a natural sensitivity to certain elements which cause dermatitis infections, while others develop sensitivities to chemicals after long term exposure. After such sensitivities occur, even small exposure may cause an onset of symptoms.

Personal protective equipment is a must, therefore, you must insure that the proper type of protective gear is available and that you use it. If you need assistance or information concerning protective equipment, contact Bioenvironmental Engineering, extension 3-0311.

METHYL ETHYL KETONE

PREPARED FOR: LA/F-111 RESEAL

Synonyms: 2-Butanone, MEK

Description: Colorless liquid; acetone-like odor

Occupational Exposure: Chemical manufacturing, cosmetics, dopes, lacquers, paint removers, pharmaceuticals, rubber, solvent, varnishes

Toxicity:

Route of Entry: Inhalation

Mode of Action: Irritant, depressant for central nervous system

Signs and Symptoms: Irritation of eye and respiratory tract, headache, dizziness, nausea and vomiting, dermatitis

Disability: No permanent effects reported

Preventive Measures: Adequate ventilation, chemical goggles, chemical cartridge respirator, rubber gloves. Refer to the latest Bioenvironmental Engineering survey for specific preventive measures for your shop.

SOLVENTS

PREPARED FOR: LA/F-111 RESEAL

1. GENERAL. These are mixtures of primarily aliphatic hydrocarbons, with some naphthene and benzene derivatives, which is used extensively in degreasing operations and as a paint thinner. They can be clear, colorless liquids with a kerosene-like odor. They are often flammable and insoluble in water. They are usually toxic with effects similar to gasoline.

2. SYNONYMS: Safety Solvent, Mineral Spirits, PD-680, Petroleum distillate, dry cleaning solvent, white spirits, varnoline, Stoddard Solvent.

3. OCCUPATIONAL EXPOSURE: Used extensively for dry cleaning and degreasing, and as thinners for paints and other finishes.

4. ROUTES OF ENTRY. Inhalation of vapor, skin or eye contact, or ingestion.

5. TARGET ORGANS: Skin, Eyes, Respiratory System, Central Nervous System.

6. MODE OF ACTION: Irritant, mild depressant for central nervous system, damage to the brain, liver, and kidney can occur in severe intoxications, sensitization to additives may occur.

7. PERSONAL PROTECTIVE EQUIPMENT.

a. Eye Protection. In operations where there is danger of contact with eyes, splash-proof safety goggles should be worn.

b. Skin Protection. Impervious clothing and gloves should be worn to prevent repeated or prolonged skin contact.

c. Respiratory Protection. This should be worn in areas where exposure exceeds Federal Standards. A chemical cartridge respirator with a full facepiece and an organic vapor cartridge should be used.

8. WORK PRACTICES.

a. Local exhaust ventilation, enclosure, etc. should be used to limit airborne concentrations when feasible.

b. If a spill should occur, follow your work area spill plan.

c. First Aid Procedures:

Eye Exposure: Immediately wash eyes with large amounts of water, occasionally lifting the lower and upper lids for 15 minutes. Get medical attention immediately.

Skin Exposure: Wash the contaminated skin with soap or mild detergent and water for 15 minutes. If this chemical soaks through the clothing, promptly remove the clothing and wash the skin with soap or mild detergent and water for 15 minutes. Get medical attention promptly.

Breathing in Large Amounts of Chemical: Move the exposed person to fresh air at once. If breathing has stopped, perform CPR. Keep the affected person warm and at rest. Get medical attention ASAP.

Swallow: DO NOT induce vomiting. Get medical attention immediately.

9. HEALTH EFFECTS.

a. Local. This is a defatting agent and causes dryness, scaling and dermatitis of the skin. Irritation of the eyes, nose and throat is also possible.

b. Systemic. This agent may cause dizziness and in very high concentrations, unconsciousness and death.

c. Disability: Recovery usually complete in several days.

STRONTIUM CHROMATE

PREPARED FOR: LA/F-111 RESEAL

Strontium Chromate is a light yellow powder used as a metal protective coating to prevent corrosion, colorant in polyvinyl chloride resins and pyrotechnics.

Chromium compounds are highly irritating to eyes, skin, and mucous membranes. Direct contact may burn the eyes and skin. The vapor or dust may irritate the nose, mouth and air passages. These are considered the acute or short-term health effects of Strontium Chromate exposure. The chronic or long-term health effects are potential damage to the lungs, heart, liver, kidneys, and the nervous system. Strontium Chromate is a carcinogen (cancer-causing agent). It has been shown to cause lung cancer.

Engineering controls are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. A regulated, marked area should be established where Strontium Chromate is handled, used, or stored.

The following good work practices can help to reduce hazardous exposures:

- Work clothing that becomes contaminated with Strontium Chromate should be changed promptly.
- Contaminated work clothing must not be taken home. Family members could be exposed. Individuals who have been informed of the hazards of Strontium Chromate should be responsible for the laundering of the contaminated clothing.
- Emergency shower facilities should be provided if there is a possibility of skin exposure. Wash or shower immediately if there is skin contact.
- Use a vacuum or dust method to reduce dust during clean-up. DO NOT DRY SWEEP! When vacuuming, a high efficiency particulate absolute (HEPA) filter should be used; NOT a standard shop vacuum.
- DO NOT EAT, SMOKE, OR DRINK where Strontium Chromate is handled, processed, or stored. Wash hands carefully after smoking or eating, since the chemical could be swallowed.
- Good personal hygiene is always one of the best ways to protect your health from possible chemical exposures.

Respiratory protection is recommended. Protective gloves, clothing, and eye wear are required, depending on the type of work processes that take place in your work area. Always check the MSDS's for information regarding any chemical you use.

TOLUENE

Prepared for: LA/F-111 RESEAL

Synonyms: Methylbenzene, phenylmethane, toluol

Description: Colorless flammable distillate from coal tar

Occupational Exposure: Chemical manufacturing, dyes, fuels, lacquers, paints, solvent, varnishes

Toxicity:

Route of Entry: Inhalation, Skin Absorption

Mode of Action: Some commercial toluene contains benzene; Irritant, central nervous system depressant; Liver damage, bone marrow suppression

Signs and Symptoms: Irritation of the eyes and eyelids; burns of the cornea; "Polisher's keratitis" - sores of the cornea; defatting dermatitis (skin irritation); bronchitis and lung inflammation; loss of appetite, nausea, vomiting, fatigue, weakness, headache, dizziness, incoordination, irritability; enlarged liver; ringing of the ears, abnormal sensation of the extremities, muscle twitching and tremors, euphoria(a high), mental confusion, stupor; long term inhalation has lead to serious neurological problems. Note that the levels required to produce narcosis (stupor) can exist without associated irritation of eyes and respiratory system.

Disability: Permanent central nervous system changes can occur

Preventive Measures: Find out about the benzene content of all toluene used. Adequate ventilation, chemical goggles, chemical cartridge respirator, rubber gloves. Individuals with diseases of central nervous system and liver should not be exposed to Toluene unless authorized by the Occupational Medicine Clinic. Refer to the latest Bioenvironmental Engineering survey for specific preventive measures for your shop.

OCCUPATIONAL HEALTH HAZARD EDUCATION PROGRAM

OCCUPATIONAL HEALTH EDUCATION PACKET

ID2#: DADO 113A

1. Bioenvironmental Engineering (SGB) survey dated 20 Dec 92, indicates personnel working in F-111 Reseal Unit are occupationally exposed to noise, Methyl Ethyl Ketone (MEK), strontium chromates, and solvents above Action Level (AL). This means that exposure is at least 50% or higher of Permissible Exposure Limits (PEL). PEL refers to concentrations of a substance to which nearly all workers may be exposed under normal working conditions day after day without harmful effect. Exposure above the AL requires them to be placed on a medical monitoring program to help ensure their job does not adversely effect their health. Employees have the potential of confined space entry during the course of some of their assigned tasks.

2. Below is a short synopsis of each of these hazards and the effects they can have on an individual's health:

NOISE

Loud noise is hazardous, and can lead to permanent hearing loss. Loud noise is the leading cause of hearing loss in the United States. Noise induced hearing loss is very preventable by wearing the proper hearing protection.

Sound is measured in decibels (dB). Noise levels greater than 84 dB are considered hazardously loud. Examples of noise levels are as follows: whisper 30 dB, conversation 60 dB, average factory background 80-90 dB, pneumatic tools 100 dB, jet engines 130-140 dB. As the noise levels increase, the amount of time you can be exposed without being harmed decreases. Other factors which influence how noise impairs the ears include: age, previous ear trouble or hearing loss, and distance from the source. Hearing effects are cumulative; that is, the more noise you expose your ears to on and off the job, the more hearing you may lose.

Hearing loss from noise exposure progresses very slowly and is not obvious at first. When a hearing loss affects the sounds you must hear while listening to others talk, the loss becomes very noticeable. The problem is that by the time you're aware of lost hearing, it is too late. The damage is to the hair cells of the inner ear. Hearing loss due to noise exposure is permanent and cannot be corrected by surgery or medicines.

The three foot rule is a good guide for identifying if noise levels are loud enough to cause harm. If you must shout to be heard at an arms length distance (3 ft or less), you are in hazardous noise and must protect your ears. Be aware of where the noise levels are and avoid them, if possible. Use ear muffs or properly fitted ear plugs to reduce the noise getting into your inner ear. In areas of high level noise (such as jet engines), you need to use both ear plugs and muffs and may need to limit the amount of time you are around the noise.

Ear plugs can be obtained from the Hearing Conservation section of the Clinic, building 98, second floor. Ear muffs and foam plugs must be provided by your

supervisor. If dirty, earplugs can be washed with soap and water, rinsed in clear water, and dried thoroughly before wearing.

Remember, hearing loss from exposure to loud sounds is PERMANENT and IRREVERSIBLE. It is also PREVENTABLE when you wear hearing protection. You are the only person that can take charge and be responsible for your hearing. Don't let yourself down.

METHYL ETHYL KETONE

Methyl Ethyl Ketone (MEK) is a clear, colorless liquid with a fragrant, mint-like odor. It is used as a solvent and in making plastics, textiles, and paints.

MEK can irritate the skin causing a rash or burning feeling on contact. The liquid can burn the eyes and exposure to the vapor can irritate the eyes, nose, mouth, and throat. Exposure to high concentrations can cause dizziness, lightheadedness, headache, nausea, and blurred vision. Repeated exposures to high concentrations can damage the nervous system. Effects may include reduced memory and concentration, personality changes, fatigue, sleep disturbances, and reduced coordination. The odor threshold of MEK only serves as a warning of exposure. NOT smelling it does not mean you are not being exposed.

Engineering controls are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Avoid skin contact to MEK. Wear solvent resistant gloves and clothing. Properly fitted and approved respirators must be used in areas where MEK is used. Good personal hygiene is also a way to reduce chemical exposures. Always wash your hands before eating, drinking, or smoking. **Do not eat, drink, or smoke where chemicals are handled, used, or stored.**

Strontium Chromate

Strontium Chromate is a light yellow powder. It is used as a metal protective coating to prevent corrosion, colorant in polyvinyl chloride resins and pyrotechnics.

Chromium compounds are highly irritating to eyes, skin and mucous membranes. Direct contact may burn the eyes and skin. The vapor or dust may irritate the nose, mouth and air passages. Repeated exposure may damage the lungs, heart, liver, kidneys, and affect the nervous system. Strontium Chromate is a **CARCINOGEN** (cancer-causing agent) in humans. It has been shown to cause lung cancer. Strontium Chromate also has the potential for causing reproductive damage in humans.

Engineering controls are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. A regulated, marked area should be established where Strontium Chromate is handled, used, or stored.

The following good **WORK PRACTICES** can help to reduce hazardous exposures:

Work clothing that becomes contaminated with Strontium Chromate should be changed promptly.

Contaminated work clothing must not be taken home. Family members could be exposed. Individuals who have been informed of the hazards of Strontium Chromate should be responsible for the laundering of the contaminated items.

Emergency shower facilities should be provided if there is a possibility of skin exposure. Wash or shower immediately if there is skin contact.

Use a vacuum or dust method to reduce dust during clean-up. DO NOT DRY SWEEP.

When vacuuming, a high efficiency particulate absolute (HEPA) filter should be used, NOT a standard shop vacuum.

DO NOT EAT, SMOKE, OR DRINK WHERE STRONTIUM CHROMATE IS HANDLED, PROCESSED OR STORED. Wash hands carefully after smoking or eating since to chemical can be swallowed.

Respiratory protection is recommended. Protective gloves, clothing and eye wear are required, depending on the type of work processes that take place in your work area.

SOLVENTS

Solvents are substances that dissolve other liquids or solids. Most industrial solvents are organic compounds made of hydrocarbons and are used to dissolve grease or oils. As one of the most common category of all industrial chemicals used, their use is widespread in products such as paints, degreasers, adhesives, plastics and rubber; and in processes such as car, airplane, metal manufacturing, maintenance and repair operations.

Solvents can cause health problems in several ways if exposure is significant. The most common way is by contact with the skin. Prolonged or repeated contact may cause dryness and cracking, leading to dermatitis (inflammation or rash) or infection. Exposure can also cause sensitization, which is a delayed allergic reaction that often becomes more severe with subsequent exposures. Some solvents, if left on the skin, can be absorbed into the bloodstream and cause damage to the target organs (usually liver, kidney, nervous system).

Inhalation of solvent vapors poses a serious health hazard. They have a mild depressant effect on the central nervous system with the acute symptoms of dizziness, nausea, headache, drowsiness, and in extreme cases of overexposure coma and death. Chronic, or long term inhalation of solvent vapors may cause damage to the liver or kidneys.

Points to remember when working with any type of solvents are as follows:

1. Avoid skin contact. Wear appropriate gloves for solvents. Wash as soon as possible after contact if it happens. Wear goggles, coveralls, aprons

to prevent splashing clothes or eyes.

2. Rinse eyes with clean water for at least 15 minutes if solvent is splashed in the eye, and seek medical attention.

3. Avoid ingesting by accident. Do not eat, drink, or smoke around solvents. Wash hands thoroughly before eating. Use good hygiene measures.

4. Work in well ventilated areas to avoid breathing solvent vapors. They rapidly disperse in air, so the concentration is much less and available oxygen is adequate for the worker.

5. Use lotions and body oils to replace any lost oils from the skin. This helps prevent dermatitis and keeps the body's natural protection healthy.

Using all the proper protective equipment as well as the ventilation systems in place (booths, vacuums, exhaust systems) will help prevent contact with solvents and any of the potential health hazards. If symptoms do exist, report to Occupational Medicine, building 98. If the concentration of vapors is above the allowable exposure levels, a worker may need to wear respirators. Make sure proper selection, fit testing, and employee training has been carried out before any respirator is used.

Details on the hazards associated with each product you use in your work place can be found on the material safety data sheets (MSDS) for your workplace. MSDS are available from microfiche readers in 6 locations on the base. Contact your supervisor or Bioenvironmental Engineering for copies of MSDS.

3. Individuals working in areas where these hazards are present are required to wear the following protective equipment: earplugs/earmuffs, respirator, gloves, head covers.

Details on which type of protective equipment to wear and when are found in 652 MG/SGB report provided to your work area supervisor under separate cover. This report must be available in your work area for your review.

4. A team of health care professionals including a physician, occupational health nurse, environmental health officer, and an industrial hygienist have reviewed the SGB survey results and determined, using Air Force and Occupational Safety and Health Administration (OSHA) Guidelines, that a physical exam will be given, including the following tests:

a. PREPLACEMENT

Workplace Exposure Summary
Health History
Audiogram (hearing test)
Complete Blood Count
PA Chest (x-ray)
Liver Function P-3
Urinalysis
Pulmonary Function
Physical Examination

b. ANNUAL

Workplace Exposure Summary
Health History
Audiogram
Complete Blood count
PA Chest **
Liver Function P-3
Urinalysis
Pulmonary Function
Urine Chromates **
Physical Examination

c. TERMINATION

Workplace Exposure Summary
Health History
Audiogram
Complete Blood Count
PA Chest
Liver Function P-3
Pulmonary Function
Urine Chromates **
Physical Examination

(** at examining physician's discretion)

This physical is only designed to monitor the effects of the work environment on an individual's health, it is not a complete physical. The tests given are specifically used to determine if the hazards in the work place may be affecting workers health.

5. You, or your designated representative, have a right to review and have a copy of your personal medical and occupational exposure data. You can review and copy your medical records in the Occupational Medicine Clinic, building 98, extension 5-456. Your personal occupational exposure data can be reviewed in Bioenvironmental Engineering, building 250M, extension 3-0315. Please call to set up an appointment if you desire to review your occupational exposure or medical records.

6. All pregnant active duty Air Force and civilian employees must have a medical interview and workplace evaluation accomplished. If you become pregnant, immediately report in person to the 652 Medical Group clinic for an evaluation. This action is necessary to protect your health and to help ensure that your unborn child is not exposed to toxic hazards that may be in the work environment. Active duty personnel should contact Military Public Health (SGPM) and civilian personnel should report to Occupational Medicine Services immediately after being diagnosed as pregnant. For further information, contact Military Public Health at extension 5-447.

7. For further information on the hazards in your work place you can contact Bioenvironmental Engineering at extension 3-0315. For occupational health education, contact Military Public Health at extension 5-447. For information on occupational health examinations, contact Occupational Medicine Services at extension 5-313.



LORI D. WINTER, GS-7
Military Public Health Technician

OCCUPATIONAL HEALTH HAZARD EDUCATION PROGRAM

OCCUPATIONAL HEALTH EDUCATION PACKET

ID2#: DADO 113A

1. Bioenvironmental Engineering (SGB) survey dated 28 SEP 90, indicates personnel working in F-111 Reseal Unit are occupationally exposed to Noise and Chemicals, above Action Level (AL). This means that exposure is at least 50% or higher of Permissible Exposure Limits (PEL). PEL refers to concentrations of a substance to which nearly all workers may be exposed under normal working conditions day after day without harmful effect. Exposure above the AL requires them to be placed on a medical monitoring program to help ensure their job does not adversely effect their health.

2. Below is a short synopsis of each of these hazards and the effects they can have on an individual's health:

NOISE

Loud noise is hazardous, and can lead to permanent hearing loss. Loud noise is the leading cause of hearing loss in the United States. Noise induced hearing loss is very preventable by wearing the proper hearing protection.

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The three foot rule is a good guide for identifying if noise levels are loud enough to cause harm. If you must shout to be heard at an arms length distance (3 ft or less), you are in hazardous noise and must protect your ears. Be aware of where the noise levels are and avoid them, if possible. Use ear muffs or properly fitted ear plugs to reduce the noise getting into your inner ear. In areas of high level noise (such as jet engines), you need to use both ear plugs and muffs and may need to limit the amount of time you are around the noise.

Ear plugs can be obtained from the Hearing Conservation section of the Clinic, building 98, second floor. Ear muffs and foam plugs must be provided by your supervisor. If dirty, earplugs can be washed with soap and water, rinsed in clear water, and dried thoroughly before wearing.

Remember, hearing loss from exposure to loud sounds is PERMANENT and IRREVERSIBLE. It is also PREVENTABLE when you wear hearing protection. You are the only person that can take charge and be responsible for your hearing. Don't let yourself down.

SOLVENTS

Solvents are substances that dissolve other liquids or solids. Most industrial solvents are organic compounds made of hydrocarbons and are used to dissolve grease or oils. As one of the most common category of all industrial chemicals used, their use is widespread in products such as paints, degreasers, adhesives, plastics and rubber; and in processes such as car, airplane, metal manufacturing, maintenance and repair operations.

Solvents can cause health problems in several ways if exposure is significant. The most common way is by contact with the skin. Prolonged or repeated contact may cause dryness and cracking, leading to dermatitis (inflammation or rash) or infection. Exposure can also cause sensitization, which is a delayed allergic reaction that often becomes more severe with subsequent exposures. Some solvents, if left on the skin, can be absorbed into the bloodstream and cause damage to the target organs (usually liver, kidney, nervous system).

Inhalation of solvent vapors poses a serious health hazard. They have a mild depressant effect on the central nervous system with the acute symptoms of dizziness, nausea, headache, drowsiness, and in extreme cases of overexposure coma and death. Chronic, or long term inhalation of solvent vapors may cause damage to the liver or kidneys.

Points to remember when working with any type of solvents are as follows:

1. Avoid skin contact. Wear appropriate gloves for solvents. Wash as soon as possible after contact if it happens. Wear goggles, coveralls, aprons to prevent splashing clothes or eyes.
2. Rinse eyes with clean water for at least 15 minutes if solvent is splashed in the eye, and seek medical attention.
3. Avoid ingesting by accident. Do not eat, drink, or smoke around solvents. Wash hands thoroughly before eating. Use good hygiene measures.
4. Work in well ventilated areas to avoid breathing solvent vapors. They rapidly disperse in air, so the concentration is much less and available oxygen is adequate for the worker.

5. Use lotions and body oils to replace any lost oils from the skin. This helps prevent dermatitis and keeps the body's natural protection healthy.

Using all the proper protective equipment as well as the ventilation systems in place (booths, vacuums, exhaust systems) will help prevent contact with solvents and any of the potential health hazards. If symptoms do exist, report to Occupational Medicine, building 98. If the concentration of vapors is above the allowable exposure levels, a worker may need to wear respirators. Make sure proper selection, fit testing, and employee training has been carried out before any respirator is used.

Details on the hazards associated with each product you use in your work place can be found on the material safety data sheets (MSDS) for your workplace. MSDS are available from microfiche readers in 6 locations on the base. Contact your supervisor or Bioenvironmental Engineering for copies of MSDS.

3. Individuals working in areas where these hazards are present are required to wear the following protective equipment: Earplugs/Muffs, Respirators, Overalls, Goggles, and Gloves.

Details on which type of protective equipment to wear and when are found in USAF Clinic/SGB report provided to your work area supervisor under separate cover. This report must be available in your work area for your review.

4. A team of health care professionals including a physician, occupational health nurse, environmental health officer, and an industrial hygienist have reviewed the SGB survey results and determined, using Air Force and Occupational Safety and Health Administration (OSHA) Guidelines, that a physical exam will be given, including the following tests:

a. Pre-placement

Health History
Audiogram (Hearing Test)
P-3 Panel
Urinalysis
Pulmonary (Lung) Function Test
Physical Examination

b. Annually

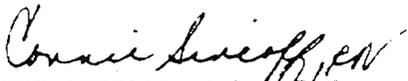
Health History
Audiogram
P-3 Panel
Urinalysis
Pulmonary (Lung) Function Test

c. Termination

Audiogram

This physical is only designed to monitor the effects of the work environment on an individual's health, it is not a complete physical. The tests given are specifically used to determine if the hazards in the work place may be affecting workers health.

5. For further information on the hazards in your work place you can contact Bioenvironmental Engineering at extension 5-366. For occupational health education, contact Environmental Health Services at extension 5-447. For information on occupational health examinations, contact Occupational Medicine Services at extension 5-313.



CONNIE SINCOFF, R.N. BSN
Asst Chief, Environmental Health Svcs

6

TECHNICAL MANUAL

DEPOT

**FUSELAGE FUEL TANK
DESEAL/RESEAL PROCEDURES**

USAF SERIES

F-111

AIRCRAFT

serno 75-0582
and subsequent

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Published Under Authority of the Secretary of the Air Force

1 JANUARY 1990
CHANGE 7 - 19 APRIL 1996

LIST OF EFFECTIVE PAGES

NOTE: The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and changed pages are:

Original	0	1 Jan 90	Change	4	8 Feb 93
Change	1	3 Jan 91	Change	5	30 Aug 93
Change	2	7 Jan 92	Change	6	25 Jul 95
Change	3	8 Jul 92	Change	7	19 Apr 96

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vi Blank	0	7-5 - 7-9 Added	2		
vii - viii	2	7-10 Blank Added	2		
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2-2 Blank	0	C-1 - C-6	0		
3-1 - 3-7	0	D-1 - D-4	0		
3-8	7	E-1 - E-22	0		
3-9	0	F-1 - F-4	7		
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3-18 Blank	7	F-12	7		
4-1 - 4-2	0	G-1	0		
4-3	3	G-2 Blank	0		
4-4 - 4-5	0	H-1 - H-2	0		
4-6 Blank	0	I-1 - I-5 Added	1		
5-1	7	I-6	6		
5-2 - 5-4	0	I-6.1 Added	6		
5-5	7	I-6.2 Blank Added	6		
5-6	3	I-7 - I-11 Added	1		
5-6.1 Added	2	I-12 Blank Added	1		
5-6.2 Blank Added	2	J-1 Added	1		
5-7 - 5-15	0	J-2 Blank Added	1		
5-16 - 5-30	7				
6-1	7				
6-2	6				
6-2.1 Added	6				
6-2.2 Blank Added	6				
6-3	1				
6-4 - 6-20	0				
6-20.1 - 6-20.3 Added	1				
6-20.4 Blank Added	1				
6-21 - 6-24	1				
6-25 - 6-30	0				

*Zero in this column indicates an original page

SECTION III
REPAIR OF FUSELAGE
FUEL TANKS

3-1. GENERAL.

3-2. In the fueltight areas of the fuselage, all of the boundary bulkheads, spars, beams and longerons are machined members. The skin panels are of bonded honeycomb construction and are generally attached to the understructure, including tank boundary structure, with aluminum rivets. Highly loaded joints are fastened with shear pins or bolts.

3-3. AEROSPACE GROUND EQUIPMENT REQUIRED.

3-4. The aerospace ground equipment required for fuel tank sealing and testing is listed in Figure 3-1.

3-5. REPAIR OF FUSELAGE FUEL TANKS.

3-6. Repair of the fuselage fuel tanks consists of the removal of defective sealant (cleaning), preparation of fuel tank surface for sealing, cleaning for epoxy barrier, permanent repair of faying surface leak by use of special injection bolt, and repair of penetration area sealing (EF-111A aircraft only).

3-7. REMOVAL OF DEFECTIVE SEALANT (CLEANING).

3-8. Preparation of the surface to be sealed is one of the most important steps in sealing operations. The best sealant available applied in a perfect manner to an improperly prepared surface will not provide a satisfactory fueltight barrier.

3-9. Removal of defective sealant (cleaning) is as follows:

a. Remove all dust, chips and other foreign particles with a brush, vacuum cleaner or air pressure jet using filtered or clean, dry air.

WARNING

Methyl ethyl ketone is toxic and flammable. Avoid eye and skin contact or breathing of vapors. Protective equipment consisting of industrial goggles, rubber gloves and respirator is required. Irritation to eyes, skin, lungs, nose and throat or death may result if personnel fail to observe this warning.

b. Remove loosely adhered paint and paint primers from any surface to which sealant is to be applied with wiping material dampened with methyl ethyl ketone.

WARNING

Cleaning solvent (Military Specification MIL-C-38736) is toxic and flammable. Avoid eye and skin contact or breathing of vapors. Protective equipment consisting of industrial goggles, rubber gloves and respirator is required. Irritation to eyes, skin, lungs, nose and throat or death may result if personnel fail to observe this warning.

c. Remove all stencil, grease pencil, layout dye, etc., with wiping material dampened with cleaning solvent MIL-C-38736.

7

Hazard Correction List
 Department of Labor - OSHA
 El Camino Plaza

San Diego, CA 95615

3. Issuance Date 04/01/91	4. Inspection Number 107050349
5. Reporting ID 0932030	6. CSHO ID B1557
7. Optional Report No.	8. Page No. 1 of 6

1. Category of Violation(s)	2. Notice Number
Repeat	02

10. Inspection Date(s):

10/22/90 - 03/14/91

11. Inspection Site:
 McClellan Air Force Base
 McClellan, CA 95652

To:
 McClellan Air Force Base
 and its successors
 W/ALC/SEE
 McClellan, CA 95652

This list of hazardous conditions is for your use in preparing your agency's Hazard Correction List form and posting it as required by 29 CFR 1960.26 (c). The form must be posted until the condition(s) are abated, or for 3 working days, whichever is longer. If your agency does not have a form, you may use copies of this list.

Use one copy of this form and a copy of each abatement plan with your response.

Item Number	14. Description	15. Date by Which Violation Must Be Abated	16. Abated	17. Plan Submitter
1	<p>1910.132 (c): All personal protective equipment was not of safe and construction for the work to be performed:</p> <p>a) Building 251; The sealant mixing room, hand mixing operations: Employees were hand mixing sealants and were not wearing impermeable aprons or lab coats. The employees wore cotton coats which allowed the solvent and sealant to soak through to their street clothing and skin. The sealants contain chemicals such as amines and phenols which are skin sensitizers and can be absorbed through the skin.</p> <p>b) Building 251; The sealant mixing room, hand mixing operations: The employees were hand mixing using methyl ethyl ketone (MEK) and were wearing Antel gloves #G-82242C which were not approved for MEK.</p> <p>c) Outside Building 251; inside the hazardous waste sorting trailer: The employees were handling waste sealants and solvents including MEK and were wearing Antel gloves #G-82242C, which were not approved for MEK.</p>	04/10/91		

Area Director ROY N. THOMPSON

J.N. Thompson

U.S. Department of Labor
Occupational Safety and Health Administration



Hazard Correction List

1000 CAMINO PLAZA

Sacramento, CA 95815

3. Issuance Date 04/01/91	4. Inspection Number 107050987
5. Reporting ID 0932030	6. CSHO ID 81157
7. Optional Report No.	8. Page No. 2 of 2

10. Inspection Date(s):

10/22/90 - 03/14/91

1. Type of Violation(s)	2. Notice Number
Repeat	02

11. Inspection Site:

McClellan Air Force Base
McClellan, CA 95652

9. To:

McClellan Air Force Base
and its successors
SM/ALC/SEE
McClellan, CA 95652

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Enclose a copy of this form and a copy of each abatement plan with your response.

12. Item Number	13. Standard, Regulation, or Section of Executive Order Violated	14. Description	15. Date by Which Violation Must Be Abated	16. Abated	17. Plt. Su
		<p>Employees were exposed to skin rashes.</p> <p>d) building 251; the Main Bay, airplanes #019 and #021: Employees were using solvent PRC-148 and Turco 6628 inside fuel tanks and were not wearing impermeable coveralls. The employees wore cotton overalls which allowed the solvent to soak through to the street clothes and skin. The solvents, ethyl acetate and toluene, can cause dermatitis.</p> <p>e) building 251; the Main Bay, airplane #021, tank F-2: The employees were applying H&C 1750-B-2 sealant and were wearing cotton gloves and cotton overalls which allowed the sealant to soak through to their skin. The sealant contains chemicals such as amines and formaldehyde which can cause dermatitis.</p> <p>f) Building 251; the Main Bay, airplane #109, inside fuel tank F-1, bay 1-4: Employees were alodining and were not wearing impermeable coveralls. The alodining material contained corrosives such as chromic acid and hydrofluoric acid which can cause skin burns.</p>			

Area Director

ROY H. HILFSON

J.H. Thompson

U.S. Department of Labor
Occupational Safety and Health Administration

Hazard Correction List

El Camino Plaza
Fremont, CA 95015

3. Issuance Date 04/01/91	4. Inspection Number 106350655
5. Reporting ID 0402030	6. CSHO ID R1157
7. Optional Report No.	8. Page No. 3 of 3

10. Inspection Date(s):

10/22/90 - 04/01/91

1. Type of Violation(s)	2. Notice Number
Repeat	02

11. Inspection Site:

McClellan Air Force Base
McClellan, CA 95652

9. To:

McClellan Air Force Base
and its successors
SM/ALC/SEE
McClellan, CA 95652

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Enclose a copy of this form and a copy of each abatement plan with your response.

12. Item Number	13. Standard, Regulation, or Section of the Executive Order Violated	14. Description	15. Date by Which Violation Must Be Abated	16. Abated
		<p>21 Building 251; The Main Bay, airplane #109, inside fuel tank: An employees was using Turco 5625 inside the fuel tank and was not wearing impermeable coveralls. The employee had spilled the solvent on his cotton overalls and it had soaked through to his skin thereby causing burns.</p> <p>MCCLELLAN AIR FORCE BASE WAS PREVIOUSLY CITED FOR A VIOLATION OF THIS OCCUPATIONAL SAFETY AND HEALTH STANDARD, 1910.132(d), WHICH WAS CONTAINED IN THE OSHA INSPECTION 106350655, CITATION 1, ITEM 2A, ISSUED ON MAY 25, 1990.</p>		

18. Area Director

ROY N. NELSON

J. Skemper

Check on Polyurethane Suits - Do they meet OSHA Req

U.S. Department of Labor
Occupational Safety and Health Administration

Hazard Correction List

El Camino Plaza

Sacramento, Ca 95852

1. Type of Violation(s)	2. Notice Number
Repeat	02

9. To:

McClellan Air Force Base
and its successors
SFA/ALC/SHE
McClellan, CA 95852

11. Inspection Site:

McClellan Air Force Base
McClellan, CA 95852

3. Issuance Date 04/01/91	4. Inspection Number 107020098
5. Reporting ID 0932030	6. CSHO ID 01157
7. Optional Report No.	8. Page No. 4 of 5

10. Inspection Date(s):

10/22/90 - 03/14/91

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Enclose a copy of this form and a copy of each abatement plan with your response.

12. Item Number	Standard, Regulation, or Section the Executive Order Violated	14. Description	15. Date by Which Violation Must Be Abated	16. Abated
2	29 CFR 1910.1200(g)(6):	Employer did not maintain copies of the required material safety data sheets for each hazardous chemical in the workplace and ensure that they are readily accessible to the employees in their work area during each work shift: a) building 251; The sealant mixing rooms: Material safety data sheets for the sealants were not immediately available in this work area and could not be obtained on the micro-fiche. b) Building 251; temporary sealant mixing room: There was no material safety data sheet on the sealant, PKC 1750-B-6, which contains toxic chemicals.	04/10/91	
<p>McCLELLAN AIR FORCE BASE WAS PREVIOUSLY CITED FOR A VIOLATION OF THIS OCCUPATIONAL SAFETY AND HEALTH STANDARD, 1910.1200(G)(6), WHICH WAS CONTAINED IN THE OSHA INSPECTION 106350165, CITATION 1, ITEM 1A ON SEPTEMBER 1, 1989.</p>				

18. Area Director

ROY N. THOMPSON

J. N. Thompson

U.S. Department of Labor
Occupational Safety and Health Administration



Hazard Correction List
1111 CARMINO PLAZA
Sacramento, CA 95815

3. Issuance Date 04/01/91	4. Inspection Number 106350655
5. Reporting ID 0932030	6. CSHO ID M1527
7. Optional Report No.	8. Page No. 1 of 1

1. Type of Violation(s)	2. Notice Number
Repeat	02

10. Inspection Date(s):
10/22/90 - 03/14/91

11. Inspection Site:
McClellan Air Force Base
McClellan, CA 95652

9. To:
McClellan Air Force Base
and its successors
SMF ALC/SEE
McClellan, CA 95652

This list of hazardous conditions is for your use in preparing your agency's Hazard Correction List form and posting it as required by 29 CFR 1960.26 (c). The form must be posted until the condition(s) are abated, or for 3 working days, whichever is longer. If your agency does not have a form, you may post copies of this list.

Enclose a copy of this form and a copy of each abatement plan with your response.

12. Item Number	14. Description	15. Date by Which Violation Must Be Abated	16. Abated
29	<p>29 CFR 1910.1200(h)(1): Employees were not provided information as specified in 29 CFR 1910.1200(h)(1)(i) through (iii) on hazardous chemicals in their work area at the time of their initial assignment and whenever a new hazard is introduced into their work area:</p> <p>a) Building 251, The sealant mixing room: An employee was working with sealants and had not been trained on the hazards, precautions and health effects of the chemicals. The sealants contained amines including ethylene diamine which can cause skin and respiratory sensitivity.</p> <p>McCLELLAN AIR FORCE BASE WAS PREVIOUSLY CITED FOR A VIOLATION OF THIS OCCUPATIONAL SAFETY AND HEALTH STANDARD, 1910.1200(h)(1), WHICH WAS CONTAINED IN THE OSHA INSPECTION 106350655, CITATION 1, ITEM 3 ON MAY 23, 1990.</p>	04/10/91	

18. Area Director ROY N. THOMPSON *J. N. Thompson*

U.S. Department of Labor
Occupational Safety and Health Administration



Hazard Correction List

El Camino Plaza

Menlo Park, CA 94025

3. Issuance Date 04/01/91	4. Inspection Number 107050349
5. Reporting ID 0932030	6. CSHO ID E1557
7. Optional Report No.	8. Page No. 0 of 1

10. Inspection Date(s):

10/22/90 - 03/14/91

1. Type of Violation(s)	2. Notice Number
Repeat	02

11. Inspection Site:

McClellan Air Force Base
McClellan, CA 95052

9. To:

McClellan Air Force Base
and its successors
311 McClellan
McClellan, CA 95052

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Enclose a copy of this form and a copy of each abatement plan with your response.

12. Item Number	13. Standard, Regulation, or Section of the Executive Order Violated	14. Description	15. Date by Which Violation Must Be Abated	16. Abated
	29 CFR 1910.1200(h)(2)(iv)	Employees training did not include the details of the hazard communication program developed by the employer, including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use appropriate hazard information: a) Building 251, The sealant mixing room: An employee using sealants had not been trained on how to locate the material safety data sheets on the two sealant components.	04/10/91	
<p>MCCLELLAN AIR FORCE BASE WAS PREVIOUSLY CITED FOR A VIOLATION OF THIS OCCUPATIONAL SAFETY AND HEALTH STANDARD, 1910.1200(H)(2)(IV), WHICH WAS CONTAINED IN THE OSHA INSPECTION 106350165, CITATION 1, ITEM 10 ON SEPTEMBER 11, 1989.</p>				
18. Area Director				
1107 N. THOMPSON <i>J. Thompson</i>				

8

Spray Sealant Personnel Protective Plan (PPE)

SGR

1. The attached PPE plan was discussed and agreed upon by SGR, LABPF, LABRT, and LAB-1 in a meeting conducted 31 Oct 91.
2. Request your coordination on attached plan. If you nonconcur, please indicate reasons. PPE plan will be implemented pending your concurrence.
3. POCs are LT Varn or Sunny Daley, LAB-1, 3-5942.

1 Atch
PPE Plan

Attachment 2

SPRAY SEALANT TASK
PERSONNEL PROTECTIVE PLAN (PPE)

The following procedures will be complied with during the spray sealant process:

- a. Spraying can be accomplished on all shifts. No concurrent operations will be performed while spraying is in progress.
- b. The entire aircraft stall will be roped off during spraying to keep unauthorized personnel out.
- c. PPE required for personnel entering tank and standby personnel is: two Coveralls, cotton inner and saranex outer, full face respirator and solvex gloves.

PPE required for personnel 30' from aircraft accomplishing tasks other than a standby person is: (1) coverall (impervious), full face cartridge respirator and solvex gloves when mixing sealant or using solvents. NOTE: COVERALLS WILL BE TAPED SO THAT NO SKIN IS EXPOSED.

d. During spraying each aircraft fuel cell will be ventilated with four hoses, two supplying ventilated air and two exhaust hoses, which will be tied into the existing ventilation system in building 251. Directly after spraying all tanks exits will be blocked off in order to maintain an airtight environment inside the tank. One exhaust hose will be maintained per tank for five days.

1. LEL will be taken while process is being accomplished IAW 127-2.
 2. Personnel may enter tank when sealant is tackie with cotton coveralls, full face cartridge respirator, and gloves.
- e. Personnel working inside the fuel cells will have either received previous OJT training in the spray sealant or will be receiving OJT from previously trained personnel.

COORD:

LAB-1 _____ DATE _____
SEQ _____ DATE _____
SGB _____ DATE _____
LAB _____ DATE _____

LABPF RESEAL/DESEAL TASK
PROTECTION PLAN

In order to provide a safe working environment for the F-111 Reseal/De seal crew in Bldg 251, a mandatory protection plan will be implemented. The plan provides for Personal Protective Equipment (PPE) and engineering controls which will reduce or eliminate employees' potential exposure to JP-5, purging fluid and hazardous chemicals used in reseal/deseal tasks. The areas covered by this plan are depuddling and removing fuel lines for reseal process of fwd and aft fuel tasks. PPE requirements may be adjusted in the future based on the results of periodic SGB surveys and/or operational changes. Any changes that require negotiation will be sent to AFGE prior to implementation.

1. Division Policy on Aircraft production on Personal Protective Equipment:

a. Protection of employees and safety in the work area are of prime importance to LAB management. This plan has been developed to reduce exposure to hazardous chemicals used in reseal/deseal.

b. Each supervisor is responsible for implementation and enforcement of this plan. Ensure employees are briefed on what is expected of them. After the briefing, have each employee sign a briefing sheet, and file with his/her AF Form 971.

c. The use of protective equipment is mandatory where required. If an employee fails to use (or abuses) any part of the protective equipment, appropriate disciplinary action may be taken.

d. A separate PPE Plan will address the protective equipment and requirements for spray sealant.

2. Division policy on removing fuel lines, depuddling, or using solvents in the fuel tanks. In order to reduce potential JP-5 and purging fluid exposure to employees, the following restrictions will apply when removing fuel lines, depuddling, or using solvents in the fuel tanks:

a. Impervious coveralls will be worn by all personnel prior to entering into the fuel cell. Clean coveralls will be issued from specified storage area near the shop areas at the beginning of each shift and will be changed as needed.

b. Contaminated clothing will not be taken home or used for any other purpose. All contaminated clothing will be disposed by placing in flammable dumpster, located on east side of Building 251.

c. Impervious coveralls will be worn completely buttoned, zipped and sleeves and and legs fully extended.

d. Cuffs will not be cut or altered. They may be taped to provide a close seal.

e. The coveralls will not be cut or altered to create pockets, provide access to pockets underneath, or otherwise modified.

f. The employee will not wash, soak, dye, or wear coveralls inside out.

g. Impervious coveralls, latex gloves, head coverings, rubber sole shoes;

h. Employees required to wear respirators will be medically evaluated for using respirators and be fit tested by SGB in accordance with AFOSH Standard 161-1 prior to their use.

3. Work Practices:

a. Cotton coveralls will be worn when employees are performing reseal/deseal tasks in designated work areas. Cotton coveralls are the minimum PPE requirements for entering any fuel tanks. Cotton coveralls may be used during the sealant process, when no other chemicals are involved, (SGB Approved).

b. Eating, drinking, smoking and application of cosmetics are not permitted in the PPE area.

c. Food, beverages, eating or drinking utensils, or personal clothing will not be stored in the PPE area.

d. Employees will wash their hands and face prior to eating, drinking, smoking, or applying cosmetics.

e. All F-111 fuel employees are included on the Occupational Health Medical Examination Program.

f. The security badge will be worn at all times by personnel except when entering the main fuel tanks of F-111 aircraft. Maintenance or inspection in close cramped quarters may cause the badge to become dislodged, creating a potential FOD hazard. All employees prior to entering main fuel cells to perform maintenance will remove their security badge and secure it in the personal drawer of their tool box.

4. An adequate stock of personal protective equipment will be provided for employee use which meets or exceeds the requirements established by this plan and SGB with respect to type and quality. LABP will ensure that a 90-day stock level of the appropriate PPE is maintained and is responsible for the enforcement of this protective plan.

5. In order to ensure the physical well being of each employee working in the tanks, a roving monitor will be assigned.

a. All personnel working in the tanks will sign in on the tank entry sign-in checklist. First, this ensures that the employee is aware of the proper PPE required for the task being accomplished. Second, this list also informs the monitor as to how many employees are in the tank.

b. The monitor will check on employees hourly while they are in the tanks and take an LEL reading at that time. The monitor will make the appropriate entry on the LEL log.

c. The monitor will also take LEL readings on a daily and weekly basis as required.

9



MCD Date

1. Complaint Number **72722861**

2. Employer Name **McClellan Air Force Base**

3. Location (Street, City, State, ZIP) **Building 251**

4. Mailing Address (If different) (Street, City, State, ZIP)

5. Management Official

6. Telephone Number

7. Type of Business

8. Hazard Description Describe briefly the hazard(s) which you believe exist. Include the approximate number of employees exposed to or threatened by each hazard

- 1) Toxic chemicals are used with insufficient training and protection gear.
- 2) Equipment is often not in good working order. LEL METERS - in
- 3) Employees are intimidated by reason of reprisal action if they report or speak to officials; base cover up is widespread practice.
- 4) Employees are not given proper documentation to support claims at time of incident (CA7). LEL CROWDER

9. Hazard location Specify the particular building or worksite where the alleged violation exists

10

Last Name : Nelson
First Name. : Daniel

77 Medical Group/SGPB/McClellan AFB
FitPlus Version B
TSI Incorporated

FIT TEST REPORT

Last Name : Nelson
First Name. : Daniel
ID Number : 569-76-8214
Initial Fit Test. . . :
Annual Fit Test . . . : 11 Aug 98
Special Fit Test . . . :
Next Test Due : 11 Aug 99
Operator Name : Peck
Resp. Manufacturer . . : MSA
Full Face : Ultratwin
Size. : Large
Job Series/AFSC . . . : 8852
WPIDC : 236A-1

Test Date : 08-11-98
Test Time : 9:49am

TEST DATA

Fit Factor Pass Level: 1000

Ex.	Ambient (Part/cc)	Mask (part/cc)	Fit Factor	Pass/Fail
NB	5780	4.66	1240.0	PASS
DB	5740	4.49	1270.0	PASS
SS	5560	2.94	1880.0	PASS
UD	5480	2.47	2210.0	PASS
T	5420	4.07	1330.0	PASS
G	5410	1.20	4500.0	PASS
B	5400	8.26	653.0	FAIL
NB	5340	0.90	5920.0	PASS

Overall Fit Factor = 1520.0 PASS

Last Name : Nelson
First Name. : Daniel

77 Medical Group/SGPB/McClellan AFB
FitPlus Version B
TSI Incorporated

FIT TEST REPORT

Last Name : Nelson
First Name. : Daniel
ID Number : 569-76-8214
Initial Fit Test. . . :
Semi-Annual Fit Test:
Annual Fit Test . . . : 28 Aug 96
Special Fit Test. . . :
Next Test Due : 28 Aug 97
Operator Name : Peck
Resp. Manufacturer : MSA
Half Face :
Full Face : Ultratwin
Size. : Large
Job Series/AFSC . . . : 8801
WPIDC : 108A-1

Test Date : 08-28-96
Test Time : 6:26am

TEST DATA

Fit Factor Pass Level: 1000

Ex.	Ambient (Part/cc)	Mask (part/cc)	Fit Factor	Pass/Fail
NB	8760	0.51	17100.0	PASS
DB	8600	2.62	3280.0	PASS
SS	8560	0.60	14200.0	PASS
UD	8480	1.01	8390.0	PASS
T	8530	6.19	1370.0	PASS
NB	8600	0.81	10600.0	PASS

Overall Fit Factor = 4350.0 PASS

Last Name : Nelson
First Name : Daniel

77 Medical Group/SGPB/McClellan AFB
FitPlus Version B
TSI Incorporated

FIT TEST REPORT

Last Name : Nelson
First Name : Daniel
ID Number : 569-76-8214
Annual Fit Test . . . : 5 Oct 95
Initial Fit Test . . . :
Semi-Annual Fit Test :
Special Fit Test . . . :
Next Test Due : 5 Oct 96
Operator Name : Peck
Resp. Manufacturer : MSA
Half Face :
Full Face : Ultratwin
Size : Large
Job Series/AFSC . . . : 8801
WPIDC : 108A-1

Test Date : 10-05-95
Test Time : 6:29am

TEST DATA

Fit Factor Pass Level: 1000

Ex.	Ambient (Part/cc)	Mask (part/cc)	Fit Factor	Pass/Fail
NB	3310	1.69	1950.0	PASS
DB	3640	1.89	1920.0	PASS
SS	3840	0.82	4680.0	PASS
UD	3650	0.95	3840.0	PASS
T	3740	3.22	1160.0	PASS
G	4000	2.29	1740.0	PASS
B	4090	2.61	1560.0	PASS
NB	4300	2.54	1690.0	PASS

Overall Fit Factor = 1910.0 PASS

94-06	" " " " " "	" " " " " "	" " " "	Md	Md	Md	Md
94-12	" " " " " "	" " " " " "	" " " "	Md	Md	Md	Md
94-01	Mitchell, Mark	540-04-6503	863A-1			Md	
94-02	Mitchell, Steven	549-19-8206	472E-1			Lg	Uni
94-09	Mitts, Mark	552-02-6188	985F-1	M/L	Lg	Lg	
-01	Montgomery, Keith	173-42-2767	863A-1			Md	
-10	Moore, Brian	395-86-9531	803A-1	Md	Sm	Sm	
94-01	Moore, Terry	571-27-7320	863A-1			Fl	
94-11	Moreira, Ruy	140-60-4538	904F-1		Lg		
94-08	Mott, William	562-64-8855	108A-1		Md	Md	
94-01	Mousel, Ronald	359-42-7133	863A-1			Lg	
-94-09	Mularchuk, Peter	559-11-6684	803A-1		Lg	Lg	
-94-04	Mulligan, John	031-38-0101	115A-1	S/M	Md		Uni
94-08	Muro, Stephen	555-49-7536	108A-1		Md	Md	
-94-08	Murphy, Christopher	436-25-7334	236A-1			Md	
94-11	Murphy, Robert	019-52-1029	985F-1		Md	Md	
94-11	Murrell, Terrance	118-46-3484	940B-1			Lg	
94-01	Musgrove, Kem	305-76-0830	905B-1		Md		
94-01	Mustain, Gary	570-92-5861	113A-1		Lg	Lg	
94-01	Nance, David	236-21-9052	863A-1			Sm	
94-01	Nasarro, Juanito	460-27-9684	863A-1			Md	
-94-08	Nawlin, Flora	553-84-6894	730A-1	Md	Md	Md	Md
94-12	" " " " " "	" " " " " "	" " " "	Md	Md	Md	Md
94-01	Nay, Glen	528-74-6667	109A-1		Lg	Lg	
-94-01	Neahr, Frank	571-82-3998	109A-1		Lg	Lg	
-94-04	Neer, Robert	561-68-3044	115A-1	Fl	Lg		Uni
-94-08	Nelson, Daniel	569-76-8214	113A-1		Lg	Lg	
-94-08	Neri, Abel	551-74-1371	113A-1		Md	Md	
94-01	Nesbitt, Lederrick	571-06-7310	109A-1		Md	Md	
94-06	Newbigging, Tommy	572-27-9339	803-1		Md	Md	
-06	Newman, Donald		BOR	Md			
-08	Newell, Daniel	518-90-0353	457D-1				X-Lg
-94-04	Nichols, Jack	568-62-4333	115A-1	Fl	Lg		Uni
94-01	Nieset, Jason	280-60-8401	863A-1			Lg	
-94-08	Nitz, Henry	571-82-3470	236A-1			Md	
-94-08	Niver, Robert	547-39-0821	108A-1		Md	Md	
-94-05	Nixon, Larry	478-98-0028	905D-1		Md		
94-11	" " " " " "	" " " " " "	" " " "		Md		
94-01	Noble, Nestro	342-68-3194	863A-1			Fl	
-94-06	Noble, Randy	123-56-7233	940F-1	S/M	Sm		
94-01	Nocito, Daniel	050-74-5769	863A-1			Md	
-94-04	Null, Robert	572-66-1431	115A-1	S/M	Lg		Uni
94-01	Nunez, Tony	562-64-5054	724A-1	Md			
-94-08	O'Brien, Mark	551-11-1834	113A-1		Lg	Lg	
94-08	O'Brien, Steven	564-29-6234	108A-1		Md	Md	
-94-04	O'Donnell, Marlin	463-42-0005	115A-1	Md	Lg		Uni
-94-06	O'Haver, Gregory		BOR	Lg			
94-01	Okrio, Patrick	548-96-0644	114A-1		Md	Md	
-94-01	Oliveras, Michael	248-13-1323	726A-1				X-Lg
-94-01	Olsen, Charles	569-72-0784	726A-1				X-Lg
94-09	Olsen, Theresa	397-92-9821	926A-1		Md	Md	Md
94-01	O'Neil, Mark	242-57-8960	863A-1			Md	
-94-01	Orcales, Patrick	571-55-5307	109A-1		Lg	Lg	
-94-01	Orr, Michael	569-76-9815	109A-1		Lg	Lg	
-94-01	Ortiz, Danny	550-29-6511	114A-1		Lg	Lg	
-94-05	Ortiz, David	561-84-7503	108A-1	Md	Md	Md	
-12	Osborne, Robert	433-62-4159	905D-1		Lg		
-94-06	Ostrander, Richard		BOR		Md		
-94-04	Ouzts, Kenneth	557-86-3792	115A-1	Fl	Lg		Uni
94-02	Owens, David	243-98-7111	736A-1			Md	
94-01	Owens, Wesley	411-82-5738	109A-1		Lg	Lg	
-94-01	Oxley, Larry	564-62-7281	114A-1		Md	Md	

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**OSHA**Occupational Safety & Health Administration
U.S. Department of LaborHome
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Search

OSHA Regulations (Standards - 29 CFR)

TABLE Z-1 Limits for Air Contaminants. - 1910.1000 TABLE Z-1

[◀ OSHA Regulations \(Standards - 29 CFR\) - Table of Contents](#)

- **Standard Number:** 1910.1000 TABLE Z-1
- **Standard Title:** TABLE Z-1 Limits for Air Contaminants.
- **SubPart Number:** Z
- **SubPart Title:** Toxic and Hazardous Substances
- **Applicable Standard:** Applicable Standard:

TABLE Z-1 LIMITS FOR AIR CONTAMINANTS

NOTE: Because of the length of the table, explanatory Footnotes applicable to all substances are given below as well as at the end of the table. Footnotes specific only to a limited number of substances are also shown within the table.

Footnote(1) The PELs are 8-hour TWAs unless otherwise noted; a (C) designation denotes a ceiling limit. They are to be determined from breathing-zone air samples.

Footnote(a) Parts of vapor or gas per million parts of contaminated air by volume at 25 degrees C and 760 torr.

Footnote(b) Milligrams of substance per cubic meter of air. When entry is in this column only, the value is exact; when listed with a ppm entry, it is approximate.

Footnote(c) The CAS number is for information only. Enforcement is based on the substance name. For an entry covering more than one metal compound measured as the metal, the CAS number for the metal is given - not CAS numbers for the individual compounds.

Footnote(d) The final benzene standard in 1910.1028 applies to all occupational exposures to benzene except in some circumstances the distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures; for the excepted subsegments, the benzene limits in Table Z-2 apply. See 1910.1028 for specific circumstances.

Footnote(e) This 8-hour TWA applies to respirable dust as measured by a vertical elutriator cotton dust sampler or equivalent instrument. The time-weighted average applies to the cotton waste processing operations of waste recycling (sorting, blending, cleaning and willowing) and garnetting. See also 1910.1043 for cotton dust limits applicable to other sectors.

Footnote(f) All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by the Particulates Not Otherwise Regulated (PNOR) limit which is the same as the inert or nuisance dust limit of Table Z-3.

Footnote(2) See Table Z-2.

Footnote(3) See Table Z-3

Footnote(4) Varies with compound.

TABLE Z-1. - LIMITS FOR AIR CONTAMINANTS

Substance	CAS No. (c)	ppm (a) (1)	mg/m(3) (b) (1)	Skin designation
Acetaldehyde.....	75-07-0	200	360	
Acetic acid.....	64-19-7	10	25	
Acetic anhydride.....	108-24-7	5	20	
Acetone.....	67-64-1	1000	2400	
Acetonitrile.....	75-05-8	40	70	
2-Acetylaminofluorene; see 1910.1014.....	53-96-3			
Acetylene dichloride; see 1,2-Dichloroethylene.				
Acetylene tetrabromide.	79-27-6	1	14	
Acrolein.....	107-02-8	0.1	0.25	
Acrylamide.....	79-06-1	.....	0.3	X
Acrylonitrile; see 1910.1045.....	107-13-1			
Aldrin.....	309-00-2	.....	0.25	X
Allyl alcohol.....	107-18-6	2	5	X
Allyl chloride.....	107-05-1	1	3	
Allyl glycidyl ether... (AGE).....	106-92-3	(C)10	(C)45	
Allyl propyl disulfide.	2179-59-1	2	12	
alpha-Alumina.....	1344-28-1			
Total dust.....		.....	15	
Respirable fraction..		.....	5	
Aluminum Metal (as Al).	7429-90-5			
Total dust.....		.....	15	
Respirable fraction..		.....	5	
4-Aminodiphenyl; see 1910.1011.....	92-67-1			
2-Aminoethanol; see Ethanolamine.....				
2-Aminopyridine.....	504-29-0	0.5	2	
Ammonia.....	7664-41-7	50	35	
Ammonium sulfamate.....	7773-06-0			
Total dust.....		.....	15	
Respirable fraction..		.....	5	
n-Amyl acetate.....	628-63-7	100	525	
sec-Amyl acetate.....	626-38-0	125	650	
Aniline and homologs...	62-53-3	5	19	X
Anisidine (o-,p-isomers).....	29191-52-4	.....	0.5	X
Antimony and compounds (as Sb).....	7440-36-0	.....	0.5	
ANTU (alpha Naphthylthiourea)....	86-88-4	.....	0.3	
Arsenic, inorganic				

compounds (as As); see 1910.1018.....	7440-38-2				
Arsenic, organic compounds (as As)....	7440-38-2	.....	0.5		
Arsine.....	7784-42-1	0.05	0.2		
Asbestos; see 1910.1001.....	(4)				
Azinphos-methyl.....	86-50-0	.....	0.2		X
Barium, soluble compounds (as Ba)....	7440-39-3	.....	0.5		
Barium sulfate.....	7727-43-7				
Total dust.....			15		
Respirable fraction..			5		
Benomyl.....	17804-35-2				
Total dust.....			15		
Respirable fraction..			5		
Benzene; See 1910.1028.	71-43-2				
See Table Z-2 for the limits applicable in the operations or sectors excluded in 1910.1028(d)					
Benzidine; See 1910.1010.....	92-87-5				
p-Benzoquinone; see Quinone.					
Benzo(a)pyrene; see Coal tar pitch volatiles.....					
Benzoyl peroxide.....	94-36-0	.....	5		
Benzyl chloride.....	100-44-7	1	5		
Beryllium and beryllium compounds (as Be).....	7440-41-7		(2)		
Biphenyl; see Diphenyl.					
Bismuth telluride, Undoped.....	1304-82-1				
Total dust.....			15		
Respirable fraction..			5		
Boron oxide.....	1303-86-2				
Total dust.....			15		
Boron trifluoride.....	7637-07-2	(C)1	(C)3		
Bromine.....	7726-95-6	0.1	0.7		
Bromoform.....	75-25-2	0.5	5		X
Butadiene (1,3-Butadiene); See 29 CFR 1910.1051; 29 CFR 1910.19(1)....	106-99-0	1 ppm/5 ppm STEL			
Butanethiol; see Butyl mercaptan.					
2-Butanone (Methyl ethyl ketone)	78-93-3	200	590		
2-Butoxyethanol.....	111-76-2	50	240		X
n-Butyl acetate.....	123-86-4	150	710		
sec-Butyl acetate.....	105-46-4	200	950		
tert-Butyl acetate.....	540-88-5	200	950		
n-Butyl alcohol.....	71-36-3	100	300		
sec-Butyl alcohol.....	78-92-2	150	450		
tert-Butyl alcohol.....	75-65-0	100	300		
Butylamine.....	109-73-9	(C)5	(C)15		X
tert-Butyl chromate (as CrO(3)).....	1189-85-1	.....	(C)0.1		X
n-Butyl glycidyl ether (BGE).....	2426-08-6	50	270		
Butyl mercaptan.....	109-79-5	10	35		
p-tert-Butyltoluene....	98-51-1	10	60		
Cadmium (as Cd); see 1910.1027.....	7440-43-9				
Calcium Carbonate.....	1317-65-3				
Total dust.....			15		

Total dust.....			15	
Respirable fraction..			5	
Mercury (aryl and inorganic) (as Hg)....	7439-97-6		(2)	
Mercury (organo) alkyl compounds (as Hg)....	7439-97-6		(2)	
Mercury (vapor) (as Hg)	7439-97-6		(2)	
Mesityl oxide.....	141-79-7	25	100	
Methanethiol; see Methyl mercaptan.				
Methoxychlor.....	72-43-5			
Total dust.....			15	
2-Methoxyethanol; (Methyl cellosolve)..	109-86-4	25	80	X
2-Methoxyethyl acetate (Methyl cellosolve acetate).....	110-49-6	25	120	X
Methyl acetate.....	79-20-9	200	610	
Methyl acetylene (Propyne).....	74-99-7	1000	1650	
Methyl acetylene propadiene mixture (MAPP).....		1000	1800	
Methyl acrylate.....	96-33-3	10	35	X
Methylal (Dimethoxy-methane)..	109-87-5	1000	3100	
Methyl alcohol.....	67-56-1	200	260	
Methylamine.....	74-89-5	10	12	
Methyl amyl alcohol; see Methyl Isobutyl carbinol.....				
Methyl n-amyl ketone...	110-43-0	100	465	
Methyl bromide.....	74-83-9	(C)20	(C)80	X
Methyl butyl ketone; see 2-Hexanone.....				
Methyl cellosolve; see 2-Methoxyethanol.				
Methyl cellosolve acetate; see 2-Methoxyethyl acetate.....				
Methyl chloride.....	74-87-3		(2)	
Methyl chloroform (1,1,1-Trichloroethane).....	71-55-6	350	1900	
Methylcyclohexane.....	108-87-2	500	2000	
Methylcyclohexanol....	25639-42-3	100	470	
o-Methylcyclohexanone..	583-60-8	100	460	X
Methylene chloride....	75-09-2		(2)	
Methyl ethyl ketone (MEK); see 2-Butanone				
Methyl formate.....	107-31-3	100	250	
Methyl hydrazine (Monomethyl hydrazine).....	60-34-4	(C)0.2	(C)0.35	X
Methyl iodide.....	74-88-4	5	28	X
Methyl isoamyl ketone..	110-12-3	100	475	
Methyl isobutyl carbinol.....	108-11-2	25	100	X
Methyl isobutyl ketone; see Hexone.....				
Methyl isocyanate.....	624-83-9	0.02	0.05	X
Methyl mercaptan.....	74-93-1	(C)10	(C)20	
Methyl methacrylate....	80-62-6	100	410	
Methyl propyl ketone; see 2-Pentanone.....				
alpha-Methyl styrene...	98-83-9	(C)100	(C)480	
Methylene bisphenyl isocyanate (MDI)....	101-68-8	(C)0.02	(C)0.2	
Mica; see Silicates....				
Molybdenum (as Mo)....	7439-98-7			

Triethylamine.....	121-44-8	25	100	
Trifluorobromomethane..	75-63-8	1000	6100	
2,4,6-Trinitrophenol; see Picric acid.....				
2,4,6-Trinitrophenyl- methyl nitramine; see Tetryl.....				
2,4,6-Trinitrotoluene (TNT).....	118-96-7	.....	1.5	X
Triorthocresyl phosphate.....	78-30-8	.....	0.1	
Triphenyl phosphate....	115-86-6	.....	3	
Turpentine.....	8006-64-2	100	560	
Uranium (as U).....	7440-61-1			
Soluble compounds....		.....	0.05	
Insoluble compounds..		.....	0.25	
Vanadium.....	1314-62-1			
Respirable dust (as V(2)O(5)).....		.....	(C)0.5	
Fume (as V(2)O(5))...		.....	(C)0.1	
Vegetable oil mist.....				
Total dust.....		.....	15	
Respirable fraction..		.....	5	
Vinyl benzene; see Styrene.....				
Vinyl chloride; see 1910.1017.....	75-01-4			
Vinyl cyanide; see Acrylonitrile				
Vinyl toluene.....	25013-15-4	100	480	
Warfarin.....	81-81-2	.....	0.1	
Xylenes (o-, m-, p-isomers)..	1330-20-7	100	435	
Xylidine.....	1300-73-8	5	25	X
Yttrium.....	7440-65-5	.....	1	
Zinc chloride fume.....	7646-85-7	.....	1	
Zinc oxide fume.....	1314-13-2	.....	5	
Zinc oxide.....	1314-13-2			
Total dust.....		.....	15	
Respirable fraction..		.....	5	
Zinc stearate.....	557-05-1			
Total dust.....		15	
Respirable fraction..		5	
Zirconium compounds (as Zr).....	7440-67-7	5	

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Footnote(d) The final benzene standard in 1910.1028 applies to all occupational exposures to benzene except in some circumstances the distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures; for the

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Footnote(2) See Table Z-2.

Footnote(3) See Table Z-3

Footnote(4) Varies with compound.

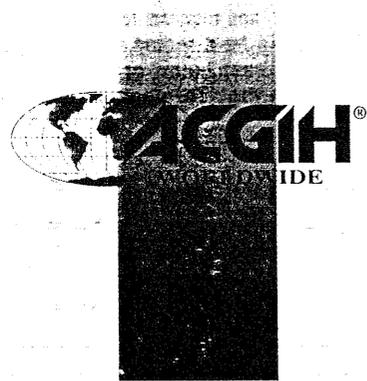
[54 FR 36767, Sept. 5, 1989; 54 FR 41244, Oct. 6, 1989; 55 FR 3724, Feb. 5, 1990; 55 FR 12819, Apr 6, 1990; 55 FR 19259, May 9, 1990; 55 FR 46950, Nov. 8, 1990; 57 FR 29204, July 1, 1992; 57 FR 42388, Sept. 14, 1992; 58 FR 35340, June 30, 1993; 61 FR 56746, Nov. 4, 1996; 62 FR 42018, August 4, 1997]

◀ [OSHA Regulations \(Standards - 29 CFR\) - Table of Contents](#)

1999

TLVs[®] and BEIs[®]

Based on the Documentations for
Threshold Limit Values
for Chemical Substances
and Physical Agents
Biological Exposure Indices



Substance [CAS No.]	ADOPTED VALUES		Notations	Mol Wgt	TLV Basis—Critical Effect(s)
	TWA (ppm/mg/m ³)	STEL/C (ppm/mg/m ³)			
Methyl chloride [74-87-3]	50 ppm	100 ppm	Skin; A4	50.49	Kidney; CNS; reproductive
Methyl chloroform [71-55-6]	350 ppm	450 ppm	A4; BEI	133.42	Anesthesia; CNS; liver; kidney; CVS; dermatitis
Methyl 2-cyanoacrylate [137-05-3]	0.2 ppm	—	—	111.10	Irritation; dermatitis
Methylcyclohexane [108-87-2]	400 ppm	—	—	98.19	Narcosis; irritation
Methylcyclohexanol [25639-42-3]	50 ppm	—	—	114.19	Irritation; narcosis; liver; kidney
o-Methylcyclohexanone [583-60-8]	50 ppm	75 ppm	Skin	112.17	Irritation; narcosis
2-Methylcyclopentadienyl manganese tricarbonyl [12108-13-3], as Mn	0.2 mg/m ³	—	Skin	218.10	CNS; liver; kidney
Methyl demeton [8022-00-2]	0.5 mg/m ³	—	Skin; BEI	230.30	Irritation; cholinergic
Methylene bisphenyl isocyanate (MDI) [101-68-8]	0.005 ppm	—	—	250.26	Irritation; pulmonary edema; sensitization
Methylene chloride, <i>see</i> Dichloromethane					
4,4'-Methylene bis(2-chloroaniline) [MBOCA; MOCA [®]] [101-14-4]	0.01 ppm	—	Skin; A2; BEI	267.17	Anoxia; kidney; cancer (bladder)
Methylene bis(4-cyclohexylisocyanate) [5124-30-1]	0.005 ppm	—	—	262.35	Irritation; sensitization

Substance [CAS No.]	ADOPTED VALUES		Notations	Mol Wgt	TLV Basis—Critical Effect(s)
	TWA (ppm/mg/m ³)	STEL/C (ppm/mg/m ³)			
4,4'-Methylene dianiline [101-77-9]	0.1 ppm	—	Skin; A3	198.26	Liver
Methyl ethyl ketone (MEK) [78-93-3]	200 ppm	300 ppm	BEI	72.10	Irritation; CNS
Methyl ethyl ketone peroxide [1338-23-4]	—	C 0.2 ppm	—	176.24	Irritation; liver; kidney
Methyl formate [107-31-3]	100 ppm	150 ppm	—	65.05	Irritation; narcosis; pulmonary edema
5-Methyl-3-heptanone, <i>see</i> Ethyl amyl ketone					
Methyl hydrazine [60-34-4]	0.01 ppm	—	Skin; A3	46.07	Irritation; liver
Methyl iodide [74-88-4]	2 ppm	—	Skin	141.95	CNS; irritation
Methyl isoamyl ketone [110-12-3]	50 ppm	—	—	114.20	Irritation; narcosis; liver; kidney
Methyl isobutyl carbinol [108-11-2]	25 ppm	40 ppm	Skin	102.18	Irritation; anesthesia
Methyl isobutyl ketone [108-10-1]	50 ppm	75 ppm	BEI	100.16	Irritation; narcosis; liver; kidney
Methyl isocyanate [624-83-9]	0.02 ppm	—	Skin	57.05	Irritation; pulmonary edema; sensitization
Methyl isopropyl ketone [563-80-4]	200 ppm	—	—	86.14	Irritation; narcosis
Methyl mercaptan [74-93-1]	0.5 ppm	—	—	48.11	Irritation; CNS
‡ Methyl methacrylate [80-62-6]	(100 ppm)	(—)	(—); A4	100.13	Irritation; dermatitis

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file

OCCUPATIONAL ILLNESS / INJURY REPORT

(THIS FORM IS SUBJECT TO THE PRIVACY ACT OF 1974 - Use Blanket PAS - DD Form 2005)

PATIENT IDENTIFICATION

1. NAME (Last, First, MI) Nelson, Daniel		2. SSAN WG 8		3. GRADE 5 6 9 7 6 8 2 1 4		4. SEX <input type="checkbox"/> MIL <input checked="" type="checkbox"/> CIV <input checked="" type="checkbox"/> M <input type="checkbox"/> F		5. AGE 44		
6. WORK LOCATION Bldg 251		7. DUTY PHONE 3-1620		8. ORGANIZATION AND SYMBOL LA/LAPFF			9. INSTALLATION McClellan AFB, Ca MUOFFGLV			
10. OCCUPATION (Job Title/AFSC) Fuel Systems mechanic/8801					11. SUPERVISOR (Name and Duty Phone) Flavia Moore/3-6120					

II. INCIDENT / ILLNESS DATA

12. DATE AND TIME OF EXPOSURE: 1988		ILLNESS: Dec 94		13. STATUS AT TIME OF EXPOSURE <input checked="" type="checkbox"/> ON DUTY <input type="checkbox"/> OFF DUTY <input type="checkbox"/> LEAVE <input type="checkbox"/> TDY <input type="checkbox"/> OTHER					
14. DURATION OF EXPOSURE approx 8 hours/day				15. WITNESS (Name and Phone) none					
16. DESCRIPTION OF SYMPTOMS AT ONSET OF ILLNESS Sinus problems/endoscopic surgery (95% of sinus lining removed).									

III. MEDICAL DATA

17. DIAGNOSIS AND RELEVANT MEDICAL DATA (Indicate affected body parts) Chronic sinusitis (unspecified) ICD9: 473.9				18. CLASSIFICATION ²						OSHA CODE	
				OCCUPATIONAL SKIN DISEASE						21	
				DUST DISEASE OF LUNGS						22	
				RESPIRATORY CONDITION DUE TO TOXIC AGENT						23	
				SYSTEMATIC EFFECT OF TOXIC MATERIAL (poisoning)						24	
				DISORDER DUE TO PHYSICAL AGENT (Other than toxic material)						25	
DISORDER DUE TO REPEATED TRAUMA (Exclude hearing loss)						26					
FATALITY		RESULTED IN UNCONSCIOUSNESS		<input checked="" type="checkbox"/>		OTHER OCCUPATIONAL DISEASE		29			

19. DATE/TIME OF INITIAL TREATMENT/DIAGNOSIS 7 Mar 94/0835				20. MEDICAL FACILITY 77 AMDS/SGPFO McClellan AFB, Ca					
21. TREATMENT ADMINISTERED (Check One) <input type="checkbox"/> FIRST AID ¹				<input checked="" type="checkbox"/> DEFINITIVE CARE (Specify in Remarks)					

22. DISPOSITION OF PATIENTS			
YES	NO		NO. OF DAYS
<input checked="" type="checkbox"/>	<input type="checkbox"/>	RETURN TO NORMAL DUTY	0
<input checked="" type="checkbox"/>	<input type="checkbox"/>	REFER TO PRIVATE PHYSICIAN	0
<input checked="" type="checkbox"/>	<input type="checkbox"/>	EXCUSED FOR REST OF DUTY DAY	22
		ADMITTED TO HOSPITAL ²	
		PLACED ON QUARTERS ²	
		RETURN TO LIMITED DUTY ²	

23. NAME OF MEDICAL OFFICER Connie Slavich, BSN COHN-S, 139-42-9080 DSN 633-8454 *Lori Page*

24. REMARKS RX: Continue follow-up with PMD, no exposure to toxic chemicals. Light Duty x 22 days total.

Source: CA2 & 12 Lori Page, GS7 DSN 633-8448

IV. ENVIRONMENTAL DATA

25. DESCRIBE JOB TASKS THAT RESULTED IN EXPOSURE TO HAZARDOUS MATERIALS / AGENTS (Specify the material / agent)
Employee feels his symptoms are related to his exposure to and working with toxic chemicals to include: MEK, cyanide, cadmium, toluene, spray sealants and Asbestos. He performs reseal/deseal operations and works with aircraft fuel lines.

V. CASE CLASSIFICATION

26. OCCUPATIONAL INCIDENT <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		27. TYPE <input type="checkbox"/> INJURY <input checked="" type="checkbox"/> ILLNESS		28. WORKPLACE IDENTIFIER 0 1 1 7 D A D O 1 1 3 A	
29. REVIEWING OFFICER Alton G. Wills, MD, Chief, Occupational Medicine Services					30. DATE (YYMMDD) 9/6/06 25

1. One-time treatment of minor scratches, cuts, burns, and splinters which do not require professional care.
2. See AFR 127-12.

31. BIOENVIRONMENTAL ENGINEERING SURVEY (Summarize investigation of patient's exposure. Indicate results of appropriate measurements and assessment of protective measures. Consultant reports of or in lieu of this survey should be referenced and attached.)

1. On 17 June 1996, Sgt Michael Keys, Bioenvironmental Engineering, conducted an Occupational Illness/Injury Evaluation of Mr. Daniel Nelson. Mr. Nelson is assigned to the F-111 Reseal Shop, LACPPF, and works full-time as a Fuel Systems mechanic, WG-8801. This evaluation was performed in accordance with AFI 48-101, The Aerospace Medical Program, and AFI 91-204, Investigating and Reporting Mishaps.

2. Findings:

a. According to the AF Form 190 we received, Mr. Nelson's exposures occurred between 1988 and 1994. His hobbies and work prior to 1988 is unknown.

b. Through interviewing, our office determined that Mr. Nelson performed numerous operations that involved hazardous chemicals. These operations included, but were not limited to the following:

(1) Mr. Nelson used methyl ethyl ketone (MEK) during fuel tank cleaning operations. MEK was applied by hand using brushes and rags. The solvent was left to dry for 60 minutes and employees then entered tanks for sealing operations. Air samples taken in the past have consistently shown exposures to MEK to be above the Short Term Exposure Limit. However, Mr. Nelson was provided an air line respirator, and the following personal protective equipment (PPE): cotton coveralls, Saranex coveralls with booties, head covers, nitrile or Chem-Pro gloves, hourly O₂ and LEL measurements, and an active confined space program which ensured exposures were kept to a minimum.

(2) In the past, old sealant had to be removed manually from the fuel tanks by scraping, brushing, and picking. These procedures may have contributed to Mr. Nelson's claim of cadmium exposure. Once again, air line respirator and proper PPE were available and worn during this operation.

(3) The current method involves spraying primer and sealant directly over the old sealant; eliminating the removal process. A white primer containing strontium chromate, MEK, and toluene is applied to the inside of the fuel tanks after the MEK wipedown. This process takes approximately 20-30 minutes. It is left to dry for 30 minutes, then a different individual enters the tank to apply a black sealant. Extensive air sampling was conducted by our office in 1991, 1992 and 1993. Again, results show exposures to various chemicals were above acceptable limits without the use of respiratory protection. Since these operations require the use of an airline respirator and PPE, no overexposures should have occurred.

(4) Through our investigation, it was not determined where exposures from asbestos and cyanide occurred.

c. Mr. Nelson is enrolled in the Respiratory Protection Program (RPP) and is fit tested on an annual basis. According to F-111 Reseal Unit's RPP Operating Instruction, respirators are issued to workers on a daily basis and returned to the LOX shop for cleaning, inspection, maintenance, storage and cartridge replacement at the end of each shift. Respirators are hand washed, double rinsed and disinfected (water is changed after each batch of respirators is cleaned). Mr. Nelson was trained on the procedures to follow if a defective respirator or failed respirator seal is encountered and cannot be corrected. These procedures include discontinuing use of the respirator, notifying the supervisor and obtaining a properly fitted/functional respirator.

3. Conclusions: Mr. Nelson was potentially exposed to MEK, strontium chromate, toluene and cadmium while employed as a fuel systems mechanic (WG-8801). Our investigation, however, could not determine where exposures from asbestos and cyanide occurred. Adequate personal protective equipment, to include respiratory protection, was available and used.

4. Recommendations: None at this time.

32. DATE

1 9 | 0 | 6 | 9 | 6

33. SURVEY PERFORMED BY

SGT MICHAEL KEYS

13

SEALANT PROCEDURES

Until the sample results from Brooks Laboratories are received the following procedures will be complied with during the spray sealant process:

A. All spraying will be completed on the off shift, swing shift (1530-2400), and work until the aircraft is completed. No spraying will take place on day shift (0700-1500). If possible spraying will be accomplished on weekends. In any case personnel will be minimum required in the affected area.

B. A 150 ft area around the aircraft will be roped off to keep unauthorized personnel out.

C. PPE required for personnel entering tank and standby personnel is:
(2) Coveralls, cotton inner and saranex outer, full face respirator and gloves.

PPE required for personnel 50' from aircraft accomplishing tasks other than a standby person is: (i) coverall, impervious, cartridge respirator, gloves and splash proof goggles or face shield when mixing sealant or using solvents. NOTE: COVERALLS WILL BE TAPED SO THAT NO SKIN IS EXPOSED.

D. Aircraft ventilation will be exhausted by 4 hoses tied into the existing ventilation system in building 251.

A HDU13/C cooler aircart will supply air to the tank being sprayed providing cool air ventilation.

Tank exits will be blocked off.

LEL will be taken while process is being accomplished IAW 127-2.

After spraying, the tank will be vented for a period of 48 hours. Personnel may enter tank when ALC is ~~tackie~~ with cotton coveralls, cartridge respirator and gloves.
E. Personnel working inside the fuel cells will have either received previous OJT training in the spray sealant or will be receiving OJT from previously trained personnel.

These procedures supersede the previous plan agreed upon 26 July 91 and will be applicable until Brooks lab results are accomplished.

COORD:

LABPF

DATE

14 Aug 91

SGB

DATE

14 Aug 91

Del J. Huffins 15 Aug 91

AL/OEMI Robert B. Watton 14 AUG 91

Atch 1

14

MEMO to FILE

27 Feb 97

SUBJ: F-1 tank, MEK washdown, evaluation of adequacy of ventilation to keep LEL below 10%, as required by Confined Space Entry Permit

0600-arrive at b250m- it is locked!

0615-leave for b251

0620- arrive: on site are myself; Reid Nieman and one other unrecognized and unintroduced man from I.A Safety; Flavia Moore; Herb Binford; assorted other personnel and F-111 resealers in process of suiting up with PPE. Work has not started yet as promised because, acc to Nieman, we were waiting for you. Nieman and his associate have very hostile attitude. I perceive. Nieman tells me "...we've lived with this system for 10 years now and why all the concern all of a sudden..."; Nieman states that I cannot go up to the F-1 tank, about to be MEK washed, because I do not have a respirator. I ask how I can tell that 10% of the LEL is being exceeded and how I can air sample if not allowed within '30 feet' of the operation. Nieman states that they will have someone checking the LEL and "...if we don't trust them to be honest and accurate...."

0622- I call the office and again at 0635- can not get thru to anyone. System needs to be changed!

0636- tell assembled group that I must leave to get sampling pumps and will be back in five!

0645+/- I return to B251. Mr. John Wilson of Base Safety is on the scene. I tell group that I will need to have workers I will have to hang pumps every 15 minutes to take STEL readings for MEK. Am told by Nieman and friend that this is impossible and "...we can't have people exiting every 15 mins from the tank..." I state that in reality, workers probably will have to exit every 5 minutes because <20 LELs will be reached even sooner than every 5 minutes. Nieman states that no sampling, basically, will be allowed. I concur, stating that we already know it is a health hazard and well controlled but that it is a safety hazard that is uncontrolled and state that I will not air sample this time.

0655+/- I look at ventilation system. Note 3 supply flex-ducts to tank F-1 and 3 to F-2. Later learn that only F-1 will be done and then F-2. Normally both are done simultaneously. Note that there are two exhaust headers off the top of the tank.

0700+/- I ask Ms Moore, et al., to explain the ventilation system and enquire if intrinsically safe lighting is being use. Am told yes to the lighting concern: "...has been approved by Base Safety Engineers..." Am told that 3 supply ducts from large air-conditioning blowers exhaust the tank being worked. I note that this was not the case when I sampled the A-1 tank weeks earlier. Told that supply not practical for A-1, 2 tanks. Told that forced air blowers used to be used but that this was discontinued with "Bio concurrence..." because oil was being deposited on tank walls with forced air blowers.

Atch 5

0700+/- Workers are ready to enter tank F-1. I tell Nieman that their entry permit (EP) states that operations must cease and desist when LEL reaches over 10%. He argues that they are allowed to go to 20% for spraying ops. I state that the last, not current, EP, states that 20% is only allowed during primer applications and that for MEK washdowns only 10% is allowed. Nieman again states that I am wrong and that he has been overseeing this operation for 10 years and he ought to know and that T.O. 1-1-3 states they are allowed to reach 20%. He says he can show me the T.O. or WP and I ask that he get it. He does not get them. Though I privately disagree I offer that I will take his word for it and will allow 20%.

(I notice that a 1/2- 1-pint spray bottle of MEK is taken into the tank rather than the 1 gallon of MEK in an open bucket that is the usual practice. I state to Nieman that apparently the problem of excessive LELs is occurring because of poor ventilation and because "...from what I understand from Rick Hite of Base Safety, you used to use only 4 or 5 ounces of MEK but gradually you have increased the amount to 1 gallon..." Ms Moore and Herb Binford stated this is not true that 4 or 5 ounces have never been used- always larger amounts. I state that I believe that the workers know that the LEL routinely exceeds 20% but work anyway. A nearby worker states this may be true and that the LEL exceeds 20% within the first few minutes of entry and washdown. Another worker states that they have no choice but to work under these conditions.

0705+/- (As I expected) after only 5 minutes in the F-1 fuel tank, the LEL exceeds 20% and the worker exits from the tank. Mr Nieman, Wilson, and Binford express strong concerns that the operation will "...last all day at this rate..." and express dismay that "...it is more of a safety hazard to have the workers come in and out of the tank every 5 minutes)

0710+/- LEL has apparently gone down below 20% and worker reenters F-1 fuel tank.

0715+/- Worker exits tank as LEL has gone above 20% again. At this point there is apparent general anger and dismay in everybody's reactions and statements. Mr. Wilson of Ground Safety states that the situation is ridiculous and that he is known as the safety guy that overlooks or bends the rules to "...get the job done...". More accusations and unpleasanties surface, none on my part as I am determined to act professionally. I calmly tell all that the T.O. and/or EP states that entry not allowed above 20% (in reality, above 10%) and that I have discovered that the LEL routinely goes over this and that "Bio was willing to work with you" because this is essentially a safety hazard. Reid Nieman states that I could have a 2-star general chewing me out if I continue to push the issue. At this point, I state that I am leaving, that it has been pointed out that a dangerous safety situation exists, and that if they need any further consult from Bio, to feel free to call me or my supervisor, Capt. Dove. Mr Wilson states that he will talk to a supervisor and get back to us. A copy of this memo will be placed into the 113A Case File and a 2954 notation made.

Jim McMenamin

cc: Capt Dove

15



DEPARTMENT OF THE AIR FORCE

77th AEROSPACE MEDICINE SQUADRON (AFMC)
MCCELLELLAN AIR FORCE BASE, CALIFORNIA

MEMORANDUM FOR SM-ALC/LAPFFC

24 MAR 1997

FROM: 77 AMDS/SGPB

SUBJECTS: Air Sampling Results and Lower Explosive Limit Readings, F-111 Reseal Shop, LAPFFC, Building 251 (0117-DADO-113A)

1. On 23 Jan 97, Mr. Jim McMenamin of the Bioenvironmental Engineering Flight took air samples during a methyl ethyl ketone (MEK) wipedown of A-1 and A-2 fuel tanks on an F-111 aircraft. While air sampling, lower explosive limit (LEL) readings were being taken to ensure that workers weren't working in a potentially explosive atmosphere. Ten minutes after the worker entered the A-1 tank and began working, a gas monitor was used to take an LEL reading. The meter registered 78% of the LEL in both the A-1 and A-2 tanks. The gas monitor probe was withdrawn from both tanks before the reading had stabilized. According to Technical Order 1-1-3, entry into a confined space is not allowed if the LEL measures over 20%. Your confined space permit does not allow entry into a confined space if the LEL reads over 10% when using chemicals other than spray sealant. In addition, 29 CFR 1910.146 (e)(5) and (e)(5)(ii) state that the entry supervisor shall cancel the entry permit and terminate entry when conditions arise in the confined space that are not allowed on the entry permit. Air Force Occupational Safety and Health Standard 91-25, Confined Spaces, states that an on-site supervisor will revoke the permit and contact Base Ground Safety when any entry conditions are not consistent with the Master Entry Plan. Since we worked with your shop and the Safety Office to identify possible ways of reducing the LEL, we will continue to monitor MEK wipedowns to ensure that the LEL does not reach an unacceptable level. Continue to use a minimum amount of MEK with a squirt bottle in the tank and take breaks whenever the LEL reads above 10%. Suggest the shop supervisor contact the Base Confined Space Team to amend the Confined Space Permit to allow 20% LEL when performing MEK wipedowns. To assist you in reducing the MEK levels, air blowers have also been located and will be used which will help dilute the air within the fuel tank during the MEK wipedown.

2. Results from the air sampling of MEK were received by our office from Armstrong Laboratory. Due to saturation of the sampling media, we can not quantify the exact results to the worker during the time sampled. However, the results indicate that the levels of MEK exceeded the allowable short-term exposure limit (STEL) of 300 parts per million. The STEL is the concentration to which workers can be exposed continuously for a short period of time, not to exceed 15 minutes while above the threshold limit value-time weighted average (TLV-TWA). The TLV-TWA is the average concentration for a conventional 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

SGB COORD & OFFICIAL FILE

3. It is assumed that this sampling regime is representative of all MEK wipedowns of F-111 aircraft fuel tanks. Respiratory protection currently in use (full-faced airline respirator in the pressure demand mode) is sufficient to protect employees from a health standpoint. However, as noted in paragraph 1 above, from a safety standpoint, the MEK wipedowns are not being accomplished in accordance with the confined space permit, which only allows a maximum of 10% LEL. Contact myself or Mr. McMenemy prior to performing the next MEK wipedown operation. We would like to observe the process and the LEL readings to see if the blowers aid in the dilution of the MEK.

4. If you have any questions or need any other assistance please feel free to call myself or Mr. McMenemy at 3-0311, Extensions 341 and 337, respectively.



LAUREL A. DOVE, Capt, USAF, BSC
Section Chief, Industrial Hygiene
Bioenvironmental Engineering Flight

cc:
SM-ALC/SEG (Rick Hight)
LAPMS (Reid Nieman)
LAPFFC (Pete Burch)

MEMORANDUM FOR THE RECORD (0117-DADO-113A)

FROM: 77AMDS/SGPB
3200 Peacekeeper Way #5
McClellan AFB, Ca, 95652-1030

Subject: MEK Wipedown Operation;

On 25 March 1997, A1C Sturgess observed and performed personnel air sampling during the MEK wipedown operation performed in the rear tanks of the F-111 aircraft. This sampling was accomplished after the Reseal workers were observed allowing LEL readings to go far beyond acceptable levels (40-180% are common readings) and not removing the worker from the tank as specified by the shops own operating instructions. I asked the Base Safety representative on the scene why this was being allowed and he replied that this was all an unnecessary "dog and pony show" and that the workers staying in the tanks was an acceptable risk. It was explained to me that if they followed their O.I. which states that the worker will be removed from the tank and the operation would stop anytime that the LEL exceeded 20%, that the work would never get down because the worker would be in for 3 minutes and out for 5. Therefore the Base Safety representative deemed the operation to be an acceptable risk. The samples were not able to be quantified due to chemical break-through, but we do know that the airborne concentration was at least between 6081 and 15,822 mg/M for a 15 minute period of time. The standard for a 15 minute concentration or Ceiling is 885 mg/M which is never to be exceeded, even instantaneously at anytime.

During the next operation there was only observation, this was attended by A1C Sturgess of the Bioenvironmental Engineering office, John Wilson of the Base Safety office, and Flavia Moore of the LA Directorate. During this operation they workers added another air supplying hose to the top of the aircraft and decreased the fan speed to reduce turbulence the LEL readings were decreased to below 20% as reported to me by the workers.

On 19 May 1997, A1C Sturgess observed the operation again, also in attendance were Tyron Hicks of the Base Safety office, and Flavia Moore, Reseal supervisor and John Decker of the LA Safety Directorate. During this operation the workers were working in the forward tanks rather than the rear, the LEL readings again exceeded the limit, they ranged from 40-175% through-out the course of the operation. The operation was not stopped as under the advise of Base Safety. The workers monitoring outside the tank were wearing Sarnex coveralls, full face air supplying respirators and paper hoods, workers were observed by A1C Sturgess wearing the hoods under the respirators. This was brought to the attention of the supervisor, Flavia Moore, no corrective action was taken.


Jared A. Sturgess, SrA, USAF
Bioenvironmental Engineering Flight



DEPARTMENT OF THE AIR FORCE

77th AEROSPACE MEDICINE SQUADRON (AFMC)
MCCLELLAN AIR FORCE BASE, CALIFORNIA

MEMORANDUM FOR SM-ALC/LAPFP

FROM: 77 AMDS/SGPB

SUBJECT: Air Sampling Results from Application of Methyl Ethyl Ketone
(MEK) component (2-part.), (0117-DADO-113A)

1. On 25 Mar 97, A1C Sturgess, from the Bioenvironmental Engineering Flight, (SGPB), conducted air sampling at the F-111 Reseal Unit shop in Bldg 251 during, an MEK wipedown operation. The purpose of the sampling was to determine if workers' airborne exposure concentration to methyl ethyl ketone (MEK), was above allowable levels. Prior samples had indicated this to be the case.
2. Air Force Occupational Safety and Health (AFOSH) Standard 48-8, "Controlling Exposures to Hazardous Materials," incorporates Air Force, OSHA, and the American Conference of Governmental Industrial Hygienists (ACGIH) airborne exposure limits. The most stringent limit is used, per Air Force practice and policy. The ACGIH lists an airborne Threshold Limit Value (TLV) for MEK of 590 milligrams/ cubic meter (mg/m^3) and a Short Term Exposure Limit (STEL) of 885 mg/m^3 . A STEL is a value determined for a period not to exceed 15 minutes. This value is higher than the 8 hour exposure limit because the worker is only performing the operation for a short time and does not accomplish the same task more than twice in one day. In this case, since only a 15-minute sample was obtained, results were compared against the STEL.
3. The worker sampled wore a full-faced MSA air-line respirator, Ansell-Edmont Chemi-Pro gloves, double Saranex coveralls and head and foot covers. Engineering controls consisted of (3) 5"-diameter flexible ducts which supply 200 cubic feet/minute (cfm) each to the A-1 tank and two similar ducts exhausting, , 250 cfm each from the tank.

a. Findings:

<u>DATE</u>	<u>WORKER</u>	<u>STEL</u>	<u>SAMPLE NUMBER</u>	<u>15 MIN CONC.</u>
25 Mar 97	Dan Bridges	885 mg/M^3	EZ970088	15822 mg/M^3
			EZ970089	8652 mg/M^3
			EZ970090	6081 mg/M^3

b. Conclusions/Recommendations: The above results indicate the worker was working in an environment that was exceeding the STEL, however the personal protective equipment (PPE)

issued to the workers protects them from any exposure to MEK. The supervisor should ensure that workers gloves are being changed out if necessary to prevent any MEK contact to their skin. The flexible supply/exhaust ducts attached to the tanks are meant to control the explosion hazard. The air-line respirators used by the workers operate in a pressure demand model and provides a protection factor of 1000 times the occupational exposure limit. Respiratory protection provided to the workers is adequate.

4. Actions required: The worker must be notified of the sampling results. The supervisor should continue to ensure that PPE and engineering controls are maintained.

5. If you have any questions on this report or the sampling results, please contact Capt Dove at 3-0311, extension 341, or A1C Sturgess at extension 325.



LAUREL A. DOVE, Capt, USAF, BSC
Section Chief, Industrial Hygiene
Bioenvironmental Engineering Flight

cc:

SM-ALC/LAP

SE

LAPMS

77 AMDS/SGPM

FOR OFFICIAL USE ONLY
AEROSPACE SAFETY AUTOMATION PROGRAM
LOCAL HAZARD ABATEMENT PROGRAM SUMMARY
AS OF: 1997/09/10 09:39

INFO COPY

PERIOD: 1997/03/03 TO 1997/03/03
MAJCOM: MTC STATUS: CLOSED RAC: 3

EVENT NUMBER: PRJY19970303012S

BASE: PRJY

UNIT: LAPH

DEFICIENCY: NO

CEI: 0

HAZARD CATEGORY SAFETY: YES

FIRE: NO

HEALTH: NO

METHOD OF ABATEMENT:

PDP:

FISCAL YEAR FUNDED: 1997

LOCATION: BLDG 251

DESCRIPTION:

HIGH LEL READING DURING MEK WIPE DOWN ON F-111 FUEL TANKS.

ABATEMENT ACTION

USE THE AIR DRIVEN ASSIST PUMPS, INSURE ALL VENTS ARE OPEN,
INSURE FLEXIBLE DUCT WORK IS SERVICEABLE, USE A LESS AMOUNT
OF MEK DURING WIPE DOWN. STD VIOLATED: T.O. 1-1-3

INTERIM CONTROL MEASURE:

CLOSING ACTION: HAZARD HAS BEEN ELIMINATED ACFT NO LONGER
BEING WORKED FOR FUELS.

PROJECT COST: 0

ABATEMENT COST: 0

COMPLETION DATE: 1997/08/05

ACTUAL/ESTIMATED: ESTIMATED

HAZARD POC: RIED NIEMAN

HAZARD POC OFFICE SYMBOL: LAP-1

POC DSN: DSN 633-5942

16

**INDUSTRIAL VENTILATION SURVEY
FACE VELOCITY METHOD**

DATE (YYMMDD) 9/10/91
 WORKPLACE IDENTIFIER 0117
 BASE B A D O
 ORGANIZATION 1131

(See this space for mechanical imprint)

BASE McClellan AFB
 ORGANIZATION LABPF

WORKPLACE F-111 Reseal

BLDG NO/LOCATION 251-roof
 ROOM/AREA high bay 102

Pm* = 1284

SURVEY INSTRUMENTATION

MANUFACTURER & MODEL Alnor 6000P
 SERIAL NUMBER Y-02
 CALIBRATION DATE (YYMMDD) 10/10/91

BASELINE SURVEY DATA

PROCESS OR SYSTEM EVALUATED

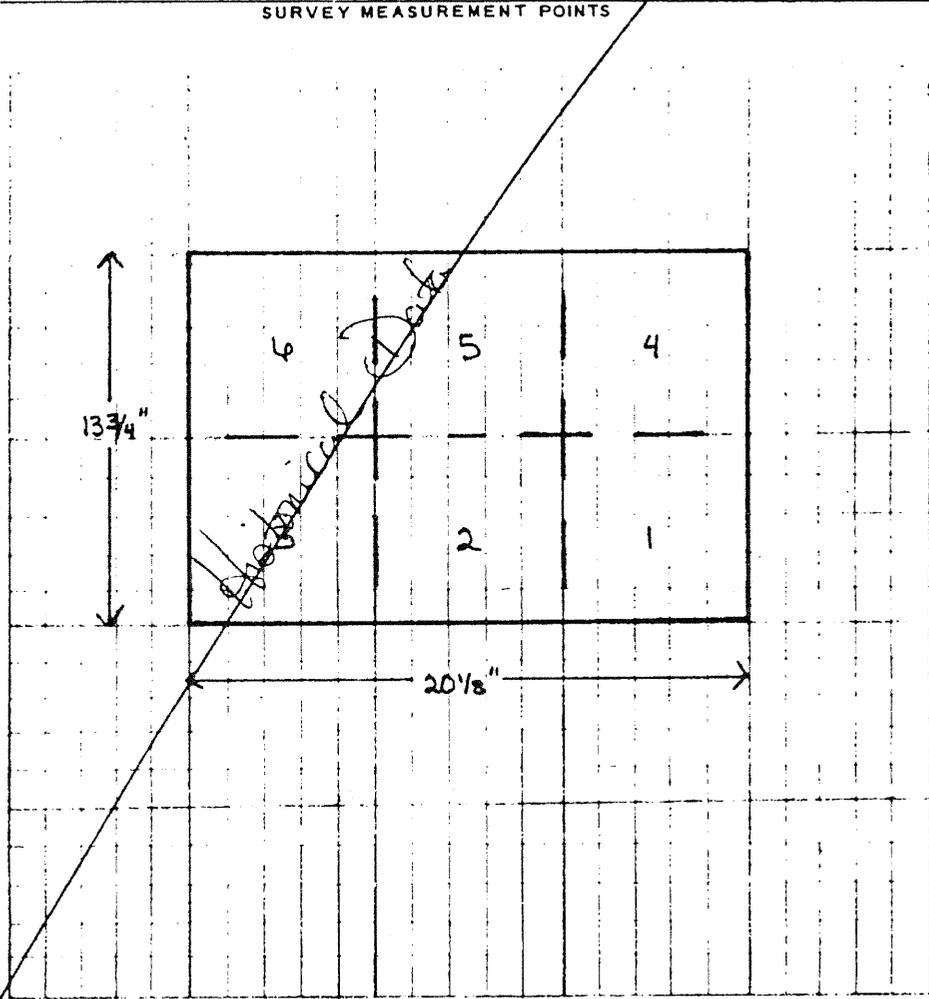
Suel Ventilation

LOCATION & SURVEY CONDITIONS

Roof of 251

POINT NO	VEL	POINT NO	VEL
1	1550	11	
2	1350	12	
3	1625	13	
4	850	14	
5	1400	15	
6	1750	16	
7		17	
8		18	
9		19	
10		20	
TOTAL	8525		

SURVEY MEASUREMENT POINTS



V_m = Average Velocity (fpm) 1421
 A = Area (sq ft) 1.93
 Q = Volume (cfm) 2742.53

CALCULATIONS & OTHER MEASUREMENTS

$$V_m = \frac{V_1 + V_2 + \dots + V_n}{n}$$

 = of readings

$A = L \times W$

$Q = V_m A$

The minimum airflow is 1000 fpm duct velocity IAW AFOSH Std 161-2, Section C, paragraph 3, sub-paragraph A(3)(C). Until air sampling can be conducted, the value for V_m will be used as baseline as of 17 Sept 91. This value will be used for quarterly checks and will be adjusted accordingly once air sampling can be performed.

Danielle L. Smith

[Signature]

SYSTEM MEETS CRITERIA
 YES NO

SU Danielle L. Smith, USAF (FSC)
 Industrial Hygiene Technician

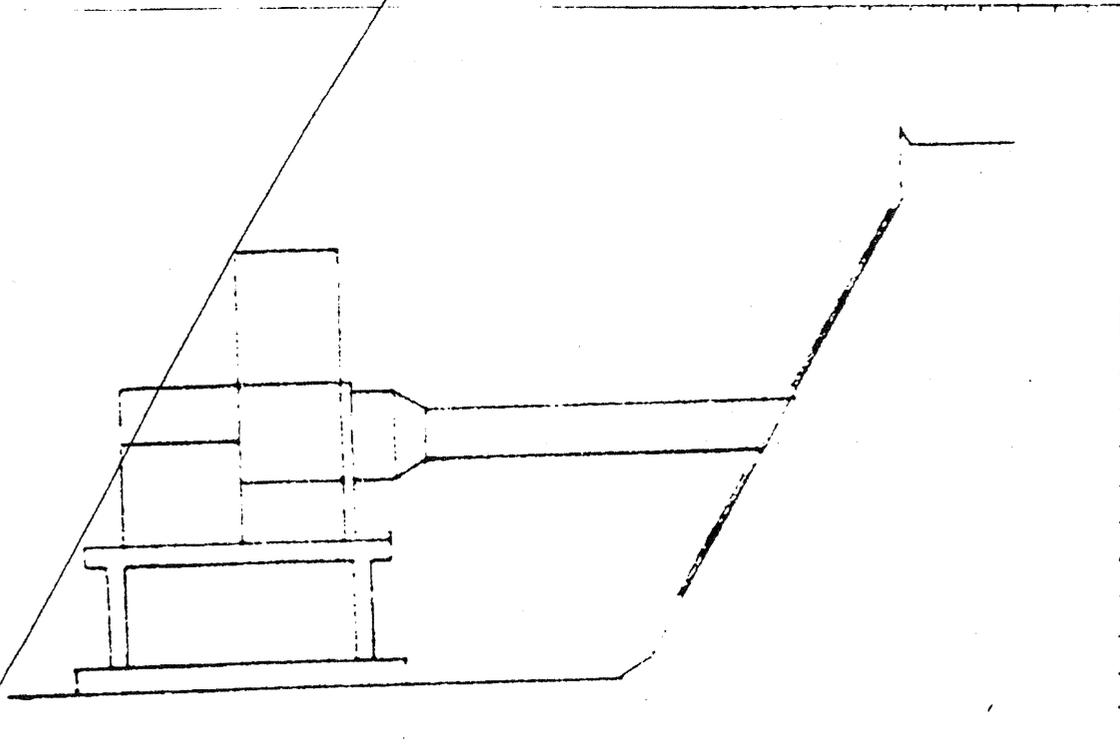
DALE E. GRIFFIN, GS-11-000
 Environmental Engineering Services
 Industrial Hygienist

QUARTERLY CHECKS

CHECK PARAMETER STATIC PRESSURE OTHER Pressure LOCATION 3 + 4 ACCEPTABLE RANGE (low - 5% airflow reduction) 21421 fpm 1280 fpm

ATE (YYMMDD)	MEASUREMENT		SURVEY INSTRUMENT			SURVEYED BY (Name, Grade, AFSC)
	VALUE	WITHIN RANGE	MANUFACTURER & MODEL	SERIAL NUMBER	CAL DATE (YYMMDD)	
9311021	2337 fpm	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Sierra 617	2236	92103117	Sgt Dugan 90750
9411025	636 fpm	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	Alnor 6000P	2182	94106117	David Vanatta 65-480-11
9412115	1075	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	Alnor 6000P	52182	94106117	David Vanatta 65-480-11
9511115	1152	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	Trisense 637	Fm 2048	95108117	Jim M. Norton 65-690
950249	883 fpm	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	Dwyer Series 470	0698059	9510727	NARDUCI GS-640-09
960509	1443 fpm	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	TRISENSE 637	Fm 2048	95108117	NARDUCI GS-640-09
960716	1280 fpm	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	TRISENSE 637	5562	95108117	NARDUCI GS-640-09
9611024		<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			Miller, AIC, 4B031
9701130	1013 fpm	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	Tri. Sense 637	M93004973	916112110	Miller, AIC, 4B031
970311		<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			Miller, AIC, 4B031
9707109		<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			Sturgess, AIC, 4B031
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				

TEST LOCATION DIAGRAM



INDUSTRIAL VENTILATION SURVEY
FACE VELOCITY METHOD

DATE (YYMMDD) 9,11,91
 WORKPLACE IDENTIFIER 0117 DAD 0113A

Use this space for mechanical imprint

BASE McClellan AFB ORGANIZATION LABPF

WORKPLACE E-11 Rescal

BLDG NO/LOCATION 251 - roof ROOM/AREA high bay 1+2

Pm* - 1275

SURVEY INSTRUMENTATION

MANUFACTURER & MODEL Alnor 6000P SERIAL NUMBER Y-02 CALIBRATION DATE (YYMMDD) 9,11,91

BASELINE SURVEY DATA

PROCESS OR SYSTEM EVALUATED

Suel Ventilation

LOCATION & SURVEY CONDITIONS

Roof of 251

POINT NO	VEL	POINT NO	VEL
1	1200	11	
2	1000	12	
3	1150	13	
4	850	14	
5	700	15	
6	1350	16	
7		17	
8		18	
9		19	
10		20	

TOTAL 6250

V_m = Average Velocity (fpm) 1042

A = Area (sq ft) 1.63

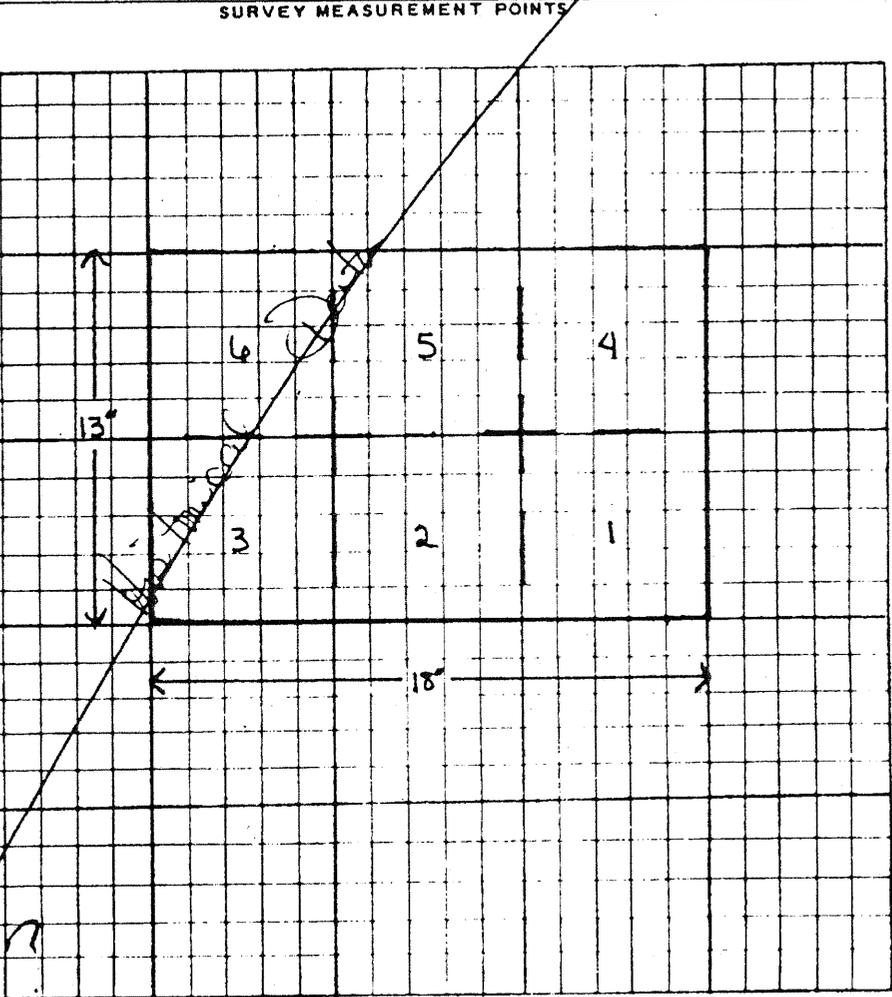
Q = Volume (cfm) 1698

CALCULATIONS & OTHER MEASUREMENTS

$V_m = \frac{V_1 + V_2 + \dots + V_n}{\text{# of readings}}$

$A = L \times W$

$Q = V_m A$



The minimum airflow is 1000 fpm. Test velocity 1AW AFOSH Std 101-2, Section C, paragraph 3, sub-paragraph A(2)(f). Until air sampling can be conducted, the value for V_m will be used as baseline as of 17 Sept 91. This value will be used for quarterly checks and will be adjusted accordingly once air sampling can be performed.

Danell L. Smith
 Industrial Hygiene Technician

REVIEWED BY: [Signature]
 DATE: 09-11-91
 Environmental Engineering Services
 Industrial Hygienist

SYSTEM MEETS CRITERIA
 YES NO

QUARTERLY CHECKS

CHECK PARAMETER

LOCATION

ACCEPTABLE RANGE (at 5 10% air flow reduction)

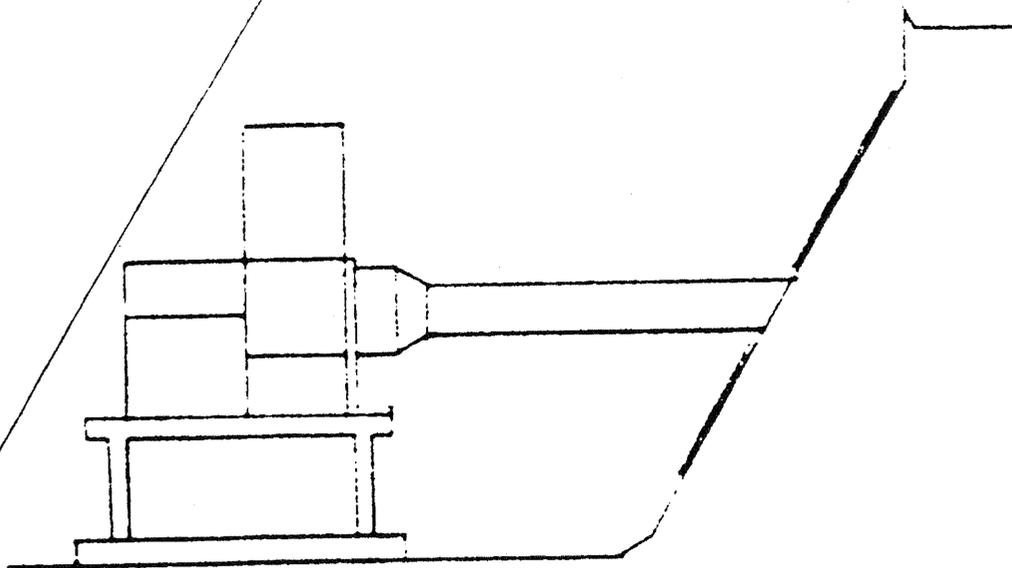
STATIC PRESSURE OTHER

inoperable 3 + 4

> 90% static pressure

SITE (MMDD)	MEASUREMENT		SURVEY INSTRUMENT			SURVEYED BY (Name, Grade, AFSC)
	VALUE	WITHIN RANGE	MANUFACTURER & MODEL	SERIAL NUMBER	CAL DATE (YYMMDD)	
9311021	533 fpm	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	Sierra 617	2236	912013117	SRA Dugan 90750
9411026	inoperable	<input type="checkbox"/> Y <input type="checkbox"/> N	inoperable			
9411027	1008	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Alnor 6000P	0437	911014117	D Venath GS690
9511118	1536	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Trisense 637	FM2048	951081114	J. McManis 61-090
960229		<input type="checkbox"/> Y <input type="checkbox"/> N	OUT OF SERVICE			NARDUCCI GS64009
960509	416 fpm	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	TRISENSE 637	FM2048	950814	NARDUCCI GS64009
960716	188 fpm	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	TRISENSE 637	5362	950814	NARDUCCI GS64009
9611024	806 fpm	<input type="checkbox"/> Y <input type="checkbox"/> N	Alnor 6000-P	54356	915019121	Miller, AIC 48031
9709130		<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			Miller, AIC 48031
9703111		<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			Miller, AIC 48031
970709		<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			Sturgess, AIC 48031
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				

TEST LOCATION DIAGRAM



INDUSTRIAL VENTILATION SURVEY
FACE VELOCITY METHOD
use this space for mechanical imprint)

DATE (YYMMDD) 9,10,91,7
 WORKPLACE IDENTIFIER 0117 2130 1134

BASE McClellan AFB ORGANIZATION LABPF

WORKPLACE F-111 Reseal

BLDG NO/LOCATION 251-roof ROOM/AREA high bay 1+2

Pm*- 1931

SURVEY INSTRUMENTATION

MANUFACTURER & MODEL Alder 6000P SERIAL NUMBER Y-02 CALIBRATION DATE (YYMMDD) 9,10,41,91

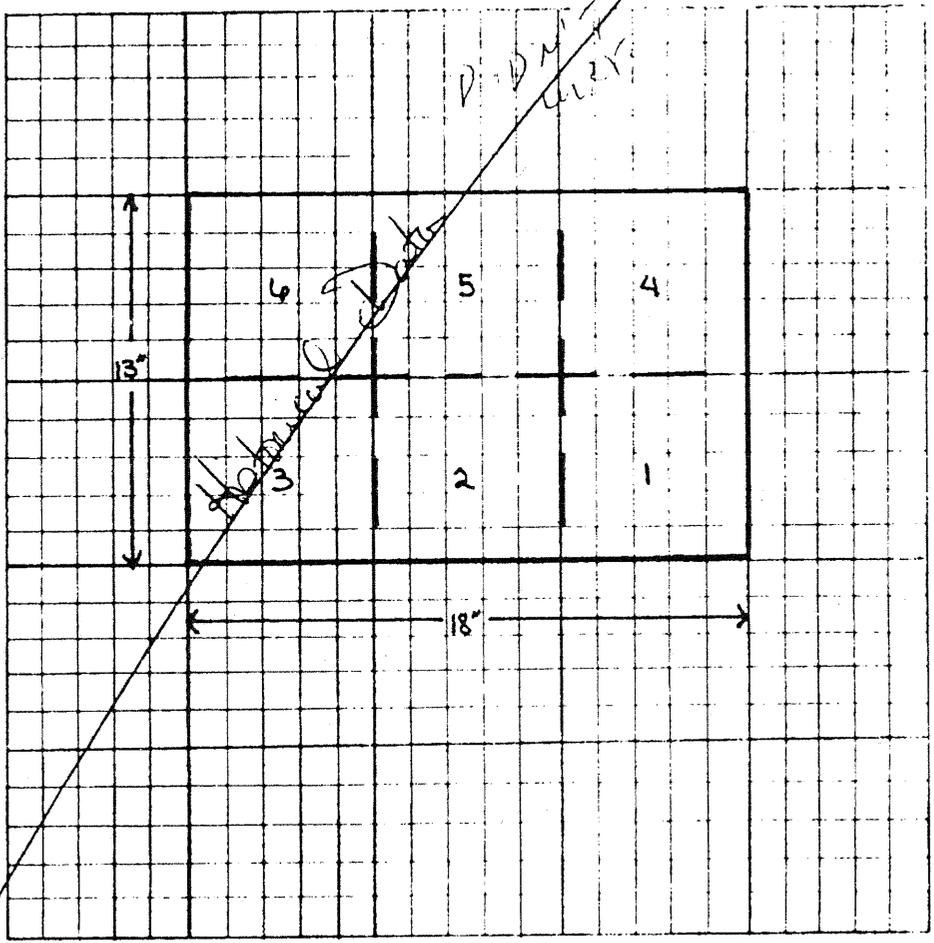
BASELINE SURVEY DATA

PROCESS OR SYSTEM EVALUATED Fuel Ventilation

SURVEY MEASUREMENT POINTS

LOCATION & SURVEY CONDITIONS Roof of 251

POINT NO	VEL	POINT NO	VEL
1	1400	11	
2	1200	12	
3	1100	13	
4	600	14	
5	900	15	
	1500	16	
7		17	
8		18	
9		19	
10		20	
TOTAL	6700		



$V_m = \text{Average Velocity (fpm)}$ 1117
 $A = \text{Area (sq ft)}$ 1.63
 $Q = \text{Volume (cfm)}$ 182071

CALCULATIONS & OTHER MEASUREMENTS

$V_m = \frac{V_1 + V_2 + \dots + V_n}{\text{# of readings}}$

$A = L \times W$

$Q = V_m A$

The maximum airflow is 1000 cfm that velocity is 1000 fpm AFOSH Std 101-2, section E, paragraph 1, sub-paragraph A(3)(c). Until air sampling can be conducted, the value for V_m will be used as baseline as of 17 Sept 91. This value will be used for quarterly checks and will be adjusted accordingly once air sampling can be performed.

Danell L. Smith
 Industrial Hygiene Technician

DALE E. GOSPE, CST-690
 Environmental Engineering Services
 Industrial Hygienist

SYSTEM MEETS CRITERIA
 YES NO

QUARTERLY CHECKS

CHECK PARAMETER

LOCATION

ACCEPTABLE RANGE (for $\leq 10\%$ airflow reduction)

STATIC PRESSURE OTHER

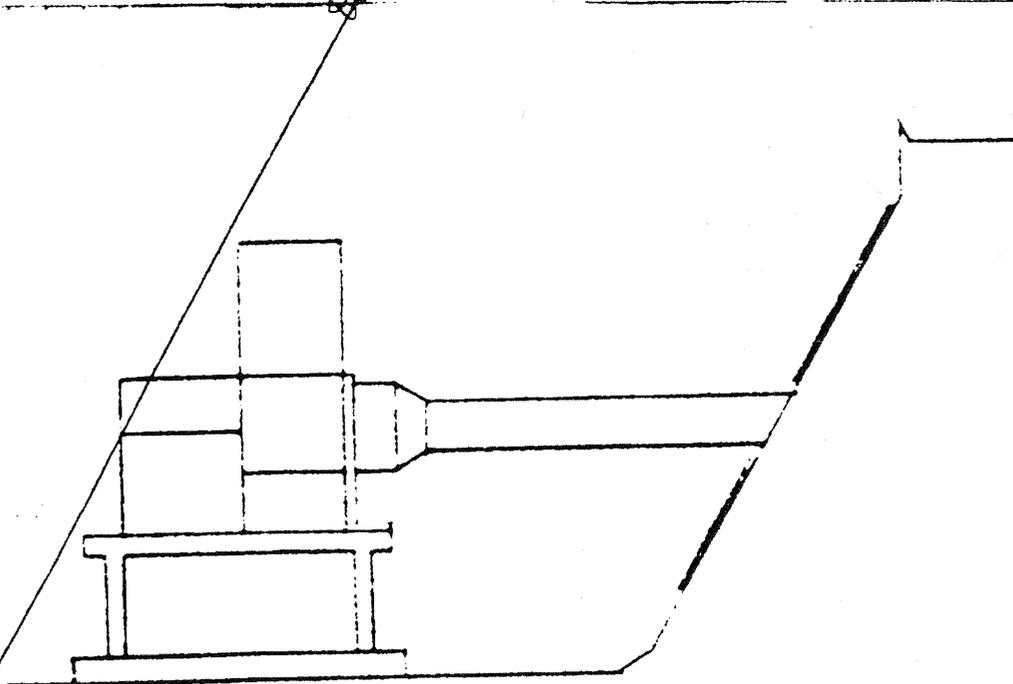
3000-3000 fpm

3+4

> 117 fpm

DATE (MMDD)	MEASUREMENT		SURVEY INSTRUMENT			SURVEYED BY (Name, Grade, AFSC)
	VALUE	WITHIN RANGE	MANUFACTURER & MODEL	SERIAL NUMBER	CAL DATE (YYMMDD)	
		<input type="checkbox"/> Y <input type="checkbox"/> N				
<i>9/31/02/21</i>	<i>1450 fpm</i>	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	<i>Sierra 617</i>	<i>2236</i>	<i>9/21/03/17</i>	<i>SRA Dugan 90720</i>
<i>9/11/02/26</i>	<i>1136 fpm</i>	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	<i>Alnor 6000P</i>	<i>2182</i>	<i>9/11/06/17</i>	<i>David Van Dyke GS-650-11</i>
<i>9/19/02/21</i>	---	<input type="checkbox"/> Y <input type="checkbox"/> N	OUT OF SERVICE			NARDUCE GS-640-09
<i>9/4/05/09</i>	<i>1049 fpm</i>	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	<i>TRISENSE 637</i>	<i>7712042</i>	<i>9/10/08/14</i>	<i>NARDUCE GS-640-09</i>
<i>9/10/07/16</i>	<i>805 fpm</i>	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	<i>TRISENSE 637</i>	<i>5562</i>	<i>9/6/08/14</i>	<i>NARDUCE GS-640-09</i>
<i>9/6/10/24</i>	<i>783 fpm</i>	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	<i>Alnor 6000-P</i>	<i>54356</i>	<i>9/15/09/21</i>	<i>Miller, AIC, 4B031</i>
<i>9/9/01/30</i>	---	<input type="checkbox"/> Y <input type="checkbox"/> N	Out of service			Miller, AIC, 4B021
<i>9/7/03/16</i>	---	<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			Miller, AIC, 4B031
<i>9/7/07/09</i>	---	<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			Stagers, AIC, 4B031
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				

TEST LOCATION DIAGRAM



INDUSTRIAL VENTILATION SURVEY FACE VELOCITY METHOD	DATE (YYMMDD)	WORKPLACE IDENTIFIER
	9,11,09,11,7	0117 DAD0 113A

(use this space for mechanical imprint)

BASE	ORGANIZATION
McClellan AFB	LABPF
WORKPLACE	
F-111 Rescal	
BLDG NO / LOCATION	ROOM / AREA
251 - roof	high bays 1+2

Pm # 0336

SURVEY INSTRUMENTATION

MANUFACTURER & MODEL	SERIAL NUMBER	CALIBRATION DATE (YYMMDD)
Alnor 1000P	Y-02	19,11,0,4,1,9

BASELINE SURVEY DATA

PROCESS OR SYSTEM EVALUATED

Just Ventilation

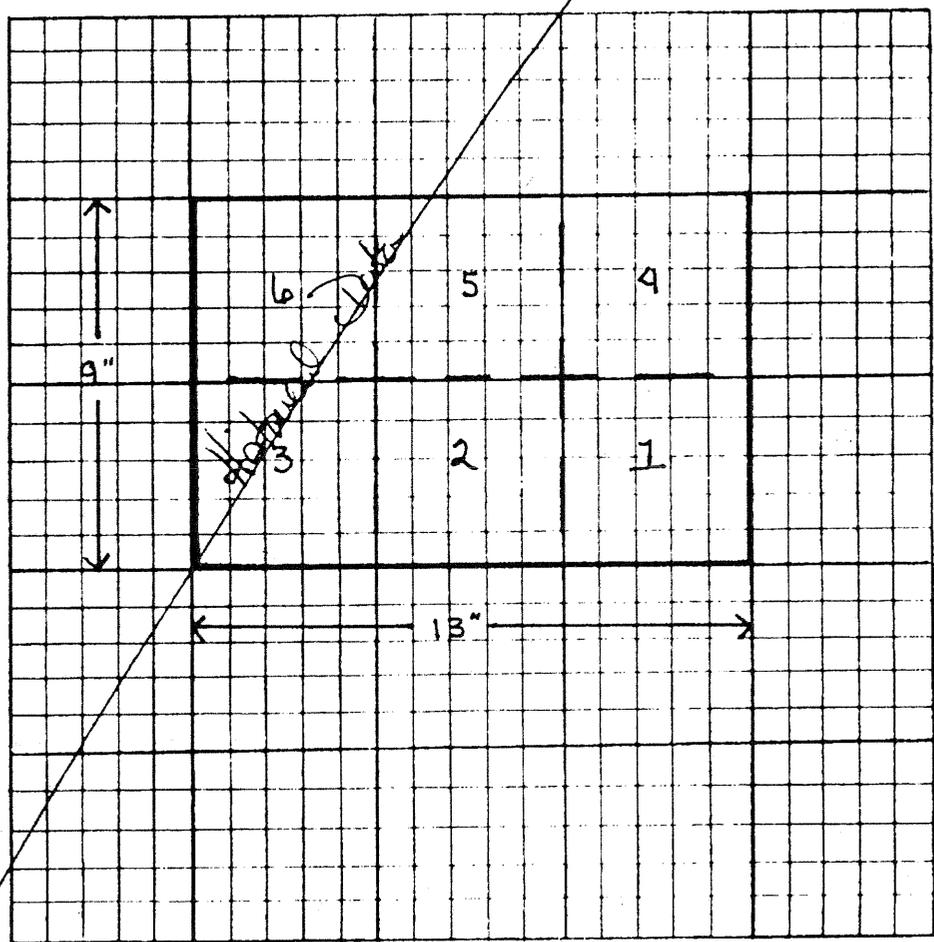
LOCATION & SURVEY CONDITIONS

Roof of 251

POINT NO	VEL	POINT NO	VEL
1	1750	11	
2	1400	12	
3	1350	13	
4	4500	14	
5	4600	15	
	3800	16	
		17	
8		18	
9		19	
10		20	
TOTAL	17400		

V_m = Average Velocity (fpm)	2900
A = Area (sq ft)	0.813
Q = Volume (cfm)	2357.7

SURVEY MEASUREMENT POINTS



CALCULATIONS & OTHER MEASUREMENTS

$V_m = \frac{V_1 + V_2 + \dots + V_n}{n}$
of readings

$A = L \times W$

$Q = V_m A$

The minimum airflow is 1000 fpm direct velocity 1AW AFOSH Std 161-2, Section C, Paragraph 3, sub-paragraph A(3)(c). Until air sampling can be conducted, the value for V_m will be used as baseline as of 17 Sept 91. This value will be used for quarterly checks and will be adjusted accordingly once air sampling can be performed.

Dorelle L. Smith
Dorelle L. Smith, USA
Industrial Hygiene Technicians

REVIEWED BY: *[Signature]*
DALE E. GILBERT, GS-11-690
Bioenvironmental Engineering Services
Industrial Hygienist

SYSTEM MEETS CRITERIA	SURVEYED BY (NAME AND TITLE)	REVIEWED BY (NAME AND TITLE)
<input type="checkbox"/> YES <input type="checkbox"/> NO		

QUARTERLY CHECKS

CHECK PARAMETER

STATIC PRESSURE OTHER

MANUFACTURER MAKE & MODEL

LOCATION

ACCEPTABLE RANGE (for $\leq 10\%$ airflow reduction)

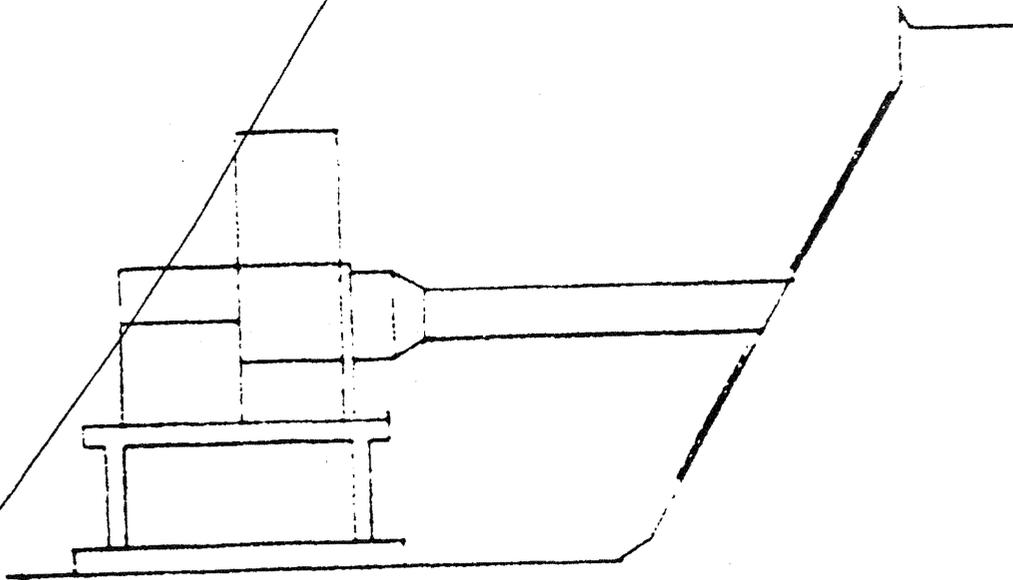
3 + 4

2988 fpm

DATE (MMDD)	MEASUREMENT		SURVEY INSTRUMENT			SURVEYED BY (Name, Grade, AFSC)
	VALUE	WITHIN RANGE	MANUFACTURER & MODEL	SERIAL NUMBER	CAL DATE (YYMMDD)	
9.31.10.21	1983 fpm	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Sierra 617	2236	9.21.0.3.17	SRA Dugan 90750
9.4.10.27	1891 fpm	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	Alnor 6000p	2182	9.4.10.6.17	David Van R. H. GS-650-11
9.5.10.11.5	1917	<input checked="" type="checkbox"/> Y <input checked="" type="checkbox"/> N	SMILES TRENDS 637	EM2048	9.5.10.8.17	ME-Name GS-698
9.6.10.21.9		<input type="checkbox"/> Y <input type="checkbox"/> N	OUT OF SERVICE			NARDUCCI GS-640-09
9.6.10.5.09		<input type="checkbox"/> Y <input type="checkbox"/> N	OUT OF SERVICE			NARDUCCI GS-640-09
9.6.10.7.16		<input type="checkbox"/> Y <input type="checkbox"/> N	OUT OF SERVICE			NARDUCCI GS-640-09
9.6.11.0.12.4		<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			Miller, AIC, 4B031
9.7.9.1.30		<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			Miller, AIC, 4B031
9.7.10.3.14		<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			Miller, AIC, 4B031
9.7.10.7.09		<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			Sturgess, AIC, 4B031
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				

No Physical Data

TEST LOCATION DIAGRAM



INDUSTRIAL VENTILATION SURVEY
FACE VELOCITY METHOD

DATE (YYMMDD) **9,11,91** WORKPLACE IDENTIFIER **0117** **DA** **0113**

Use this space for mechanical imprint

BASE **mcclellan AFB** ORGANIZATION **LABPF**

WORKPLACE **F-111 Rescal**

BLDG NO/LOCATION **251-roof** ROOM/AREA **high bay 1+2**

Pm* - 1287

SURVEY INSTRUMENTATION

MANUFACTURER & MODEL **Olmer W000P** SERIAL NUMBER **Y-02** CALIBRATION DATE (YYMMDD) **19,11,91**

BASELINE SURVEY DATA

PROCESS OR SYSTEM EVALUATED

Fuel Ventilation

LOCATION & SURVEY CONDITIONS

Roof of 251

POINT NO	VEL	POINT NO	VEL
1	500	11	
2	300	12	
3	350	13	
4	500	14	
5	400	15	
	500	16	
7		17	
8		18	
9		19	
10		20	

TOTAL **2550**

V_m = Average Velocity (fpm) **425**

A = Area (sq ft) **1.63**

Q = Volume (cfm) **692.75**

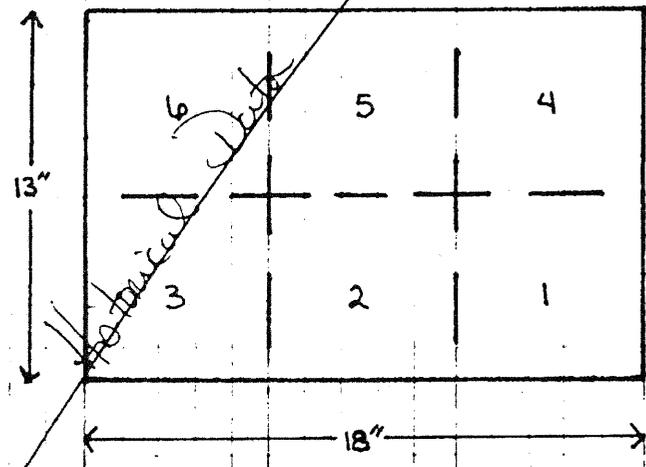
CALCULATIONS & OTHER MEASUREMENTS

$V_m = \frac{V_1 + V_2 + \dots + V_n}{n}$
 * of readings

A = L x W

Q = V_mA

SURVEY MEASUREMENT POINTS



System in use during survey

The minimum distance is 100 fpm that velocity law AFCH - 1st 1st-2, section C, range 8 fpm, sub-procedure A(3)(c). Until air sampling can be conducted, the value for V_m will be used as baseline as of 24 Sept 91. This value will be adjusted accordingly once air sampling can be performed.

Darrell L. Smith

SYSTEM MEETS CRITERIA
 YES NO

SURVEYED BY **Darrell L. Smith, USAF**
 Industrial Hygiene Technician

REVIEWED BY (Name, Grade, AFSC)

QUARTERLY CHECKS

CHECK PARAMETER

LOCATION

ACCEPTABLE RANGE (60% S 10% airflow reduction)

STATIC PRESSURE

OTHER: Static Velocity

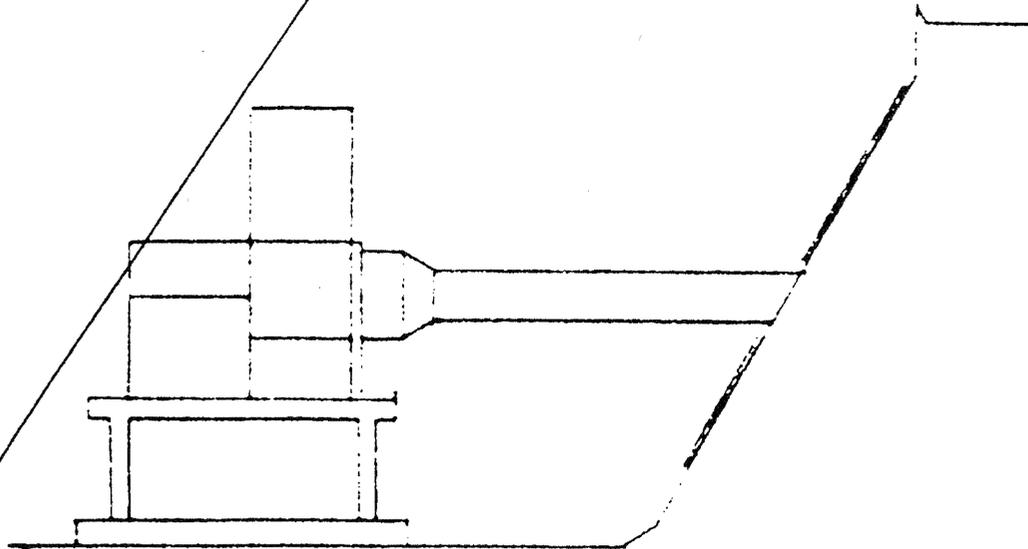
3+4

1000 fpm

DATE (MMDD)	MEASUREMENT		SURVEY INSTRUMENT			SURVEYED BY (Name, Grade, AFSC)
	VALUE	WITHIN RANGE	MANUFACTURER & MODEL	SERIAL NUMBER	CAL DATE (YYMMDD)	
		<input type="checkbox"/> Y <input type="checkbox"/> N				
9.31.01.21	1133 fpm	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Sierra 617	2236	9.20.31.17	SRA Jagan 90752
9.41.02.16	411 fpm	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	Alnor 6000P	2182	9.410.611.7	Vanatta D. 65-640-11
9.41.21.15	1058	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Alnor 6000P	52182	9.40.01.17	David Venette 65-640
9.51.11.15	919	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Trisense 637	FM2048	9.510.811.17	J. McNeven 65-640
9.6.02.20	1400 fpm	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Dwyer series 470	CL 83659	9.510.7.27	NARDUCCI 65-640-07
9.6.05.09		<input type="checkbox"/> Y <input type="checkbox"/> N	OUT OF SERVICE			NARDUCCI 65-640-09
9.6.07.10	1321 fpm	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	TRISENSE 637	5562	9.510.811.17	NARDUCCI 65-640-09
9.6.11.02.24		<input type="checkbox"/> Y <input type="checkbox"/> N	Out of Service			Miller, AIC, 4B031
9.7.01.13.30	568 fpm	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	Tri-Sense 637	M93004973	9.6.1.2.10	Miller, AIC, 4B031
9.7.10.31.11		<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			Miller, AIC, 4B031
9.7.07.14.9		<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			Sturgess, AIC, 4B031
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				

TEST LOCATION DIAGRAM

Vertical duct



INDUSTRIAL VENTILATION SURVEY FACE VELOCITY METHOD		DATE (YYMMDD) 9/11/09/24	WORKPLACE IDENTIFIER 0117 DAD0 113A		
<small>(See this space for mechanical imprint)</small> Pm*-1274		BASE McClellan AFB	ORGANIZATION LABPF		
		WORKPLACE F-111 Reseal			
		BLDG NO/LOCATION 251-roof	ROOM/AREA high bay 1+2		
SURVEY INSTRUMENTATION					
MANUFACTURER & MODEL Alnor 6000P		SERIAL NUMBER Y-02	CALIBRATION DATE (YYMMDD) 19/11/04/19		
BASELINE SURVEY DATA					
PROCESS OR SYSTEM EVALUATED Aul Ventilation		SURVEY MEASUREMENT POINTS 			
LOCATION & SURVEY CONDITIONS Roof of 251					
POINT NO	VEL			POINT NO	VEL
1	1800			11	
2	1600			12	
3	1950			13	
4	950			14	
5	1450			15	
6	1150			16	
7				17	
8		18			
9		19			
10		20			
TOTAL	8900				
V _m = Average Velocity (fpm)		483			
A = Area (sq ft)		1.63			
Q = Volume (cfm)		2393.3			
CALCULATIONS & OTHER MEASUREMENTS					
$V_m = \frac{V_1 + V_2 + \dots + V_n}{n}$ $A = L \times W$ $Q = V_m A$		<p>The minimum airflow is 1 m³/min but velocity 1AW AFOSH Std 101-2, Section C, para 3, sub-paragraph A(2)(c). Until air sampling can be conducted, the value for V_m will be used as baseline as of 24 Sept 91. This value will be adjusted accordingly once air sampling can be performed.</p>			
SYSTEM MEETS CRITERIA <input type="checkbox"/> YES <input type="checkbox"/> NO		SURVEYED BY (Name, Grade, AFSC) Danielle L. Smith, USAF Industrial Hygiene Technician			
		REVIEWED BY (Name, Grade, AFSC)			

QUARTERLY CHECKS

CHECK PARAMETER

LOCATION

ACCEPTABLE RANGE (for $\leq 10\%$ airflow reduction)

STATIC PRESSURE OTHER

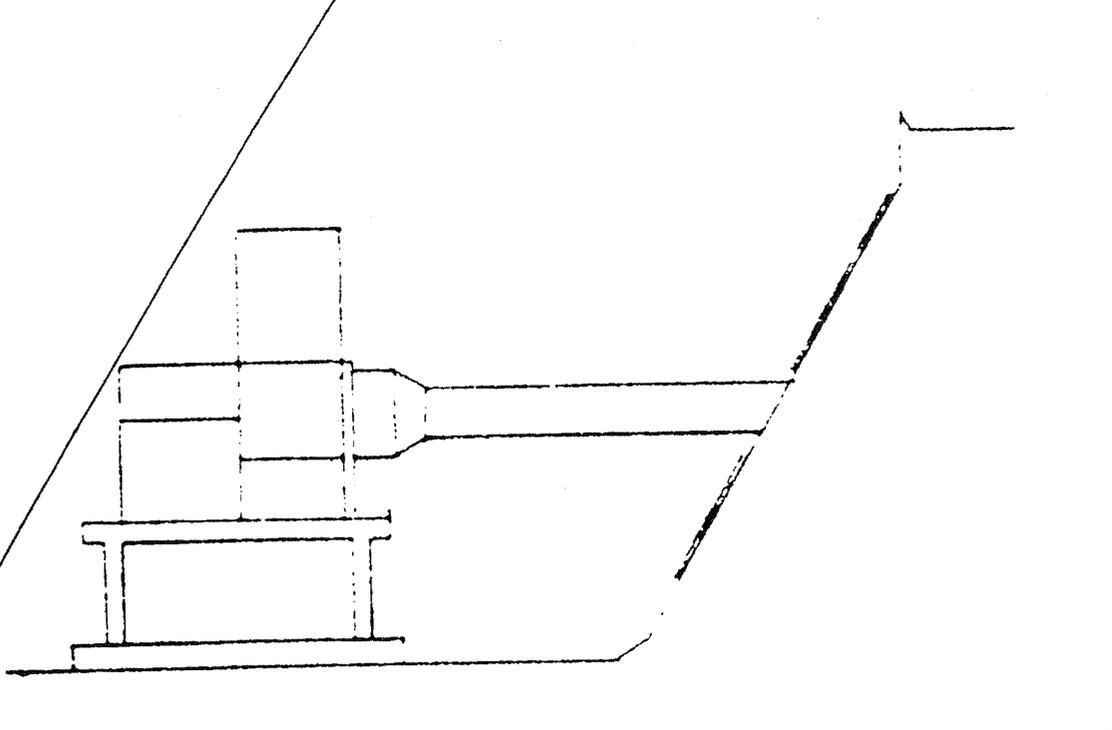
air velocity

3+4

1422 fpm 71335

DATE (MMDD)	MEASUREMENT		SURVEY INSTRUMENT			SURVEYED BY (Name, Grade, AFSC)
	VALUE	WITHIN RANGE <input type="checkbox"/> Y <input type="checkbox"/> N	MANUFACTURER & MODEL	SERIAL NUMBER	CAL DATE (YYMMDD)	
9311021	767 fpm	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	Sierra 617	2236	92101317	SEA Duggan 90750
9411026	860	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	Alnor 6000P	2182	94101617	David Vanatta 65-690-11
9511115	1085	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	Tri-Sense 637	FM2048	95101817	J.M. Yonah 65-690
9610201	1242 fpm	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	Dwyer series 470	FM2048 TMOE# 0488659	95101127	NARDUCE 6564009
960501		<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			NARDUCE 6564009
960716	1042 fpm	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	TRISENSE 637	5322	95101814	NARDUCE 65-640-09
9610124	670 fpm	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	Alnor 6000P	53456	95101921	Miller, AIC, 48031
9719130		<input type="checkbox"/> Y <input type="checkbox"/> N	out of service			Miller, AIC, 48031
97103111	801 fpm	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	Tri-Sense 637	493004793	916112110	Miller, AIC, 48031
9719109		<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	out of service			Stungess, AIC, 48031
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				
		<input type="checkbox"/> Y <input type="checkbox"/> N				

TEST LOCATION DIAGRAM



17

21 Jan 99

SMALC/LA comments reference 6 Jan 99 SSS, subject Letter Response to Congressional Correspondence

One of the documents ~~being~~ released to Mr Nelson, Form 190, Occupational Illness /Injury Report, contains a paragraph in the findings (b(4)) that states "LA Safety personnel and LA management were documented as stating to overlook/bend the rules to get the job done".

Col Lloyd and Col Chandler discussed this comment and determined that it was not accurate. While the document itself can not be changed, Col Chandler will have his personnel supplement the document with an accurate statement. Additionally, the colonels agreed that they would work together to document an accurate picture of the environment that Mr Nelson worked in, including the requirement to wear PPP and the degree of exposure (or non-exposure) to chemicals based on the duties that Mr Nelson was performing at the time.



CONNIE LLOYD, Col, USAF
Director
Aircraft Management

18

file

OCCUPATIONAL ILLNESS / INJURY REPORT

(THIS FORM IS SUBJECT TO THE PRIVACY ACT OF 1974 - Use Blanket PAS - DD Form 2005)

PATIENT IDENTIFICATION

I. NAME (Last, First, MI) elson, Daniel; 2. SSAN 569768214; 3. GRADE WG 8; 4. SEX M; 5. AGE 44; 6. WORK LOCATION Bldg 251; 7. DUTY PHONE 3-6120; 8. ORGANIZATION AND SYMBOL LA/LAPFFE; 9. INSTALLATION McClellan AFB, Ca MUOFFGLV; 10. OCCUPATION (Job Title/AFSC) Metal Tank Sealer/8801; 11. SUPERVISOR (Name and Duty Phone) none

II. INCIDENT / ILLNESS DATA

12. DATE AND TIME OF EXPOSURE: 1986; ILLNESS: Oct 95; 13. STATUS AT TIME OF EXPOSURE: ON DUTY; 14. DURATION OF EXPOSURE: approx 8 hours/day; 15. WITNESS (Name and Phone) none; 16. DESCRIPTION OF SYMPTOMS AT ONSET OF ILLNESS: R hand/wrist pain.

III. MEDICAL DATA

17. DIAGNOSIS AND RELEVANT MEDICAL DATA (Indicate affected body parts): CTS, ICD9: 354.0; 18. CLASSIFICATION: OCCUPATIONAL SKIN DISEASE (21), DUST DISEASE OF LUNGS (22), RESPIRATORY CONDITION DUE TO TOXIC AGENT (23), SYSTEMATIC EFFECT OF TOXIC MATERIAL (poisoning) (24), DISORDER DUE TO PHYSICAL AGENT (Other than toxic material) (25), DISORDER DUE TO REPEATED TRAUMA (Exclude hearing loss) (26), OTHER OCCUPATIONAL DISEASE (29); 19. FATALITY: NO; RESULTED IN UNCONSCIOUSNESS: NO

19. DATE/TIME OF INITIAL TREATMENT/DIAGNOSIS: 6 May 96/1325; 20. MEDICAL FACILITY: 77 AMDS/SGPFO McClellan AFB, Ca; 21. TREATMENT ADMINISTERED (Check One): FIRST AID: NO; DEFINITIVE CARE: YES

22. DISPOSITION OF PATIENTS: YES/NO table with columns for RETURN TO NORMAL DUTY, REFER TO PRIVATE PHYSICIAN, EXCUSED FOR REST OF DUTY DAY, ADMITTED TO HOSPITAL, PLACED ON QUARTERS, RETURN TO LIMITED DUTY

23. NAME OF MEDICAL OFFICER: Connie Slavich, RN BSN, 139-42-9080; DSN 633-8454; 24. REMARKS: RX: Continue F/U with PMD, Limited duty-no work that requires the bending of R wrist-x 40 days.

Source: 12

Lori Page, GS 7, DSN 633-8448

IV. ENVIRONMENTAL DATA

25. DESCRIBE JOB TASKS THAT RESULTED IN EXPOSURE TO HAZARDOUS MATERIALS / AGENTS (Specify the material / agent): Employee feels his symptoms are related to his repetitive work removing and replacing sealants. Sometimes this requires an extreme amount of force.

V. CASE CLASSIFICATION

26. OCCUPATIONAL INCIDENT: YES; 27. TYPE: ILLNESS; 28. WORKPLACE IDENTIFIER: 0117 DADO 113A; 29. REVIEWING OFFICER: Alton G. Wills, MD Chief, Occupational Medicine Services; 30. DATE (YYMMDD): 960625

1. One-time treatment of minor scratches, cuts, burns, and splinters which do not require professional care. 2. See AFR 127-12.

31. BIOENVIRONMENTAL ENGINEERING SURVEY (Summarize investigation of patient's exposure. Indicate results of appropriate measurements and assessment of protective measures. Consultant reports of or in lieu of this survey should be referenced and attached.)

1. On 17 June 1996, Mr. Terry Edwards, Bioenvironmental Engineering (SGPB), performed an Occupational Illness/Injury Evaluation on Mr. Daniel Nelson. Mr. Nelson is assigned as a metal tank sealer, WG-8801, for LA/LAPFFE, Aircraft Production Division - F-15/A10 Production Flight, at Building 251. The evaluation was accomplished in accordance with AFI 48-101, Aerospace Medical Operations, and AFI 91-204, Investigating and Reporting Mishaps.

2. Findings:

a. Mr. Nelson has been assigned as a metal tank sealer since 1986. The majority of Mr. Nelson's workload involves precise picking/scraping of residual sealants not removed by previous water picking processes on the inside of F 111 fuel tanks. The areas of sealant removal in the F 111 fuel tanks are very compact in size; some areas are only 2'X3'X4'.

b. The tasks performed by Mr. Nelson involve repetitive operations for periods of up to 8 hours per day, five days per week. Generally, Mr. Nelson will work for about 50 minutes, and then take a 5 10 minute break. He is required to use the following tools:

TOOLS	ACTION	INJURY POTENTIAL
Putty knife	Grasping/Awkward angles	Medium
Home hand tools	Grasping/Awkward angles	Medium
Wire brushes	Grasping/Awkward angles	Medium
Screwdrivers	Twisting	Medium
Wrenches	Twisting	Medium
Hammers	Twisting	Low

*NOTE: The duration of tool use depends on the process being performed. The employee is unsure on the exact time that the tools are being used on a weekly basis because of the task variability.

c. The tools used include small instruments, such as wire brushes (tooth brush), scribes, and various types of wire brush wheels. Use of these tools require continuous force, as well as a 'pinch type' grip, to hold them in position.

d. Many of the tools used require continuous force to be applied to hold them in awkward positions. The awkward position and force required to grasp the tool could contribute to ergonomic stresses. The repetitive motion of drilling, along with use of other tools Mr. Nelson uses, could contribute to muscle weakness and fatigue, as well as wrist injuries.

e. Mr. Nelson has attended the Public Health's ergonomics training class.

3. Conclusions: Mr. Nelson spends many hours in confined space spaces, in awkward positions, and using tools that are not ergonomically designed. The tasks that Mr. Nelson performs could contribute to repetitive motion injuries.

4. Recommendations are in SGPB's letter, Follow Up for Occupational Illness/Injury Report: Mr. Daniel Nelson, dated 18 Jun 96.

32. DATE

18 | 0 | 6 | 9 | 6

33. SURVEY PERFORMED BY

MR. TERRY EDWARDS

Computer Entered

93-167

I. PATIENT IDENTIFICATION										
1. NAME (Last, First, MI) ██████████			2. SSAN ██████████			3. GRADE WG5 <input type="checkbox"/> MIL <input checked="" type="checkbox"/> CIV		4. SEX <input checked="" type="checkbox"/> M <input type="checkbox"/> F		5. AGE 45
6. WORK LOCATION Bldg 251		7. DUTY PHONE 3-4560		8. ORGANIZATION AND SYMBOL LA/LAPPF			9. INSTALLATION MUOFFGLV McClellan AFB CA 95652			
10. OCCUPATION (Job Title/AFSC) Metal Tank Sealer/3858					11. SUPERVISOR (Name and Duty Phone) Mrs. Moore/3-4560					
II. INCIDENT / ILLNESS DATA										
12. DATE AND TIME OF EXPOSURE: July 1984					13. STATUS AT TIME OF EXPOSURE <input checked="" type="checkbox"/> ON DUTY <input type="checkbox"/> OFF DUTY <input type="checkbox"/> LEAVE <input type="checkbox"/> TDY <input type="checkbox"/> OTHER					
14. DURATION OF EXPOSURE Approximately 9 hours					15. WITNESS (Name and Phone) none					
16. DESCRIPTION OF SYMPTOMS AT ONSET OF ILLNESS Elevated Liver function tests										
III. MEDICAL DATA										
17. DIAGNOSIS AND RELEVANT MEDICAL DATA (Indicate affected body parts) Undetermined disease possibly related to industrial solvents poisoning ICD#9: 980.9					18. CLASSIFICATION ²				OSHA CODE	
					<input type="checkbox"/> OCCUPATIONAL SKIN DISEASE				21	
					<input type="checkbox"/> DUST DISEASE OF LUNGS				22	
					<input type="checkbox"/> RESPIRATORY CONDITION DUE TO TOXIC AGENT				23	
					<input checked="" type="checkbox"/> SYSTEMATIC EFFECT OF TOXIC MATERIAL (poisoning)				24	
					<input type="checkbox"/> DISORDER DUE TO PHYSICAL AGENT (Other than toxic material)				25	
<input type="checkbox"/> DISORDER DUE TO REPEATED TRAUMA (Exclude hearing loss)				26						
<input type="checkbox"/> OTHER OCCUPATIONAL DISEASE				29						
19. DATE/TIME OF INITIAL TREATMENT/DIAGNOSIS 14 July 93					20. MEDICAL FACILITY 652 Med Grp, McClellan AFB CA 95652					
21. TREATMENT ADMINISTERED (Check One) <input type="checkbox"/> FIRST AID ¹ <input checked="" type="checkbox"/> DEFINITIVE CARE (Specify in Remarks)										
22. DISPOSITION OF PATIENTS										
YES	NO	RETURN TO NORMAL DUTY			NO. OF DAYS	ADMITTED TO HOSPITAL ²				
		REFER TO PRIVATE PHYSICIAN			0	PLACED ON QUARTERS ²				
X		EXCUSED FOR REST OF DUTY DAY			1	RETURN TO LIMITED DUTY ²				
23. NAME OF MEDICAL OFFICER ALTON G. WILLS, M.D., 466-52-0299 DSN 633-1110 Ext 313										
24. REMARKS RX: Employee was referred to PMD. Employee was also recommended to avoid solvent exposure. Lee Anne E. Reber, SrA, USAF DSN 633-1110 Ext 44										
IV. ENVIRONMENTAL DATA										
25. DESCRIBE JOB TASKS THAT RESULTED IN EXPOSURE TO HAZARDOUS MATERIALS/AGENTS (Specify the material/agent) Employee works in fuelage tanks. The materials employee uses are turco, PR 148, MEK, Spray sealant PRC 2911, White and black, alodine, Fuel tank paint, spray sealant primer etc.										
V. CASE CLASSIFICATION										
26. OCCUPATIONAL INCIDENT <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			27. TYPE <input type="checkbox"/> INJURY <input checked="" type="checkbox"/> ILLNESS			28. WORKPLACE IDENTIFIER				0117 DADO 113A
29. REVIEWING OFFICER (Name, Grade, AFSC) DWIGHT R BASS, COL, USAF 9356A <i>Dwight Bass</i>								30. DATE (YYMMDD) 9.4.10.110.3		
1. One-time treatment of minor scratches, cuts, burns, and splinters which do not require professional care. 2. See AFR 127-12.										

1. Mr. Eric Gardner of Bioenvironmental Engineering Services (SGB) conducted an occupational illness/injury evaluation on [REDACTED]. The evaluation was conducted in accordance with AFR 161-33, The Aerospace Medicine Program and AFR 127-4, Investigating and Reporting USAF Mishaps.

2. Findings: This 190 will serve to answer both 190's on [REDACTED], submitted by Military Public Health. On 2 Dec 93 [REDACTED] was interviewed concerning the possible causes of his elevated liver function. Below is the information provided by [REDACTED] supervisor and quotes of information provided by [REDACTED] physician.

a. During the interview with [REDACTED] he identified the most commonly performed chemical processes. These included application of spray sealant, methyl ethyl ketone (MEK), "Turco" (solvent blends), polysulfide hand applied sealants and alkaline soap (See attached list of chemical constituents and case numbers). MEK was replaced in Oct 92, alkaline soap is now used to clean the fuel tanks.

b. [REDACTED] has been working as a metal tank sealer since Jul 84. He reported that during this period he never experienced any undue physical stresses as a result of his job.

c. [REDACTED] reported using the appropriate personal protective equipment (PPE) during the operations using chemicals. He then went on stating that he has repeatedly been soaked in jet fuel when breaking plumbing. He was using cotton coveralls during the procedure which is not adequate. Metal tank sealers have been repeatedly briefed not to wear cotton coveralls during this operation. [REDACTED] also reported to his private physician that he does not always use the prescribed PPE. (See letter from [REDACTED], dated 11 Oct 93). The use of proper PPE has repeatedly been emphasized to the metal tank sealers since the end of 1990.

d. [REDACTED] reported that he has no exposures outside of his job. [REDACTED] stated that he was under no unusual stresses from his private life. [REDACTED] reported he is a moderate drinker. (Approximately a 12 pack of beer/weekend). He also stated that he abstained from alcohol intake for the 48 hours prior to his exams.

e. [REDACTED] current duties do not include any chemical exposures. He is currently performing facilities maintenance.

f. [REDACTED] reported that [REDACTED] is an average worker. She also commented that [REDACTED] absenteeism has been up for the past year. [REDACTED] has missed an unusual amount of Fridays and Mondays.

3. Recommendations: No recommendations at this time.

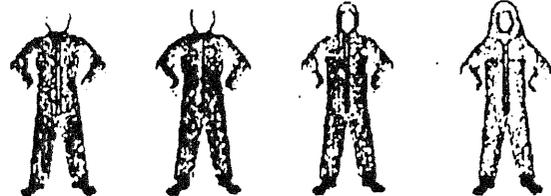
19

Description:

This is standard Tyvek® which has been laminated with Saranex® 23-P film. The Saranex® 23-P film offers maximum protection, more so than polyethylene-coated fabrics because it resists a wider range of chemicals. It has zero permeability for air and moisture, therefore, it provides total protection against hazardous materials that are contacted during the handling of chemicals; transformer servicing; working with agriculture fertilizers and pesticides; metal finishing; emergency-response-team situations; marine spill management; and in airport service centers. Bound seams are reinforced with an additional layer of fabric, and provide considerably greater protection than conventional seams. The material exhibits no unusual burning characteristics and meets the Flammable Fabrics Act standards for Class I Materials. However, this material should not be used for any exposures where flame or heat contact is expected or in flammable or explosive atmospheres. This fabric offers excellent tensile and tear strength, puncture, and abrasion resistance, and barrier performance.

Recommended applications:

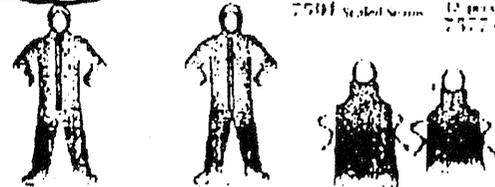
- Acid Handling and Tank Cleaning
- Agriculture/Pesticide Handling
- Asbestos Abatement
- Chemical Handling in Manufacturing
- Emergency Medical Services
- Hazardous Waste Management
- Metal Finishing, Acids & Caustics
- Paint Spraying



1559 Coveralls, Zip, Collar, Storm Flap, Bound Seams, 12 per case
 1566 Coveralls, Zip, Collar, Plastic, White and Ankles, Bound Seams, 12 per case
 1580 Coveralls, Zip, Storm Flap, Hood w/ Full Elastic Face, Ankles & Ankles, Bound Seams, 12 per case
 7580 Sealed Seams
 1581 Coveralls, Zip, Storm Flap, Full Hood, All-around Elastic Back w/ Full Elastic Face, Ankles & Ankles, Bound Seams, 12 per case
 7581 Sealed Seams



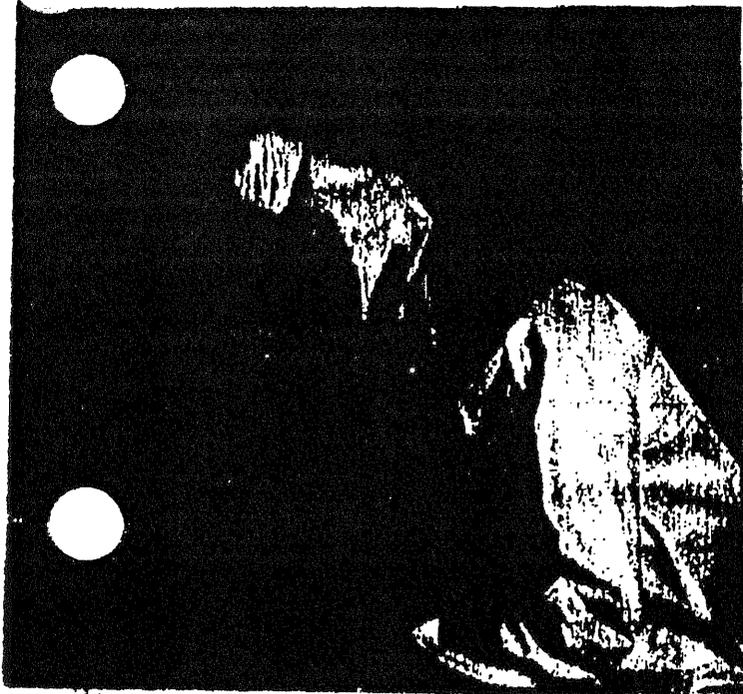
1571 Coveralls, Zip, Hood, Storm Flap, Bound Seams, 12 per case
 7571 Sealed Seams
 1570 Coveralls, Zip, Hood, Storm Flap, Bound Seams, 12 per case
 7570 Sealed Seams
 1581 Coveralls, Zip, Storm Flap, Full Hood, Storm Flap, Bound Seams, 12 per case
 7581 Sealed Seams
 1577 Full Body Suit, Storm Flap, Bound Seams, 12 per case
 7577 Sealed Seams



1590 Coveralls, Zip, Storm Flap, Hood, w/ Elastic Face, White, Bound, Bound & Sealed Seams, 12 per case
 7590 Sealed Seams
 1591 Coveralls, Zip, Storm Flap, Full Hood, w/ Elastic Face, White, Bound, Bound & Sealed Seams, 12 per case
 7591 Sealed Seams
 1540 Apron, 48" x 36" Neck & Waist ties, 100 per case
 1530 Apron, 48" x 36" Neck & Waist ties, 100 per case



1510 Boot, 12 per case
 1511 Boot, 12 per case
 1512 Boot, 12 per case
 1513 Boot, 12 per case



916 643 1346: # 2

UNIFORMS MFG. INC. 9-14-92 9:17PM

Atch 2-1

SENT BY:

20

TIMELINE RE BUTYL GLOVES AND MEK FOR USE BY F-111 RESEAL SHOP

05 Jan 96 Annual IH letter mailed to LAFCC

FINDINGS:

1. Nitrile gloves were not "entirely suitable hand protection against MEK or Turco or primer/sealant ops
2. Sealant Room issuing gloves without consideration for what HAZMAT issuee will use gloves.
3. Resealers stated that issued gloves (Stansolve Nitrile, also recommended by the T.O. 1-1-3 that governs reseal ops) disintegrated with MEK use and that Chemi-pro gloves did not.

RECOMMENDATIONS:

1. Sealant Room do not arbitrarily issue gloves without consulting Bio.
2. Isopropanol (against which most existing gloves protect) be used instead of MEK or Turco for washdowns.
3. 4H or SilverShield gloves be used with Turco (contains 25%, +/-, toluene).
4. 17 mil butyl gloves be used with MEK.
5. Site-specific HAZCOM training be redone emphasizing correct PPE
6. Labels at the Sealant Room be amended to include correct PPE for each HAZMAT issued.
7. ACGIH PPE Guidelines copy given to supervisor.

08 Jan 96 Closed with Flavia Moore, Mr. Binford, Mr. Gillespie, and Mr. McMenam. Noted the above recommendations and that T.O. apparently in error re correct gloves and needed to be amended.

26 Feb 96 In letter to LAPFCC, recommended 4H or SilverShield gloves for use with MEK. Recommended included in letter regarding air sampling results.

May 96 Telecon with Flavia Moore, discussing our office's insistence on replacing nitrile/Chemi-pro gloves with butyl.

Summer 96 13 mil butyl gloves (North) tried. Resealers didn't like these. Fingers stretched and stuck to parts.

Oct 96 Opening conference with Flavia Moore & Mr. McMenam.

25 Oct 96 Letter taken to LA Safety (Mae Willis) directing purchase of butyl gloves for use with MEK and/or 4H or SilverShield for use with Turco, and those products containing MEK and or toluene.

17 Dec 96 FAX received from Mr. Jack Rodman, ALC/PKOCB phone 6435481 requesting to substitute Guardian butyl gloves (25 mil) in place of North 13 mil gloves because of cost

considerations. Included in FAX was copy of Guardian's permeation rates table showing these gloves to have acceptable permeation rates vs. MEK.

18 Dec 96 FAXed Mr. Rodman: "...Discussed w/ Capt Dove substitution of the 25 mil Guardian in place of the North 13 mil gloves for protection against MEK. She agreed. Guardians would be fine...but...trial should be done to ensure that thicker gloves would be acceptable with Reseal workers."

Late Dec 96 or early Jan 97 Capt Dove and Mr. McMenammin with Mae Willis, LA Safety, visited Resealers and Sealant Room areas and concluded that double Chemi-pro gloves would suffice with MEK usage until a better glove could be found. Agreed that Sealant Room or LAPFCC supervisor should take steps to ensure this arrangement.

10 Jan 97 FAX sent to Mr. Rodman. Unknown content because FAX is set up to immediately delete sent messages. It probably stated ".....do not buy North or Guardian butyl gloves. Comesec butyl gloves apparently OK. ...will get back to you on this...."

14 Jan 97 E-mail received from LA Safety's Mae Willis. She stated that we (Capt Dove and Mr. McMenammin had done the following: 1) visited F-111 resealers and Sealant Room areas; 2) discussed failures of both types of suggested gloves (13 mil North and 25 mil Guardian- both butyl). It should be noted that Mr. Binford noted during this meeting or beforehand that the 25 mil Guardians were unusable- deteriorating and stretching.

17 Jan 97 Capt Dove called North and asked for 17 mil gloves. Told that a local maker needed to be contacted. "Paige will review MEK MSDS for glove recommendations if I send her one..." Capt Dove called Chris Ferrell, purchaser at the Sealant Room, and asked him to contact a local North distributor to obtain 17 mil butyl glove sample.

23 Jan 97 Performed MEK air sampling during an F-111 Resealer MEK washdown operation. It was noted that "Chemi-pro type" gloves were used, workers being unsure of what the glove was. Also noted that a latex-like glove, yellowish/tannish, was also given by the Sealant Room to employees at times. One employee produced one such glove which had completely deteriorated with apparent MEK use. Another worker produced a Stansolv Nitrile glove which had deteriorated badly. One worker used a single pair of yellow and blue gloves, again perhaps a Chemi-pro, that had held up well against the MEK used during the washdown. It was noted during conversation with the workers that some of them used double Chemi-pro gloves against MEK.

27 Jan 97 Telecon with Mr. Binford, LAPFCC work leader. He liked the 18 mil Comesec butyl gloves. These were xlg and he requested if medium gloves could be obtained for trial. Mr. McMenammin spoke with the Gen. Mgr. of Comesec who was reluctant to send out another sample but relented and agreed. In the mean time, Mr. McMenammin took over Comesec gloves samples for trial against MEK. Included were 28 mil neoprene/natural rubber and Multiplex (nitrile and PVA) gloves.

10 or 12 Feb 97 Mr. McMenamain took and gave 18 mil Comasec butyl gloves (medium size as requested by Mr. Binford) to Mr. Binford.

13 Feb 97 Telecon with Chris Ferrell, Sealant Room. He had not tried to get 17 mil butyl gloves requested earlier by Capt Dove in 17 Jan 97 telecon.

13 Feb 97 Telecon with Ms. Moore, who stated that Mr. Binford had not yet used 18 mil Comasec butyl gloves (medium size); but that he had used the Multiplex and 28 mil rubber gloves in a recently done MEK washdown.

13 Feb 97 Telecon with Mr. Binford- "Multiplex and rubber gloves no good- deteriorated- will try 18 mil medium Comasec butyl gloves during next washdown." He repeated that the xlg size of these gloves had worked OK.

25 March 97 Amn Sturgess accomplished air sampling during an MEK washdown. He noted that "Chemi-pro type" gloves were in use.

22 April 97 Mr. McMenamain given assignment to establish this timeline re gloves vs. MEK/Turco.

24 April 97 Telecon with Mr. Binford who stated that the 18 mil medium Comasec butyl gloves were used during an MEK washdown and worked fine. This timeline edited and given to Capt Dove.



DEPARTMENT OF THE AIR FORCE

77th AEROSPACE MEDICINE SQUADRON (AFMC)
MCCLLELLAN AIR FORCE BASE, CALIFORNIA

MEMORANDUM FOR LAPFFC

FROM: 77 AMDS/SGPB

SUBJECT: Use of 13 Mil Butyl Gloves With MEK During Wipedowns.

1. Per telecon of May 1996, please be reminded that this office feels that nitrile and Ansell Edmont's Chemi-Pro gloves, the types currently being used for MEK wipedowns in fuel cells, are not the correct glove. They are suitable for short exposures only. The proper glove is made of **butyl** rubber. This office is aware that such gloves are typically too thick to provide the dexterity needed. However, as pointed out in May 1996, there is one manufacturer that makes a relatively thin, 13-mil thick glove that appears to have good dexterity and good gripping properties. It is one of the best gloves to protect against MEK. It will provide, according to the maker, from 240-480 minutes of protection before MEK migrates through the glove and onto the hand. Nitrile gloves and Chemi-Pro gloves (the ones currently in use in LA) only provide 5-15 minutes. The cost of the 13-mil gloves is about \$10 a pair, but they last **much** longer. There may be other manufacturers but this office is not aware of any. Please be aware that they are **not** designed to be used with TURCO washdowns, for which a different glove is required. Silver Shield or 4-H gloves should be used with TURCO and any other products containing toluene. These gloves may be purchased from the maker listed below or from other glove makers.

2. The 13-mil butyl rubber gloves are made by North Safety Products, catalog number B131R, item 601125. The company may be reached at (803) 745-5900 or FAX (803) 745-5911.

3. If you need any other assistance in ensuring that these gloves are purchased and used during MEK washdowns, please feel free to call myself or Mr. McMenamin at 3-0311, extensions 341 and 337, respectively.

Laurel A. Dove

LAUREL A. DOVE, Capt, USAF, BSC
Section Chief, Industrial Hygiene
Bioenvironmental Engineering

cc: LA Safety Monitor



DEPARTMENT OF THE AIR FORCE
77th AEROSPACE MEDICINE SQUADRON (AFMC)
MCLELLAN AIR FORCE BASE, CALIFORNIA

MEMORANDUM FOR LAPFFC

25 Oct 96

FROM: 77 AMDS/SGPB

SUBJECT: Use of 13 Mil Butyl Gloves With MEK During Wipedowns.

1. Per telecon of May 1996, please be reminded that this office feels that nitrile and Anseil Edmont's Chemi-Pro gloves, the types currently being used for MEK wipedowns in fuel cells, are not the correct glove. They are suitable for short exposures only. The proper glove is made of butyl rubber. This office is aware that such gloves are typically too thick to provide the dexterity needed. However, as pointed out in May 1996, there is one manufacturer that makes a relatively thin, 13-mil thick glove that appears to have good dexterity and good gripping properties. It is one of the best gloves to protect against MEK. It will provide, according to the maker, from 240-480 minutes of protection before MEK migrates through the glove and onto the hand. Nitrile gloves and Chemi-Pro gloves (the ones currently in use in LA) only provide 5-15 minutes. The cost of the 13-mil gloves is about \$10 a pair, but they last much longer. There may be other manufacturers but this office is not aware of any. Please be aware that they are not designed to be used with TURCO washdowns, for which a different glove is required. Silver Shield or 4-H gloves should be used with TURCO and any other products containing toluene. These gloves may be purchased from the maker listed below or from other glove makers.

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Laurel A. Dove

LAUREL A. DOVE, Capt, USAF, BSC
Section Chief, Industrial Hygiene
Bioenvironmental Engineering

cc: LA Safety Monitor

Please Route to:

Mr. Jack Rodman
Fax Number : 6431346

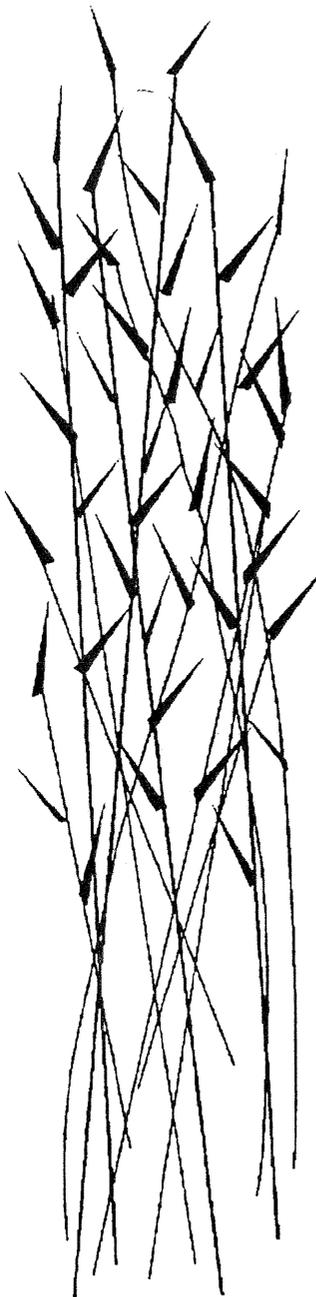
Fax Number :
Voice Number :

Date : Dec 18 1996, 07:56 AM

Subject : GUARDIAN BUTYL GLOVES

I have discussed the substitution of the 25-mil Guardian gloves in place of the North 13-mil gloves by North with my supervisor, Capt Dove, for protection against MEK. She agreed that the Guardians would be fine but that a trial amount should be used first to ensure that the thicker gove would be acceptable to the end users. Please contact the supervisors in the paint shop and the F-111 resealers so that these gloves can be put to trial use before large quantities are purchased. Again, tho, from a health point of view, the Guardians are an acceptable glove for use with MEK.

Jim McMenamin
643-0311, x337
FAX 6430300



From: Mae Willis 643-5942 <WILLIS.MAE@SMA1.MCCLELLAN.AF.MIL>
To: Anderson Whitt <WHITT.ANDERSON@SMA1.MCCLELLAN.AF.M...>
Date: 1/10/97 8:18am
Subject: GLOVES/FYI

--Boundary_[ID_YVM7DNACRSzpQjY7ffnZow]
Content-type: TEXT/PLAIN; CHARSET=US-ASCII

--Boundary_[ID_YVM7DNACRSzpQjY7ffnZow]
Content-type: MESSAGE/RFC822

Date: Fri, 10 Jan 1997 08:46:00 PDT
From: Mae Willis 643-5942 <WILLIS.MAE@SMA1.MCCLELLAN.AF.MIL>
Subject: GLOVES
To: "Laurel A. Dove" <DOVE.LAUREL@SMA1.MCCLELLAN.AF.MIL>
Cc: Mae Willis <WILLIS.MAE@SMA1.MCCLELLAN.AF.MIL>, Chris Ferrell <FERRELL.CHRIS@SMA1.MCCLELLAN.AF.MIL>
MIME-version: 1.0
Content-type: TEXT/PLAIN; CHARSET=US-ASCII
Posting-date: Fri, 10 Jan 1997 09:17:00 PDT
Importance: normal
Al-type: MAIL

Capt Dove,

this email follows previous conversations we've had about the butyl gloves. The butyl guardian gloves (substitute) we gave to F111 workleader, Herb to test, they failed. I also gave him the original pair we were going to order, for testing. Those also failed. They were also butyl gloves with a different thickness.

We are back to the drawing board. We need gloves for MEK and TURCO. Please provide guidance to us on what would be acceptable to order. My other suggestion is an immediate on-site visit with the users.

Currently the gloves we have on-hand are yellow/green nitrile and chemipro, green latex and a black chemical glove. We also have silvershields, but the users don't want to use them.

Chris Ferrell,
3-4560

--Boundary_[ID_YVM7DNACRSzpQjY7ffnZow]--

- Thin one stretched - tore
- (thicker) ones - gummy on outside - with drop
- SIL SHIELD → crinkle - can't wear under glove
- Did they use TURCO? how can we be sure - what days were they tested who tested them?
- Require double gloving during MEK/Turco work hours - Post on wall
- Ann Miller MEK sampling + gloves to Flava Moore

From: Mae Willis 643-5942 <WILLIS.MAE@SMA1.MCCLELLAN.AF.MIL>
To: Medcln.MedBio(dovela,mcmenaja)
Date: 1/14/97 5:57am
Subject: GLOVES VISIT

Capt Dove/Mr McMenamin,

thank you for your visit to the F111 and sealant room areas. During the visit we discussed the failure of both suggested gloves, butyl types, after F111s test. You all(BIO) recommended that until an acceptable glove for MEK and turco is found, users are to double the chemipro.

You agreed to:

- ✓ 1. Call the last manufactor to let them know that their gloves had failed F111s testing. *We used 13 mil glove. Ad uses 17 mil glove. Contact dist. for sample 17 mil.*
- Mr. McMen 2. You will research for a new glove and/or manufactor.
- 3. You will ask a manufactors area Rep for a possible on site visit/ demonstration. *once a suitable glove is found, have that mfc rep come out.*
- ✓ 4. Mr McMenamin left a new/different(17/18/19mil) pair of gloves with Herb for testing. Note: One glove was left and someone from BIO would bring the matching one.
- ✓ Gloves available in the sealant room were looked at. Capt Dove tried on several types, single and doubled.
- ✓ Also during the visit, Capt Dove provided me the results from SSgt Keyes Oct 1996 Annual industrial Hygiene Survey and sample results for 2216 B/A NS epoxy adhesive test. Change in #2 of Hygiene Survey on my position. I'm the workleader. Andy Whitt is the Supervisor.

Thanx again.

Mae

CC: Anderson Whitt <WHITT.ANDERSON@SMA1.MCCLELLAN.AF.M...>

Always use right type of gloves with job

"Gimme Some Skin" may be an outdated greeting in the '90s, but it's just what many hazardous chemicals ask every time we handle or work with the wrong type of rubber gloves. In addition, the right gloves for one hazardous chemical may not be the right glove for another. With increased emphasis on worker protection and the right to know the law, making the right choice of glove has never been more important.

The good old days of saying, "Hey Joe, go get some rubber gloves out of the safety locker and scrub these parts down with solvent," are gone forever. And good riddance too. Today's workers are more aware of chemical hazards.

The correct response to the above statement should be, "Exactly what solvent is it, and what type of rubber glove is best?" Here are several steps to take that will ensure you make an informed choice:

- Match the glove polymer to the chemical in use.

Nitrile, neoprene, latex, PVC. These glove polymers can and do vary widely in resistance to different chemicals. Each glove manufacturer has, or should have, test data which will tell which polymer is best for many common chemicals in use on base. The results are based on the chemical's ability to get through the polymer and tear apart the structure of the polymer.

- Compare manufacturers. Some gloves afford better chemical protection than other gloves of the same type polymer. This is because of manufacturing difference in glove thickness, consistency and polymer formulas.

- Allow for rough handling.

In addition to chemical resistance, some gloves are more prone to abrasion or other types of damage. Only you know what the gloves will be put through. Ensure that the glove type you choose is able to handle it.

- Get the proper size and length. Gloves should be chosen for the type of protec-

tion afforded. They should fit comfortably, without restricting motion and they should be long enough to protect the wrist, forearm, elbow or entire arm.

Take a close look at your hands. Is the skin red and irritated? Are they dried and cracked? Is there any type of rash developing? Do they itch? If the answer to any of these questions is yes, you may be well on your way to occupational dermatosis, the most common and most preventable, occupational disease.

The days of ordering rubber gloves are gone. Ensure that the glove is the right one for the chemical application. If the shop has numerous chemicals, you need to have numerous types of gloves and furthermore, know which glove protects against which chemical.

It may seem a little frustrating at first, but the rewards of proper protective equipment are happier workers and a more productive workforce. For more information on glove selection and chemical compatibility, call the bioenvironmental engineering services at Ext. 30311.

Personal medical records available to workers

Workers at McClellan AFB, or their designated representatives, now have the ability to review and copy their personal medical and occupational exposure records. These records include the workers' medical records maintained at the McClellan Clinic, Bldg. 98; personal occupational exposure records maintained at Bioenvironmental Engineering, Bldg. 250M, and material safety data sheets currently maintained on hazardous material information system microfiche readers at Bldgs. 443, 251, 475, 640, 783, 1048 or in bioenvironmental engineering.

To review or copy occupational medical records, contact the chief of administration, Occupational Medicine Clinic at 646-8456. An appointment can be made with a

physician to review the records. To review or copy these records, contact bioenvironmental engineering at 643-0315.

Copies of MSDS can be obtained at one of the six HMIS microfiche readers on base. For assistance in interpreting personal exposure information, industrial hygienist are available to help review the information.

If a worker's designated representative wants to review or copy the medical record or personal occupational exposure records, the representative must have a written authorization from the worker. A sample of the authorization can be obtained from the chief of administration, occupational medicine clinic, by calling 646-8456.

44.1.1.44

21

Control
Cnl.

CLINICAL OCCUPATIONAL HEALTH EXAMINATION REQUIREMENTS

WORKPLACE IDENTIFIER 0 1 1 7 D A D O 1 1 3 A

Use this space for mechanical imprint!

BASE
McClellan AFB, CA ORGANIZATION
SM-ALC/LACFFC

WORKPLACE
F-111 RESEAL UNIT

BLDG. # / LOCATION ROOM / AREA
251

EXAMINATION REQUIREMENTS

- OCCUPATIONAL HEALTH EXAMINATIONS NOT REQUIRED FOR PERSONNEL BECAUSE:
- NO SIGNIFICANT EXPOSURE NO RELEVANT TEST / EXAM
- OCCUPATIONAL HEALTH EXAMINATIONS REQUIRED FOR ALL PERSONNEL
- OCCUPATIONAL HEALTH EXAMINATIONS REQUIRED FOR SELECTED PERSONNEL ONLY. (Specify in Remarks Section)

TYPE	FREQUENCY			RATIONALE (Check Applicable Boxes)
	PRE-PLACEMENT	PERIODIC ANNUAL <small>Re-entry</small>	TERMINATION	
WORKPLACE EXPOSURE SUMMARY	X	X	X	<input checked="" type="checkbox"/> ROUTINE NOISE EXPOSURE > 85 dBA <input type="checkbox"/> PERMISSIBLE EXPOSURE LEVELS EXCEEDED <input type="checkbox"/> ACTION LEVEL EXCEEDED <input checked="" type="checkbox"/> SKIN ABSORPTION POSSIBLE <input checked="" type="checkbox"/> RESPIRATOR USAGE <input checked="" type="checkbox"/> DIRECTIVE REQUIREMENT <u>AFOSH 48-1</u> <u>AFOSH 161-20</u> <small>(Specify)</small> <input checked="" type="checkbox"/> OTHER (Specify) ISOCYANATES
HEALTH HISTORY	X	X	X	
BIOLOGICAL INDICATORS				
AUDIOGRAM	X	X	X	
COMPLETE BLOOD COUNT <input checked="" type="checkbox"/> WITH DIFFERENTIAL	X	X	X	
PA CHEST	X		X	
LIVER FUNCTION <input type="checkbox"/> SGOT <input type="checkbox"/> SGPT <input type="checkbox"/> GGPT <input type="checkbox"/> ALKPPOS <input type="checkbox"/> BILIRUBIN	C9	C9	C9	
URINALYSIS	X	X		
PULMONARY FUNCTION	X	X	X	
VISUAL ACUITY				
CHOLINESTERASE				
URINE CHROMIUM				
PHYSICAL EXAMINATION	X	X	X	

REMARKS At examining physician's discretion.

NOISE: 86.4dBA RT / 110dBA RJ. Ear plugs and/or noise muffs required.

Differential has been added to CBC because of Isocyanate exposure.

TARGET ORGANS: Blood, Central Nervous System, Eyes, Kidneys, Liver, Respiratory System, Skin

TYPED OR PRINTED NAME, AERO MED COUNCIL CHAIRMAN

SIGNATURE

ALTON G. WILLS, M.D., CHIEF OMS

DATE

22

HISTORICAL

CASE FILE	CHRONOLOGICAL RECORD OF WORKPLACE SURVEILLANCE		
DATE (YYMMDD)	BASELINE, ANNUAL, AND SPECIAL SURVEY KEY FINDINGS AND DISCREPANCIES; ANNUAL CASE FILE REVIEW; TELECONS AND DISCREPANCY STATUS CHECKS. (Sign each entry)		
960109	Combined Shop visit conducted. Members included: SRA Malley (PH), Trent Polon & Dale Gillespie (Bio), Susan Repetris (EMMS), Mary Webb (Audiology), Lt Col's Johnson & Savory and May Dahlquist (IE team). Head analysis accomplished this date.		
	Candy S. Malley CANDY S. MALLEY, SRA, USAF 480-39-7912 Public Health 4E051		
960416	Hearing Conservation Briefing Capt Ramirez		
970205	Shop closed.		
	Lori D. Page LORI D. PAGE, GS-7 Public Health Tech		
WORKPLACE SUPERVISOR		DUTY PHONE	OFFICE SYMBOL
(Use this space for mechanical imprint)		WORKPLACE IDENTIFIER	ORGANIZATION
		BASE	ROOM / AREA
		WORKPLACE	
		BLDG NO / LOCATION	

DATE (YYMMDD)	BASELINE, ANNUAL, AND SPECIAL SURVEY KEY FINDINGS AND DISCREPANCIES; ANNUAL CASE FILE REVIEW; TELECONS AND DISCREPANCY STATUS CHECKS. (Sign each entry)
94 Feb 10	SGPM ANNUAL TREND ANALYSIS FOR PERIOD OF 1 Jan 93 to 31 Dec 93
	SEE TAB F FOR DETAILED BREAKDOWN OF AF FORM 190
	AND AFIC FORM 12 AFMC 12
	<p>TRENDS NOTED WERE: No injury trends. 4 AF Form 190(s) were done, two for hearing loss determined to be occupational illnesses. However, no occ. illness trend noted. No trends in abnormal OHE results. No real significant trends since 1991. ——— Connie Slavich RN BSN COHN</p> <p>MILITARY PUBLIC HEALTH 652 MEDICAL GROUP/SGPM. McCLELLAN AFB, CA 95652-5300</p>
940510	<p>Combined shop visit accomplished this date. Dr. Khavod, Susan DePetris and Kathryn Leaby from OMS and myself were the team. Hazcom documentation is good and on AF Form 55's. Personnel are current. See Checklist this date for further info.</p> <p>Lori D. Winter LORI D. WINTER, GS-7 Military Public Health</p>
950202	SGPM ANNUAL TREND ANALYSIS FOR PERIOD OF 1 Jan 94 - 31 Dec 94
	SEE TAB F FOR DETAILED BREAKDOWN OF AF FORM 190
	AND AFIC FORM 12
	<p>TRENDS NOTED WERE: No injury trends noted. 5 AF Form 190(s) were done; 4 of 5 for RTDs, 3 were occupational illnesses. 1 for rash determined to be a non-occupational illness; one for 9 LFT's determined to be occ illness. Possible RTD occupational illness trend. ——— Connie Slavich (B.S.N. R.D.H.M.) Slavich 139-42-9080, AFSC 0610 Chief, Health Assessment & Risk Communication</p>

CASE FILE		CHRONOLOGICAL RECORD OF WORKPLACE SURVEILLANCE	
TE (DD)		BASELINE, ANNUAL, AND SPECIAL SURVEY KEY FINDINGS AND DISCREPANCIES; ANNUAL CASE FILE REVIEW; TELECONS AND DISCREPANCY STATUS CHECKS. (Sign each entry)	
21-30		SGPM ANNUAL TREND ANALYSIS FOR PERIOD OF 1-1-91 to 12-31-91	
		SEE TAB F FOR DETAILED BREAKDOWN OF AF FORM 190 AND AFLC FORM 112	
		TRENDS NOTED WERE: None — Constance M. Sincoff, RN	
		CONSTANCE M. SINCOFF, RN BSN 139-42-9080 ASST. CHIEF, ENVIRONMENTAL HEALTH SVCS.	
15 MAY 92		Hearing Conservation Program USAF Clinic/SGPMH McClellan AFB, CA 95662-6300	
		Shop visit conducted, Mr. Churchman Mr. Ryan Present. Mrs. visited and workers were observed to be using HPD's w/ Mary Webb	
		MARY T. WEBB AFSC 90650 572-11-6635	
0125		SGPM ANNUAL TREND ANALYSIS FOR PERIOD OF 1-1-92 to 12-31-92	
		SEE TAB F FOR DETAILED BREAKDOWN OF AF FORM 190 AND AFLC FORM 112	
		TRENDS NOTED WERE: None	
		Kathleen S. Coleman Kathleen S. Coleman, A.C. USAF 430-53-4551 AFSC 9060 Military Public Health Specialist	
430518		Combined shop visit conducted. Attendees were: Dr. Wills, Susan DePetris, Lois Compton and Alvina Plain from Occupational Medicine, Capt Haynes & Lori Winter from Military Public Health. New physicals to be generated. Lori DeWinters	
WORKPLACE SUPERVISOR		DUTY PHONE	
(Use this space for mechanical imprint)		OFFICE SYMBOL: 65-7 Military Public Health	
WORKPLACE IDENTIFIER		DADO 113A	
McClellan AFB		ORGANIZATION SM-ALC	
LABPFAC			
BLOG NO / LOCATION		ROOM / AREA	
251			

ALL PURPOSE CHECKLIST

PAGE 1 OF 1 PAGES

SUBJECT/ACTIVITY/FUNCTIONAL AREA

OPR

DATE

SGPM

9/10/16

CHECKLIST FOR SHOP VISITS

NO. ITEM (Assign a paragraph number to each item. Draw a horizontal line between each major paragraph.) Yes No N/A

SHOP NAME/OFFICE SYMBOL: F-111 Reser Unit / LA
 ID2 #: 0117-DAZ-113A SUPERVISOR: MAJ. Heil Flavia Moore
 DUTY PHONE: 3-6102 # OF SHIFTS: 1
 # OF PERSONNEL: MILITARY 0 CIVILIAN 15

- Is the shop on the HAZCOM Program?.....
 Does the shop have AFOSH STD 161-17?.....
 Does the shop have a chemical inventory and MSD's available?.....
 # of personnel trained: Military _____ Civilian 15
- Prior to the Visit: Reviewed Tab F.....
 Ran Trend Analysis.....
 Identified Hazards & Compiled Education Packet.....
 Packet includes:: Fact Sheets on: Ybentur
Ergonomics
Ethyl Acetate
heating-condensation (MEX)
 Other Education Pamphlets.....
 Fetal Protection Information.....
 Audio/Visual Library & Course Resume.....
- During Visit: Discussed HAZCOM Training and Documentation.....
 Reviewed HAZCOM Training Documentation.....
 Discussed Training Needs.....
 Discussed Medical Monitoring.....
 Personnel Concerns.....
 Received Briefing & Tour of Operations.....
 Personnel Observed Properly Wearing Appropriate PPE.....

4. Comments/Observations: Flavia Moore (sup) had
our personnel accompany us and
display + show work processes. All
employees were very informative.
Positive feedback on trend analysis.
Completed Shop visit.

Visit and Trend Analysis Documented in Tab A

Candy S. Malley
 Signature CANDY S. MALLEY SMT USAF

1134



DEPARTMENT OF THE AIR FORCE

HEADQUARTERS SACRAMENTO AIR LOGISTICS CENTER (AFMC)
McClellan Air Force Base, California

5 Aug 94

MEMORANDUM FOR THE RECORD

FROM: 652d MEDICAL GROUP/SGPM
5342 Dudley Bldg., Bldg. 98
McClellan AFB, CA 95652

SUBJECT: Medical Records Review pertaining to AFGE Grievance: UNC# 305/2

1. On 4 Aug 94, a medical records review was conducted to address certain contentions made in AFGE "Third Step Grievance; Horace Thompkins; UNC# 305/2; EDP Pay", 1st page, 3rd paragraph, quote: "That's why there are so many sealers with Hepatitis, blood disorders and breathing disorders."

2. We reviewed the medical records of ten (10) sealers (Reseal/Descale shop, ID2 #113A). The occupational health examinations conducted on these individuals were all within normal limits (WNL). Three (3) of the records did reveal histories of medical complaints and these are summarized below.

a. One record revealed a history of sinusitis related to chemical exposure. An Occupational Illness/Injury Report, AF Form 190 was accomplished and the determination was made that this was an "occupational illness".

b. One record revealed a history of possible respiratory irritation. An Occupational Illness/Injury Report, AF Form 190 was accomplished and the determination was made that this was not an "occupational illness".

c. One record revealed that an Occupational Illness/Injury Report, AF Form 190 was initiated for Hepatitis C. This individual had received notice from the local blood bank that a test of his blood revealed Hepatitis C. He contended that this might be caused by his occupational exposure to chemicals (type not specified). An investigation was conducted and it was determined that this was not an "occupational illness. Hepatitis C is a viral infection, not a chemically induced condition.

3. We also reviewed the medical records of five (5) sheetmetal workers (F-111 Mod Unit, ID2 #108A). The occupational health examinations which include Liver Function Tests (LFTs), conducted on these individuals were all WNL. Three (3) of the records did reveal histories of medical complaints and these are summarized below.

a. One record revealed a history of allergies possibly to some work area chemicals/fumes. Note from private medical doctor (PMD) revealed that he was treated for angioedema and urticaria - controlled by medication, and determined able to perform duties at work.

b. One record revealed a history of back strain.

c. One record revealed that an Occupational Illness/Injury Report, AF Form 190 was initiated for "Flu vs. Chemical Inhalation". An investigation was conducted and it was determined that this was an "occupational injury".

4. In conclusion, we see no adverse trends among those performing sealing/desealing, nor among sheet metal workers. Further inquiries regarding the medical aspects of this case should be coordinated through Occupational Medicine-Services (SGPO). Dr. Alton Wills or Col U.J. Kharod should be your points of contact. Questions regarding this memorandum may be addressed to me at clinic extension 5-449.



DON A. RAINWATER, MSgt, USAF
Superintendent, Public Health

ALL PURPOSE CHECKLIST

PAGE 1 OF 1

TITLE/SUBJECT/ACTIVITY/FUNCTIONAL AREA

OPR

DATE

CHECKLIST FOR SHOP VISITS

SGPM

10 May 94

NO.	ITEM (Assign a paragraph number to each item. Draw a horizontal line between each major paragraph.)	Yes	No	N/A
-----	--	-----	----	-----

SHOP NAME/OFFICE SYMBOL: Reseal/Desal - LACPFA

ID2 #: 0117-DA10-113A SUPERVISOR: Flavia Moore

DUTY PHONE: 3-2673 # OF SHIFTS: 2

OF PERSONNEL: MILITARY 0 CIVILIAN 60

- 1. Is the shop on the HAZCOM Program?.....
- Does the shop have AFOSH STDs 161-17 and 161-21?.....
- Does the shop have a written HAZCOM Program?.....
- Does the shop have a chemical inventory and MSD's available?.....
- # of personnel trained: Military _____ Civilian 60

- 2. Prior to the Visit: Reviewed Tab F.....
- Ran Trend Analysis.....
- Identified Hazards & Compiled Education Packet just sent 3/23
- Packet includes - Fact Sheets on: Hearing
- Stress
- Protect your skin
- Other Education Pamphlets HAZCOM
- Fetal Protection Information
- Audio/Visual Library & Course Resume

- 3. During Visit: Discussed HAZCOM Training and Documentation
- Reviewed HAZCOM Training Documentation
- Discussed Training Needs
- Discussed Medical Monitoring
- Personnel Concerns
- Received Briefing & Tour of Operations
- Personnel Observed Properly Wearing Appropriate PPE
- Obtained Current Personnel Roster.....

4. Comments/Observations: many individuals are here on loan, some are loaned out too. the number above reflects total workforce incl. loaners. authorized number is approx 40. Issues of special physicals were discussed, no resolution in sight.

5. Visit and Trend Analysis Documented in Tab A

6. Provide SGB (PHOENIX) with a copy of the current personnel roster.

Lori DeWinter
Signature Military Public Health

MEDICAL WORKSITE VISIT

SGB	BASE McClellan AFB, CA	WORKPLACE IDENTIFIER	0	1	1	7	D	A	D	O	1	1	3	A
VISITOR Rich Harmonson/Flavia Moore		NO PERSONNEL (MIL) (CIV) 35		NUMBER OF EMPLOYEES INTERVIEWED? 20										
ORGANIZATION LACPFA				NUMBER OF RECORDS REVIEWED? 20										
WORKPLACE F-111 Reseal/Deseal		DUTY PHONE 3-6418		OCCUPATIONAL EXAM CODE 17M										
BLDG NO/LOCATION 251		ROOM/AREA		DATE SCHEDULED 3May93					DATE OF VISIT 18May93					

SECTION A. PRE-SURVEY ITEMS EVALUATED

	YES	NO
1. DOES REVIEW OF MONTHLY SCHEDULING ROSTERS INDICATE OVERDUE EXAMINATIONS?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. DOES REVIEW OF MEDICAL RECORDS INDICATE EXAMINATIONS ARE CURRENT AND CORRECTLY COMPLETED?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. IS A CURRENT AF FORM 2766 (CLINICAL OCCUPATIONAL HEALTH EXAMINATIONS REQUIREMENT IN USE? Dated 93/03/10	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. DO STATISTICS FROM SAFETY OFFICE, ENVIRONMENTAL HEALTH SERVICES, OR PATIENT RECORDS INDICATE AN INCREASED INCIDENCE OF OCCUPATIONAL INJURIES/ILLNESS?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

SECTION B. MEDICAL ON-SITE VISIT ITEMS EVALUATED

1. MISSION
Conduct Dash 6 inspections on F-111 aircraft, clean fuel tanks with solvent, apply adhesion promoter, epoxy, sealants and alodine to the F-111 aircraft. A new process involves spraying two coats of sealant and a coat of primer to the inside of the F-111 integral fuel tanks.
2. EXPOSURE (CHEMICAL, PHYSICAL)
Hazardous noise, Confined space entry, Heat stress, Toluene, Methyl ethyl ketone, Strontium chromate (spray sealant), Ethyl acetate.

	YES	NO
THE SUPERVISOR CONCERNED ABOUT ANY CONDITIONS IN THE SHOP?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
THE SUPERVISOR GENERALLY SATISFIED WITH THE MEDICAL SERVICE PROVIDED?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A. ANY DIFFICULTY OBTAINING PERSONAL PROTECTIVE ITEMS, e.g., SAFETY GLASSES, EAR PLUGS, etc. SUPPLIED BY MEDICAL SERVICES?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. ANY DIFFICULTY IN OBTAINING OTHER PERSONAL PROTECTIVE EQUIPMENT THROUGH PROCUREMENT SUPPLY CHANNELS?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. ANY DIFFICULTY OBTAINING MEDICAL APPOINTMENTS?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. ARE EMPLOYEES RECEIVING PERIODIC OCCUPATIONAL HEALTH EDUCATION?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. DID ANY EMPLOYEES IDENTIFY CONCERNS OVER THE WORK ENVIRONMENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

REMARKS Personnel are on the Hearing Protection Program, Respiratory Protection Program and Confined Space Entry Program. Several of the metal tank sealers expressed awareness and concern about long term exposure to toxic chemicals, however they continue to volunteer to work overtime. They like the process of spraying on the sealant, the technique reduces the chemical exposure and also the ergonomic hazards.

Participants: Alton Wills, MD/SGPO; Alvin Plain, RN/SGPO; Susan DePetris, RN/SGPO; Lois Comte, RN/SGPO; Dale Gillespie, IH/SGB; Capt M. Haynes/SGPM; Lori Winter/SGPM

SIGNATURE AND TYPED NAME OF SUPERVISOR ALTON G. WILLS, MD Chief, Occupational Medicine Clinic	DATE 9-7-93
SIGNATURE AND TYPED NAME OF REVIEWER I.J. KHAROD, Colonel, USAF, MC, FS Chief, Occupational Medicine Services	DATE 7 Sept 93
COORDINATION (SIGNATURE AND TYPED NAME) DALE GILLESPIE, IH Chief, Industrial Hygiene	DATE 8 Sept 93

MEDICAL WORKSITE VISIT

TO SGPC SGB SGPC (IN TURN): SGB	WORKPLACE IDENTIFIER 0 1 1 7 D A D 0 1 1 3 A
VISOR Rebne le Stevenson	NO PERSONNEL (MIL) 0 (CIV) 50
DUTY PHONE 6120	BASE McClellan
ORGANIZATION SM-ALC/LABPFP	BLDG NO/LOCATION 251
OCCUPATIONAL EXAM CODE 19M-H	DATE SCHEDULED 20 Mar 92
	DATE OF VISIT 30 Apr 92

SECTION A PRE SURVEY ITEMS EVALUATED	YES	NO	NA
1 DOES REVIEW OF VERIFICATION ROSTER (CIVILIAN AND MILITARY) INDICATE PROPER ENTRY INTO THE PERSONNEL DATA SYSTEM, (E.G. CODES)? <i>See "Remarks"</i>			X
2 DOES REVIEW OF MONTHLY SCHEDULING ROSTERS INDICATE OVERDUE EXAMINATIONS? <i>See "Remarks"</i>			X
3 DOES REVIEW OF MEDICAL RECORDS INDICATE EXAMINATIONS ARE CURRENT AND CORRECTLY COMPLETED? NUMBER OF RECORDS REVIEWED (0)			X
4 IS A CURRENT AF FORM 2766 (CLINICAL OCCUPATIONAL HEALTH EXAMINATION REQUIREMENTS) IN USE? <i>See "Remarks"</i>		X	
5 DO STATISTICS FROM SAFETY OFFICE ENVIRONMENTAL HEALTH SERVICES OR PATIENT RECORDS REVIEW INDICATE AN INCREASED INCIDENCE OF OCCUPATIONAL INJURIES/ILLNESS?		X	-

SECTION B MEDICAL ON SITE VISIT ITEMS EVALUATED	YES	NO	NA
1 MISSION Clean, remove seam sealant and reapply sealant to walls of F-111 fuel tanks.			
2 EXPOSURE (Chemical Physical) Noise - Confined space entry - MEK - Toluene - ethyl acetate			
3 IS THE SUPERVISOR CONCERNED ABOUT ANY CONDITIONS IN THE SHOP?		X	
4 IS THE SUPERVISOR GENERALLY SATISFIED WITH THE MEDICAL SERVICES PROVIDED? ANY DIFFICULTY OBTAINING PERSONAL PROTECTIVE ITEMS SUCH AS SAFETY GLASSES, EAR PLUGS, SUPPLIED BY MEDICAL SERVICES?	X		
5 ANY DIFFICULTY IN OBTAINING OTHER PERSONAL PROTECTIVE EQUIPMENT THROUGH PROCUREMENT SUPPLY CHANNELS?		X	
6 ANY DIFFICULTY OBTAINING MEDICAL APPOINTMENTS?		X	
7 ARE EMPLOYEES RECEIVING PERIODIC OCCUPATIONAL HEALTH EDUCATION?	X		
8 DID ANY EMPLOYEES IDENTIFY CONCERNS OVER THE WORK ENVIRONMENT? <i>See "Remarks"</i>	X		
9 NUMBER OF EMPLOYEES INTERVIEWED? 12			

SECTION C REMARKS AND RECOMMENDATIONS (Use reverse side, if necessary)	YES	NO	NA
1 ANY POTENTIAL PROBLEMS IN THE WORK ENVIRONMENT?			X
2 RECOMMENDATIONS (if yes, note below)			

REMARKS
A.1. & A.2. No roster has been received. Issue is being worked by SGM (Susan Rose) and shop supervisors.
A.3. Medical records can not be identified without the roster.
A.4. The 2766 is dated 14 Dec 90. The most recent 2755 is dated 17 Jan 90. The Industrial Hygiene Survey is dated 6 Nov 90.
B.6. Employees expressed concerns over adequacy of physicals, communication of results of BEE surveys and hazard potential of long term (8-10 yrs) exposure to chemicals. Contents of critical physicals explained, need for PMD physicals emphasized. Personnel referred to SGB to review shop folders if BEE survey results not available thru supervisors.
Employees encouraged to make appointment with Dr Wills regarding concerns about exposures and lab tests.
Participants: S Hutchins, RN, A Wills, MD, SGPO/Col Bass, CFS, SGP/L Winters, SGPM

SIGNATURE AND TYPED NAME OF SUPERVISOR DUANE F. MABEUS, Colonel, USAF, MC Chief, Occupational Medicine Services	<i>Duane F. Mabeus</i>	DATE 27 May 92
RE AND TYPED NAME OF REVIEWER JHT R. BASS, Colonel, USAF, MC, CFS Chief, Aeromedical Services	<i>Robert Bass</i>	DATE May 18, 92
SUBORDINATE SIGNATURE AND TYPED NAME SHELLEY ZUEHLKE, Captain, USAF, BSC Chief, Industrial Hygiene	<i>Shelley Zuehlke</i>	DATE 3 Jun 92

MEDICAL WORKSITE VISIT

SGPCC SGB SGPCC (IN TURN)	SGB	WORKPLACE IDENTIFIER	0 1 1 7 D A D O 1 1 3 A
ISOR Quigg/Yaconelli	NO PERSONNEL (MIL) (CIV) 0 55	BASE McClellan AFB	ORGANIZATION LABPFA
DUTY PHONE 3-6418	WORKPLACE F-111 Reseal	BLDG NO./LOCATION 251	ROOM AREA NA
OCCUPATIONAL EXAM CODE 19M-H,A,P3,U,PF	DATE SCHEDULED 2 Apr 91	DATE OF VISIT 8 Apr 91	

SECTION A - PRE SURVEY ITEMS EVALUATED	YES	NO	NA
1. DOES REVIEW OF VERIFICATION ROSTER (CIVILIAN AND MILITARY) INDICATE PROPER ENTRY INTO THE PERSONNEL DATA SYSTEM, i.e., CODES?	X		
2. DOES REVIEW OF MONTHLY SCHEDULING ROSTERS INDICATE OVERDUE EXAMINATIONS?		X	
3. DOES REVIEW OF MEDICAL RECORDS INDICATE EXAMINATIONS ARE CURRENT AND CORRECTLY COMPLETED? NUMBER OF RECORDS REVIEWED: 25	X		
4. IS A CURRENT AF FORM 2766 (CLINICAL OCCUPATIONAL HEALTH EXAMINATION REQUIREMENTS) IN USE?	X		
5. DO STATISTICS FROM SAFETY OFFICE, ENVIRONMENTAL HEALTH SERVICES OR PATIENT RECORDS REVIEW INDICATE AN INCREASED INCIDENCE OF OCCUPATIONAL INJURIES/ILLNESS?		X	

SECTION B - MEDICAL ON SITE VISIT ITEMS EVALUATED	YES	NO	NA
1. MISCOSING sealers clean, deseal and then reseal the walls of F-111 tanks			
2. EXPOSURE (Chemical, Physical) confined space entry, MEK, noise			
3. IS THE SUPERVISOR CONCERNED ABOUT ANY CONDITIONS IN THE SHOP?		X	
4. IS THE SUPERVISOR GENERALLY SATISFIED WITH THE MEDICAL SERVICES PROVIDED?	X		
5. ANY DIFFICULTY OBTAINING PERSONAL PROTECTIVE ITEMS SUCH AS SAFETY GLASSES, EAR PLUGS SUPPLIED BY MEDICAL SERVICES?		X	
6. ANY DIFFICULTY IN OBTAINING OTHER PERSONAL PROTECTIVE EQUIPMENT THROUGH PROCUREMENT SUPPLY CHANNELS?		X	
7. ANY DIFFICULTY OBTAINING MEDICAL APPOINTMENTS?		X	
8. ARE EMPLOYEES RECEIVING PERIODIC OCCUPATIONAL HEALTH EDUCATION?	X		
9. DID ANY EMPLOYEES IDENTIFY CONCERNS OVER THE WORK ENVIRONMENT?			X
10. NUMBER OF EMPLOYEES INTERVIEWED: 12			

SECTION C - REMARKS AND RECOMMENDATIONS (Use reverse side, if necessary)	YES	NO	NA
1. ANY POTENTIAL PROBLEMS IN THE WORK ENVIRONMENT?			X
2. RECOMMENDATIONS (If yes, note below)			

REMARKS
 No problems found this visit; OHE's on schedule, names on list current per shop supervisor.

SIGNATURE AND TYPED NAME OF SUPERVISOR Jacqueline Jayne, M.D. Acting Chief, Occupational Medicine Services	DATE 12 Apr 91
SIGNATURE AND TYPED NAME OF REVIEWER Sgt R. Bass, Col, USAF, MC, CFS Chief, Aeromedical Services	DATE 12 Apr 91
SIGNATURE AND TYPED NAME OF COOPERATION Dale Gillespie Branch Chief, Industrial Hygiene	DATE 12 Apr 91

MEDICAL WORKSITE VISIT

TO SGPC SGB SGPC (IN TURN) SGB	WORKPLACE IDENTIFIER	01	17	D	A	D	0	1	1	3	A
SUPERVISOR rotating Cochran, Quigg	NO PERSONNEL (MIL) 0 (CIV) 79	BASE McClellan AFB		ORGANIZATION MABPFA							
PHONE 3-5669	WORKPLACE F-11 Reseal	BLDG NO/LOCATION 251		ROOM AREA NA							
OCCUPATIONAL EXAM CODE 19M		DATE SCHEDULED 30 Mar 90		DATE OF VISIT 5 Apr 90							

SECTION A - PRE SURVEY ITEMS EVALUATED	YES	NO	NA
1. DOES REVIEW OF VERIFICATION ROSTER (CIVILIAN AND MILITARY) INDICATE PROPER ENTRY INTO THE PERSONNEL DATA SYSTEM, i.e. CODES?	X		
2. DOES REVIEW OF MONTHLY SCHEDULING ROSTERS INDICATE OVERDUE EXAMINATIONS?		X	
3. DOES REVIEW OF MEDICAL RECORDS INDICATE EXAMINATIONS ARE CURRENT AND CORRECTLY COMPLETED? NUMBER OF RECORDS REVIEWED: 37	X		
4. IS A CURRENT AF FORM 2766 (CLINICAL OCCUPATIONAL HEALTH EXAMINATION REQUIREMENTS) IN USE?	X		
5. DO STATISTICS FROM SAFETY OFFICE, ENVIRONMENTAL HEALTH SERVICES OR PATIENT RECORDS REVIEW INDICATE AN INCREASED INCIDENCE OF OCCUPATIONAL INJURIES/ILLNESS?		X	

SECTION B - MEDICAL ON SITE VISIT ITEMS EVALUATED	YES	NO	NA
1. AIRSPACE clean, deseal, and reseal wall of F-111 fuel tanks			
2. EXPOSURE (Chemical, Physical) MEK, toluene, ethyl acetone; confined spaces			
3. IS THE SUPERVISOR CONCERNED ABOUT ANY CONDITIONS IN THE SHOP?		X	
4. IS THE SUPERVISOR GENERALLY SATISFIED WITH THE MEDICAL SERVICES PROVIDED?	X		
A. ANY DIFFICULTY OBTAINING PERSONAL PROTECTIVE ITEMS SUCH AS SAFETY GLASSES, EAR PLUGS, ETC. SUPPLIED BY MEDICAL SERVICES?		X	
B. ANY DIFFICULTY IN OBTAINING OTHER PERSONAL PROTECTIVE EQUIPMENT THROUGH PROCUREMENT SUPPLY CHANNELS?		X	
C. ANY DIFFICULTY OBTAINING MEDICAL APPOINTMENTS?		X	
5. ARE EMPLOYEES RECEIVING PERIODIC OCCUPATIONAL HEALTH EDUCATION?	X		
6. DID ANY EMPLOYEES IDENTIFY CONCERNS OVER THE WORK ENVIRONMENT?		X	
7. NUMBER OF EMPLOYEES INTERVIEWED: 6			

SECTION C - REMARKS AND RECOMMENDATIONS (Use reverse side, if necessary)	YES	NO	NA
1. ANY POTENTIAL PROBLEMS IN THE WORK ENVIRONMENT?		X	
2. RECOMMENDATIONS (If yes, state below)			

REMARKS:

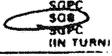
Essentially no problems found in shop. Explained to supervisors need for current updated roster of all personnel to avoid losing personnel for PHE's.

Explained need for annual PHE prior to any resp fit testing.

Participants: J.Valentine, RN,SGPO; M.Larson, RN, SGPM; C.Sincoff, RN, SGPM; T.McCune,RN. SGI

SIGNATURE AND TYPED NAME OF PARTICIPANT <i>Alvina Plain</i> Alvina Plain, R.N. Supervisor, Occupational Health Nurses	DATE 6 Apr 90
SIGNATURE AND TYPED NAME OF REVIEWER Dwight R. Bass, Col, USAF, MC, SFS Acting Chief, Occupational Medicine Services <i>Dwight R. Bass</i>	DATE 6 Apr 90
SIGNATURE AND TYPED NAME OF REVIEWER Bob E. Sherwin, Jr. Branch Chief, Industrial Hygiene <i>Bob E. Sherwin</i>	DATE 6 Apr 90

MEDICAL WORKSITE VISIT

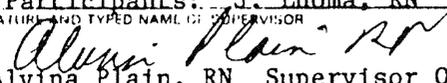
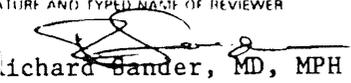
		WORKPLACE IDENTIFIER 0 1 1 7 D A D 0 1 1 3 A	
SUPERVISOR Kenny Pierce	NO PERSONNEL (MIL) (CIV) 127	BASE McClellan AFB	ORGANIZATION MABPEC
DUTY PHONE 3-5669	WORKPLACE F-111 ReSeal	BLDG NO./LOCATION 251	ROOM/AREA
OCCUPATIONAL EXAM CODE		DATE SCHEDULED 4-5-89	DATE OF VISIT 4-5-89

SECTION A PRE SURVEY ITEMS EVALUATED	YES	NO	NA
1. DOES REVIEW OF VERIFICATION ROSTER (CIVILIAN AND MILITARY) INDICATE PROPER ENTRY INTO THE PERSONNEL DATA SYSTEM, I.E., CODES?	X		
2. DOES REVIEW OF MONTHLY SCHEDULING ROSTERS INDICATE OVERDUE EXAMINATIONS?		X	
3. DOES REVIEW OF MEDICAL RECORDS INDICATE EXAMINATIONS ARE CURRENT AND CORRECTLY COMPLETED? NUMBER OF RECORDS REVIEWED (20)		X	
4. IS A CURRENT AF FORM 2766 (CLINICAL OCCUPATIONAL HEALTH EXAMINATION REQUIREMENTS) IN USE?		X	
5. DO STATISTICS FROM SAFETY OFFICE, ENVIRONMENTAL HEALTH SERVICES OR PATIENT RECORDS REVIEW INDICATE AN INCREASED INCIDENCE OF OCCUPATIONAL INJURIES/ILLNESS?		X	

SECTION B MEDICAL ON SITE VISIT ITEMS EVALUATED			
1. MISSION Inspect inside of fuel and water tanks, and cockpits for leakage; clean and seal			
2. EXPOSURE (Chemical, Physical) Noise, solvents, sealants, confined, and semi confined spaces.			
3. IS THE SUPERVISOR CONCERNED ABOUT ANY CONDITIONS IN THE SHOP?		X	
4. IS THE SUPERVISOR GENERALLY SATISFIED WITH THE MEDICAL SERVICES PROVIDED?	X		
5. ANY DIFFICULTY OBTAINING PERSONAL PROTECTIVE ITEMS SUCH AS SAFETY GLASSES, EAR PLUGS, ETC. SUPPLIED BY MEDICAL SERVICES?		X	
6. ANY DIFFICULTY IN OBTAINING OTHER PERSONAL PROTECTIVE EQUIPMENT THROUGH PROCUREMENT SUPPLY CHANNELS? Discussed with Supervisor	X		
7. ANY DIFFICULTY OBTAINING MEDICAL APPOINTMENTS?		X	
8. ARE EMPLOYEES RECEIVING PERIODIC OCCUPATIONAL HEALTH EDUCATION?	X		
9. DID ANY EMPLOYEES IDENTIFY CONCERNS OVER THE WORK ENVIRONMENT?		X	
10. NUMBER OF EMPLOYEES INTERVIEWED?	4		

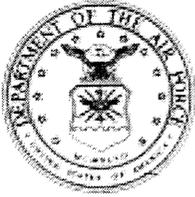
SECTION C REMARKS AND RECOMMENDATIONS (Use reverse side, if necessary)			
1. ANY POTENTIAL PROBLEMS IN THE WORK ENVIRONMENT?		X	
2. RECOMMENDATIONS (If yes, note below)		X	

REMARKS
No problems noted.

Participants: J. Luoma, RN and Dr. Mertes, MD SIGNATURE AND TYPED NAME OF SUPERVISOR  Alvina Plain, RN Supervisor Occupational Health Nurse	DATE APR 11 1989
SIGNATURE AND TYPED NAME OF REVIEWER  Richard Gander, MD, MPH Chief Occupational Medicine Services	DATE APR 11 1989
SIGNATURE AND TYPED NAME OF COORDINATOR  Bob E. Sherwin Jr.	DATE Apr 21 1989

23

1 JANUARY 1999



Command Policy

ENVIRONMENT, SAFETY, AND
OCCUPATIONAL HEALTH

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OPR: SAF/MIQ (Lt Col Kelli Ballengee)

Certified by: SAF/MI (Ruby DeMesme)

Pages: 6

Distribution: F

1. This directive establishes the Air Force Environment, Safety, and Occupational Health (ESOH) Program. The effective management of ESOH risks and costs is essential to achieve the Air Force mission, conduct and sustain operations, and protect and enhance the Total Force. This directive implements Secretary of the Air Force Order (SAFO) 103.1, *Authority and Responsibilities of the Assistant Secretary of the Air Force (Manpower, Reserve Affairs, Installations, and Environment)*; SAFO 791.1, *Delegation of Authorities under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), to Request Information Relating to Hazardous Substances, and for Wetlands and Floodplains*; and DoD Directive 4715.1, *Environmental Security*.

2. The three ESOH principles guiding our efforts are: “**sustain readiness**,” “**leverage resources**,” and “**be a good neighbor**.” To support these principles, the Air Force will make ESOH a fundamental element at all levels of planning, decision-making, budgeting, acquisition, and all phases of operations.

2.1. In order to reduce the ESOH component of installation and weapon system total ownership costs, the Air Force will strive to reach the following goals:

2.1.1. sustainable use of our installations and ranges through the conservation of natural and cultural resources and open communication with stakeholders;

2.1.2. zero enforcement actions;

2.1.3. zero occupational injuries and illnesses;

2.1.4. zero disease and nonbattle injuries (DNBI) related to contingency operations;

2.1.5. zero loss of government resources through mishaps; and

2.1.6. reduced pollutant emissions using a pollution prevention investment strategy.

2.2. The Air Force will employ quality-based management practices using a systematic method of planning, implementing, checking, and reviewing results to support ESOH activities. This approach must be compatible with already existing Air Force management systems.

3. The Air Force will provide safe and healthful workplaces and conduct operations (excluding armed conflict) in a manner that enhances mission accomplishment, preserves resources (e.g., weapons systems, facilities, and equipment), and minimizes the risks to both the environment and the safety and health of Air Force personnel and the public both on and off the installation. The Air Force will promote an atmosphere of trust and teamwork where individuals are committed to the ESOH principles.
4. The Air Force will use the operational risk management (ORM) process and applicable principles, tools, and techniques to improve performance; prevent occupational illnesses, injuries, and DNBI in support of Force Protection; and, where possible, lower costs.
5. The Air Force will provide training in ESOH principles and ORM to all military and civilian personnel, commensurate with their duties.
6. The Air Force will strive to promote public trust and confidence by informing, consulting, and maintaining open communications and dialogue with local and affected communities, tribes, regulators, and other stakeholders and foster partnerships with these groups and individuals. Consultation with federally recognized American Indian tribes and Alaskan Native Governments (herein "tribes") will be on a government-to-government basis, in accordance with applicable law.
7. The Air Force will identify ESOH costs to commanders, single managers, and functional managers to support cost-effective decision-making.
8. The following responsibilities and authorities are to be derived from this policy:
 - 8.1. **Commanders at all levels will:**
 - 8.1.1. Implement the ESOH principles and above policies in their planning, decisions, and operations.
 - 8.1.2. Hold supervisors, managers, workers, and ESOH professionals accountable for ESOH performance.
 - 8.1.3. Ensure supervisors, managers, workers, and ESOH professionals work together for continuous improvements in readiness, cost, and performance.
 - 8.1.4. Ensure all employees have ready access to all ESOH information and training to effectively accomplish their job.
 - 8.2. **SAF/MI will**, in accordance with Secretary of the Air Force Order 103.1, provide guidance, direction, and oversight of all matters pertaining to the formulation, review, and execution of policies, plans, programs, and budgets relative to ESOH. SAF/MIQ serves as the central focal point for SAF/MI and the Air Force on ESOH matters.
 - 8.3. **SAF/FM will** make existing cost reporting tools and mechanisms available to identify ESOH costs and provide the information to commanders for decision-making.
 - 8.4. **SAF/AQ will:**
 - 8.4.1. Implement this policy by integrating ESOH considerations into acquisition policies, instructions, program reviews, and training as appropriate.

8.4.2. Ensure single managers employ the ORM system safety methodologies to identify, assess, and reduce ESOH risks and to lower total ownership costs when developing new systems or modifying existing systems.

8.4.3. Within available Air Force science and technology resources, provide for research and development programs to support Air Force unique ESOH requirements.

8.5. SAF/IA will:

8.5.1. Ensure Air Force ESOH overseas activities support Air Force international objectives.

8.5.2. Integrate ESOH within Air Force cooperative engagement programs.

8.6. HQ USAF/XO will:

8.6.1. Ensure Mission Need Statements, Program Action Directives, Operational Requirements Documents, and Operational Plans address ESOH, where applicable.

8.6.2. Implement ESOH policies in management of ranges.

8.7. HQ USAF/XP will ensure the Air Force strategic plan and fiscal guidance incorporate ESOH principles, where appropriate.

8.8. HQ USAF/DP will:

8.8.1. Provide guidance to document evaluation of ESOH compliance in performance appraisals.

8.8.2. Provide guidance to integrate ESOH and ORM knowledge and principles into appropriate training programs.

8.9. HQ USAF/IL, HQ USAF/SG, and HQ USAF/SE will:

8.9.1. Develop and provide tools, training, guidance, and procedures for ESOH programs that are risk-based.

8.9.2. Identify opportunities to eliminate redundancies and promote synergy in implementing ESOH functional programs.

8.9.3. Promote cost-effective business improvements and industrial process reengineering initiatives to support the Air Force mission.

8.10. HQ USAF/IL will:

8.10.1. Develop tracking and reporting procedures integrating ESOH performance results into overall weapon system maintenance/operational performance status reporting.

8.10.2. Develop and implement cost-effective business improvements and industrial process re-engineering initiatives to minimize and control ESOH risks.

8.11. SAF/PA will define manpower requirements and training, and develop resource guidelines and communication tools to ensure public involvement efforts meet the requirements of ESOH programs.

8.12. Installation ESOH Professionals will provide ESOH technical expertise to commanders, functional managers, and supervisors to support ORM, performance improvement, and cost reductions.

8.13. All Air Force personnel shall comply with identified ORM practices to manage ESOH risks, comply with ESOH regulations and standards, improve performance, enhance personal effectiveness, and, where possible, reduce costs.

F. WHITTEN PETERS
Acting Secretary of the Air Force

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

29 CFR 1960, *Basic Program Elements for Federal Employees OSHA*

40 CFR, *Protection of Environment*

DoDD 4715.1, *Environmental Security*

AFPD 48-1, *Aerospace Medicine Program*

AFPD 32-70, *Environmental Quality*

AFPD 91-2, *Safety Program*

AFPD 91-3, *Air Force Occupational Safety, Health, and Fire Protection Program*

AFPD 90-5, *Quality Air Force*

Terms

Environment, Safety, and Occupational Health (ESOH)—ESOH includes environmental quality, environmental health, fire protection, safety, and occupational health.

ESOH Principles:

“Sustain readiness” - This includes, but is not limited to, promoting health and safety to ensure individual readiness, providing a process to reduce or offset risk and enable commanders to make well-informed decisions to ensure mission success, and maintaining access to ranges and installations crucial to Air Force readiness.

“Leverage resources” - This includes reducing and eliminating ESOH costs through various means such as using new technology, working better together, and developing libraries of more effective and efficient business practice alternatives.

“Be a good neighbor” - This includes, but is not limited to, fostering a constructive relationship with our neighbors in which they understand the Air Force goals, objectives and constraints and the Air Force understands their goals and objectives; seeking to be a responsible neighbor, to be sensitive to community issues, to be an active participant in programs to improve the local quality of life; and reducing the present impact of past contamination.

ESOH Professionals—The personnel responsible for, and with the knowledge and expertise to provide, technical recommendations on safety, fire protection, occupational health, and environmental issues.

Environmental Health—The discipline and program concerned with identifying and preventing illness and injury due to exposure to hazardous chemical, physical, and biologic agents that may be encountered in the ambient environment – air, water, or soil.

Environmental Quality—The discipline and program concerned with maintaining and improving the quality of the environment. This includes compliance, cleanup, pollution prevention, impact analysis; waste minimization and management; natural and cultural resource management; historic preservation; encroachment prevention; range, airspace, and community planning; and community impact analysis and assistance.

Hazard—Any real or potential condition that can cause mission degradation; injury, illness, or death to personnel; or damage to, or loss of, equipment or property.

Occupational Environment—The place or area where an individual works, including traditional administrative and industrial workplaces, as well as the cockpit, the battlefield, and deployed locations.

Occupational Health—The discipline and program concerned with prevention of illness resulting from work-related factors. It includes the prevention of illness during deployments not resulting from hostile acts to reduce disease and nonbattle injury rates (DNBI).

Operational Risk Management—The systematic process of identifying hazards, assessing risk, analyzing risk control options and measures, making control decisions, implementing control decisions, formally accepting residual risks, and supervising/reviewing the activity for effectiveness. ORM processes and tools include Enhanced Site Specific Risk Assessment (ESSRA), Acquisition System Safety, etc. Risk management decisions take into account such factors as: the ESOH risk; cost-benefit of control methods; risk to mission accomplishment and the importance of that particular aspect of the mission; the potential for noncompliance with ESOH regulations or laws and resulting fines; the risk of future impacts on operations due to use of non-renewable resources; the risk of adverse public reaction causing limitations on operations; the risk of illnesses/injuries causing the loss of worker productivity; and political risk (for example, Air Force personnel assigned overseas must comply with applicable requirements of international treaties, Status of Forces Agreements, the DoD Overseas Environmental Baseline Guidance Document, and Final Governing Standards).

Public Involvement—Involving the public in a timely, meaningful, and consistent manner in the decision-making process.

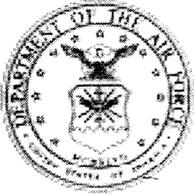
Risk—The probability and severity of loss or adverse impact from exposure to various hazards.

Safety—The discipline and program concerned with the prevention of any real or potential condition that can cause mission degradation; injury or death to personnel; or damage to, or loss of, systems, equipment, facilities, or property.

27 SEPTEMBER 1993

Safety

OCCUPATIONAL SAFETY AND HEALTH



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OPR: SAF/MIQ
(Col Michael H. Browne)

Certified by: SAF/MIQ
(Mr Gary D. Vest)

Pages: 6

Distribution: F

1. The Air Force is committed to providing safe and healthful workplaces to preserve our human resources. This directive establishes policies to prevent occupational injuries and illnesses.
2. The Air Force goal is to reduce the number of occupational injuries and illnesses to zero.
3. Air Force occupational safety and health (AFOSH) standards outlined in AFI 91-301, The US Air Force Occupational Safety, Fire Prevention, and Health Program, will apply in all areas except where otherwise prescribed or specified in status of forces agreements, or where specifically exempted.
4. The Air Force will abate workplace hazards as soon as practical, using a "worst first" approach whenever possible.
5. All employees will receive training in occupational safety and health--integrated as much as possible into job training.
6. The Air Force will train and equip people who can identify, evaluate, and control workplace hazards.
7. Safety and occupational health requirements will be incorporated as part of acquisition for new systems.
8. This directive establishes the following responsibilities and authorities:
 - 8.1. The Assistant Secretary of the Air Force for Manpower, Reserve Affairs, Installations and Environment (SAF/MI) is responsible for occupational safety and health policy.
 - 8.2. HQ USAF Safety (SE) and Surgeon General (SG) have a functional relationship with SAF/MI and bear primary responsibility for formulating and executing policy for occupational safety and health.

8.3. The Chief of Safety (HQ USAF/SE) reports to the Chief of Staff and SAF/MI on two occupational concerns: injury and illness statistics, and the status of unfunded corrections to occupational safety and health hazards.

8.4. The Air Force Safety Agency (AFSA) administers the overall AFOSH program; develops AFOSH instructions and standards for occupational safety; performs program evaluations required by Title 29, Code of Federal Regulations, Part 1960, Federal Employee Occupational Safety and Health Programs, current edition; maintains statistics on occupational injuries and illnesses; tracks the correction of workplace hazards; and reports statistics to HQ USAF/SE.

8.5. The Air Force Medical Operations Agency (AFMOA) develops AFOSH instructions and standards for occupational health, maintains occupational illness statistical data, and reports data to HQ USAF/SG.

8.6. Armstrong Laboratory collects occupational illness statistical data and reports statistics to AFSA through AFMOA.

8.7. Commanders at all levels establish and maintain an occupational safety and health program and ensure compliance with AFOSH standards.

8.8. At installations, the Chief of Ground Safety oversees occupational safety and the Director of Base Medical Services oversees occupational health guidance, surveillance, and training.

8.9. Air Force people follow standards and guidance for occupational safety and health while carrying out their duties.

9. See **Attachment 1** for measures used to comply with this policy.

10. See **Attachment 2** for related documents and interfacing publications.

JUDY ANN MILLER
Acting Assistant Secretary (Manpower, Reserve Affairs,
Installation, and Environment)

Attachment 1

MEASURING AND DISPLAYING COMPLIANCE

A1.1. AFSA will measure reduction in the number of occupational injuries and illnesses by determining the rate of occupational illnesses or injuries which result in lost workdays **Figure A1.1.** AFSA will forward this data through HQ USAF/SE, which will display it annually, with fiscal year (FY) 92 as the base year (RCS: HAF-SE(Q)7113, Ground Mishap and Safety Education Summary). The desired trend is downward toward zero.

A1.2. HQ USAF/SE will measure compliance with Federal statutory and regulatory requirements by collecting reports from the Occupational Safety and Health Administration (OSHA) on the number of citations (notices of violation) issued by OSHA to installations for occupational safety and health hazards **Figure A1.2.** HQ USAF/SE will display the data annually, with FY92 as the base year. The desired trend is downward toward zero.

A1.3. AFSA will monitor abatement of workplace hazards by determining the percentage of funded projects given risk assessment codes (RAC) of 1, 2, or 3 **Figure A1.3.** RACs are assigned to each occupational hazard or deficiency. RACs 1, 2, and 3 apply to hazards that pose an imminent, serious, or moderate danger, respectively. AFSA will forward this data through HQ USAF/SE, which will display it annually, with FY92 as the base year (RCS: HAF-SEC(A)9363, Annual Hazard Abatement Survey Report). The desired trend is upward for percent of funded projects, which means the Air Force is correcting these hazards.

Figure A1.1. Sample Metric of Occupational Illness and Injury Resulting in Lost Days.

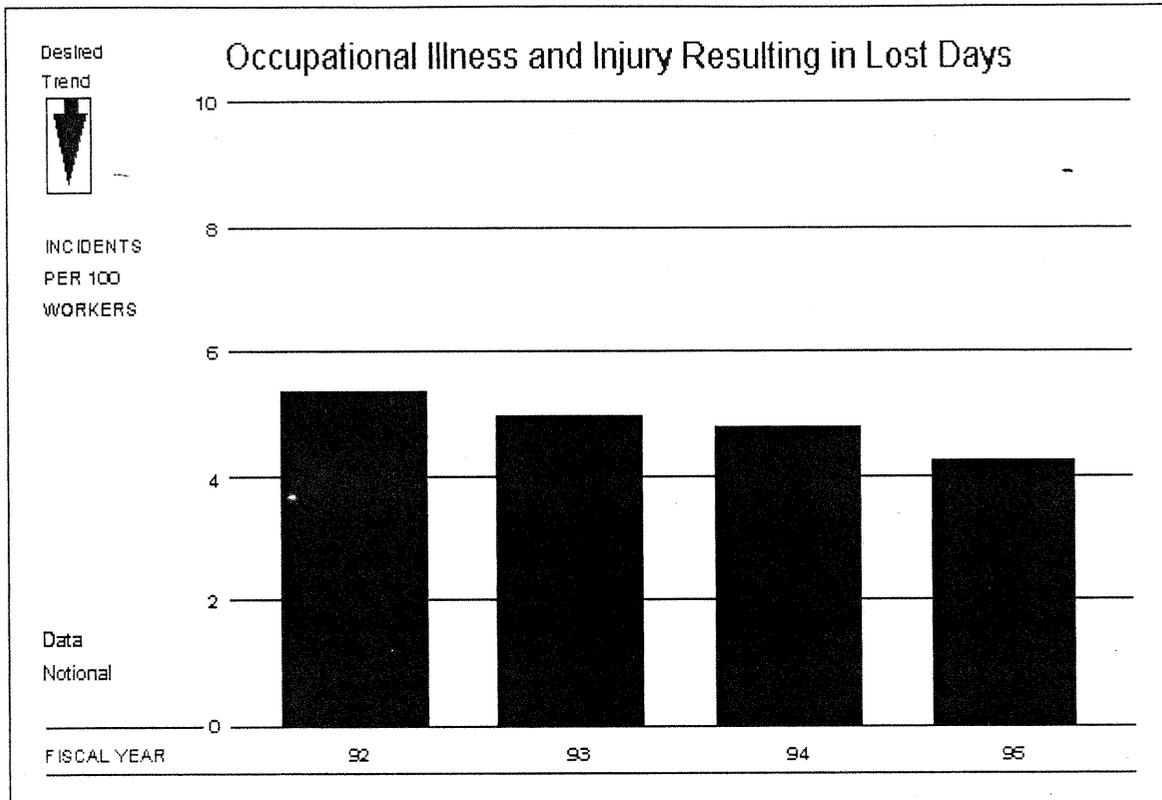


Figure A1.2. Sample Metric of Occupational Safety and Health Citations.

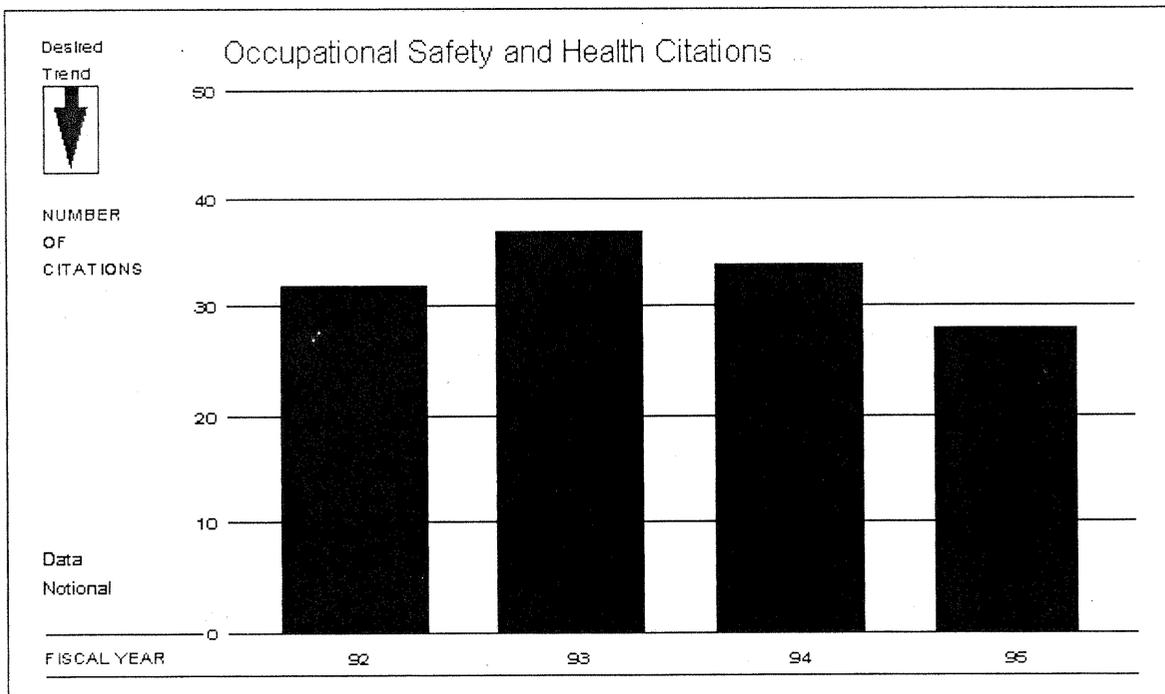
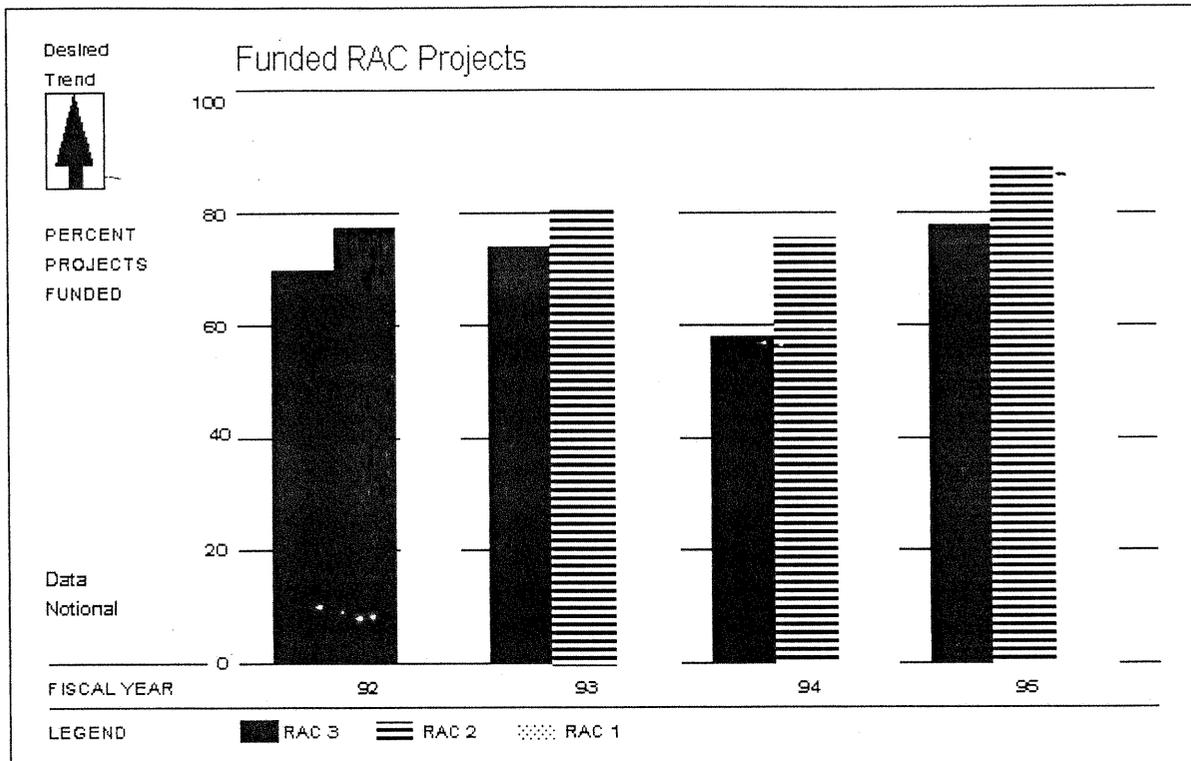


Figure A1.3. Sample Metric of Funded RAC Projects.



Attachment 2

RELATED DOCUMENTS AND INTERFACING PUBLICATIONS

Implemented Documents:

Public Law 91-596, *Occupational Safety and Health Act of 1970*, December 29, 1970

Executive Order 12196, *Occupational Safety and Health Programs for Federal Employees*, February 27, 1980

Title 29, *Code of Federal Regulations, Part 1960, Federal Employee Occupational Safety and Health Programs*, Current Edition

DoD Directive 1000.3 and Change 1, *Safety and Occupational Health Policy for the Department of Defense*, March 29, 1979

DoD Instruction 6055.1 and Changes 1 and 2, *DoD Occupational Safety and Health Program*, October 26, 1984

Interfaced Publications:

AFI 36-811, *Injury Compensation*, formerly AFR 40-810

AFPD 90-1, *Strategic Planning and Policy Formulation*

AFI 91-201, *The US Air Force Mishap Prevention Program*, formerly AFR 127-2

AFI 91-301, *The US Air Force Occupational Safety, Fire Prevention, and Health Program*, formerly AFR 127-12

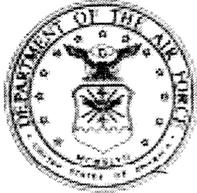
AFI 91-302, *Air Force Occupational Safety and Health Standards*, formerly AFR 8-14

AFIND 17, *Air Force Occupational Safety and Health Standards, Department of Labor Occupational Safety and Health Standards, and National Institute of Occupational Safety and Health*, formerly AFR 0-17

BY ORDER OF THE
SECRETARY OF THE AIR FORCE

AIR FORCE INSTRUCTION 91-301

1 JUNE 1996



Safety

**AIR FORCE OCCUPATIONAL AND
ENVIRONMENTAL SAFETY, FIRE
PROTECTION, AND HEALTH (AFOSH)
PROGRAM**

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OPR: HQ AFSC/SEGO (Mr. Richard L. Baird)

Certified by: HQ USAF/SE
(Brig Gen Orin L. Godsey)

Supersedes AFI 91-301, 1 April 1996.

Pages: 58

Distribution: F

This instruction implements AFPD 91-3, *Occupational Safety and Health*. It outlines the AFOSH Program. Send major command (MAJCOM), direct reporting unit (DRU), and field operating agency (FOA) supplements to this instruction to HQ AFSC/SEG, 9700 G Avenue, SE, Suite 223, Kirtland AFB NM 87117-5670 for review before publication.

SUMMARY OF CHANGES

This revision updates contents for currency, makes minor corrections, and adds program elements (section A); adds responsibilities for the Federal Employees' Compensation Act (FECA) program requirements; introduces responsibilities for flight surgeons/occupational medicine physicians; (section B) adds guidance for maintenance and disposition of AF Form 55s; adds requirement for developing annual program goals and objectives; adds items to the Job Safety Training Outline (attachment 5). A | indicates revisions from previous edition.

Section A—AFOSH Program Responsibilities and Administration

1. Purpose. To minimize loss of Air Force resources and to protect Air Force people from occupational deaths, injuries, or illnesses by managing risks.

1.1. Scope. AFOSH program guidance applies to all areas, except where otherwise prescribed or specified in *Status-of-Forces Agreements* or military-unique situations specifically exempted in this instruction. Distinctions will not be made between the requirements for military and civilian personnel. See paragraph 9 for guidance concerning contractor operations.

1.2. Program Performance. There are many methods to measure program performance. At Headquarters Air Force there are three core measurements.

1.2.1. Occupational Illness and Injury Resulting in Lost Days. The baseline year is FY92. The desired trend is downward toward zero.

1.2.2. Occupational Safety and Health Citations. The baseline year is FY92. The desired trend is downward toward zero.

1.2.3. Funded Risk Assessment Code (RAC) Projects. The baseline year is FY92. The desired trend is upward for the percentage of funded projects with RAC 1, 2, or 3 assigned.

2. Responsibilities.

2.1. HQ USAF:

2.1.1. The Assistant Secretary of the Air Force for Manpower, Reserve Affairs, Installations, and Environment (SAF/MI) is the Air Force Designated Agency Safety and Health Officer (DASHO). SAF/MI ensures that Air Force budget submission includes appropriate financial and other resources for effective implementation and administration of the AFOSH program. Appropriate resources for the AFOSH program shall include, but not be limited to:

2.1.1.1. Sufficient personnel at all levels of command.

2.1.1.2. Funds for administrative costs such as training, travel, and personal-protective equipment.

2.1.1.3. Abatement funding for correction of unsafe or unhealthful working conditions related to Air Force operations or facilities.

2.1.1.4. Safety and health sampling, testing, and diagnostic and analytical tools and equipment, including laboratory analyses

2.1.1.5. Program promotional costs such as publications, films, etc.

2.1.1.6. Technical information, documents, books, standards, codes, periodicals, and publications.

2.1.1.7. Medical surveillance program for Air Force people.

2.1.2. The Deputy Assistant Secretary for Environment, Safety, and Occupational Health (SAF/MIQ) has program oversight responsibility. SAF/MIQ:

2.1.2.1. Provides AFOSH policy direction and oversight.

2.1.2.2. Is the Air Force point of contact with the Secretary of Defense on AFOSH matters.

2.1.2.3. Coordinates program activities with other federal agencies.

2.1.2.4. Serves as the Secretary of the Air Force's (SECAF) advocate for AFOSH program resource requirements.

2.1.3. The Assistant Secretary of the Air Force for Acquisition (SAF/AQ), through the Deputy Assistant Secretary (Contracting) (SAF/AQC):

2.1.3.1. Provides acquisition policy.

2.1.3.2. Helps HQ USAF/SE, CE, and SG to implement AFOSH policy in developing and acquiring new systems, retrofit configuration changes, and government-furnished equipment (GFE).

2.1.3.3. Coordinates with HQ USAF/SE, CE, and SG on AFOSH and environmental safety matters related to contractor activities.

2.1.3.4. Coordinates federal acquisition regulations involving AFOSH and environmental safety matters with HQ USAF/SE, CE, and SG, as appropriate.

2.1.3.5. Assists Headquarters Air Force Safety Center (HQ AFSC), Hq Air Force Civil Engineering Support Agency (HQ AFCESA), and Hq Air Force Medical Operations Agency (HQ AFMOA) in preparing AFOSH standards.

2.1.3.6. Directs processing of Department of Labor (DOL) contractor citations that involve GFE or facilities.

2.1.3.7. Identifies funds for AFOSH requirements as part of total life-cycle costs during weapons system development.

2.1.4. Assistant Secretary of the Air Force (Comptroller) (SAF/FM), working through the Deputy Controller Budget (FMB), determines funding propriety and implements policies and procedures established by the Office of the Secretary of Defense for displaying budget requirements of AFOSH programs required by the Office of Management and Budget Circular A-11.

2.1.5. HQ USAF/SE, CE, and SG are the offices of primary responsibility for staff coordination and liaison with HQ USAF organizations that plan, program, and establish policy for the AFOSH program elements.

2.1.6. Deputy Chief of Staff, Personnel (DP):

2.1.6.1. Provides guidance for measuring commanders and military and civilian supervisory personnel's performance in meeting requirements of the AFOSH program.

2.1.6.2. Provides guidance for dealing with employees and employee representatives on AFOSH matters, including environmental differential pay (EDP).

2.1.6.3. Provides policy for processing employee grievances or complaints according to AFIs 34-301, Nonappropriated Fund (NAF) *Personnel Management* (formerly AFR 40-7), 36-701, *Labor-Management Relations* (formerly AFR 40-711), and 36-1201, *Discrimination Complaints* (formerly AFR 40-1614).

2.1.6.4. Assists HQ AFSC in preparing the annual Safety and Occupational Health Program Review and the input to the Department of Defense (DoD) Occupational Safety, Fire Protection, and Health (OSH) Annual Report for the Department of Labor (DOL) (IRCN: 1146-DOL-YR, *Summary of Occupational Injuries and Illnesses, and Targeted Agency*).

2.1.6.5. Provides policy for implementing the Federal Employees' Compensation Act (FECA) program according to the DoD Civilian Personnel Manual, Sub-chapter 8-10.

2.2. HQ AFSC:

2.2.1. Functions as OPR for overall AFOSH program.

2.2.2. Coordinates the AFOSH program.

2.2.3. Develops, coordinates, and provides occupational safety and fire prevention guidance.

2.2.4. Develops occupational safety AFOSH standards, instructions, pamphlets and visual aids.

2.2.5. Manages the AFOSH standards program (AFI 91-302, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Standards* [formerly AFR 8-14]).

2.2.6. Establishes procedures for dissemination of DOL OSHA inspection citations within the Air Force.

2.2.7. Coordinates with HQ AFMOA and HQ AFCESA to develop AFOSH standards.

2.2.8. Represents the Air Force on national consensus standards committees.

2.2.9. Coordinates occupational safety issues with affected HQ USAF functional disciplines.

2.2.10. Maintains liaison on occupational safety matters with DoD components, other federal agencies, and private sector groups.

2.2.11. Develops annual AFOSH goals and objectives in coordination with HQ AFMOA, HQ AFCESA, and other HQ USAF staff offices.

2.2.12. Prepares the annual occupational safety and health program review and provides the Air Force's input to DoD OSH Annual Report for the DOL (IRCN: 1146-DOL-YR).

2.2.13. Promotes occupational safety and health.

2.2.14. Develops and maintains current safety training.

2.2.15. Ensures that qualified personnel perform occupational safety duties.

2.2.16. Coordinates with MAJCOMS AND DRUs to ensure occupational safety hazards and deficiencies are included in installation hazard abatement programs.

2.2.17. Performs occupational safety program evaluations of MAJCOM, FOA, and DRUs using requirements of Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulation (CFR) 1910.79 and DoD Instruction (DODI) 6055.1, *DoD Occupational Safety and Health Program*.

2.2.18. Prepares the RCS: HAF-SEC(A) 9363, *Air Force Annual Hazard Abatement Survey Report* for the SAF.

2.2.19. Prepares 29 CFR 1910 required summary reports for each fatal and catastrophic mishap investigation.

2.3. HQ AFMOA:

2.3.1. Develops policy and provides occupational and environmental health guidance.

2.3.2. Develops occupational and environmental health AFOSH standards (see AFI 91-302).

2.3.3. Coordinates occupational and environmental health matters with affected HQ USAF functional disciplines.

2.3.4. Maintains liaison on occupational health matters with DoD components, other federal agencies, and private sector groups.

2.3.5. Helps HQ AFSC to prepare the annual occupational safety and health program review and provide Air Force inputs to the DoD OSH Annual Report for the DOL (IRCN: 1146-DOL-YR).

2.3.6. Ensures that qualified personnel evaluate hazard reports and hazard abatement plans involving occupational health.

2.3.7. Ensures that occupational health hazards or deficiencies are included in installation hazard abatement programs.

2.4. HQ AFCESA:

- 2.4.1. Develops, coordinates, and gives instructional guidance on fire protection.
- 2.4.2. Advises and assists HQ AFSC and HQ AFMOA to prepare and implement AFOSH standards.
- 2.4.3. Ensures that the fire prevention and protection program meets occupational safety and health guidelines.
- 2.4.4. Provides guidance to ensure that construction and service contracts include OSHA and Air Force safety requirements.
- 2.4.5. Provides cost information for modifications and retrofit of equipment, as needed, to comply with OSH requirement.
- 2.4.6. Provides information for military construction program submittals.
- 2.4.7. Coordinates table of allowance (TA) changes for safety or health with HQ AFSC and HQ AFMOA.
- 2.4.8. Ensures engineering and maintenance are conducted under applicable OSH guidelines.
- 2.4.9. Helps HQ AFSC prepare the annual occupational safety and health program review, and provides Air Force inputs to the DoD OSH Annual Report for the DOL.
- 2.4.10. Develops fire protection AFOSH standards (see AFI 91-302).
- 2.4.11. Ensures that qualified personnel evaluate hazard reports and hazard abatement plans involving fire hazards.
- 2.4.12. Ensures that installation hazard abatement programs identify fire hazards and safety deficiencies.

NOTE:

Basic Program Elements for Federal Employee Occupational Safety and Health Program and Related Matters (29 CFR 1960) contains responsibilities and requirements for federal agencies. Within the Air Force, occupational safety responsibilities and requirements listed in OSHA directives are divided into two areas: safety and fire protection. Inspection requirements and inspector qualifications, covered under 29 CFR 1960, apply equally to safety and fire protection staffs in the Air Force. Safety and fire protection personnel work closely to cover all areas.

2.5. MAJCOM, FOA, and DRU Commanders:

- 2.5.1. Establish and maintain an AFOSH program that provides a safe and healthful workplace.
- 2.5.2. Ensure that subordinate commanders enforce compliance with AFOSH requirements.
- 2.5.3. Ensure that the AFOSH program requirements are part of the measurement of commanders and military and civilian supervisory personnel's performance. (See paragraph 2.14.17)
- 2.5.4. Establish funding priorities for occupational hazard abatement projects during the budgetary cycle and set up budget costs using guidelines furnished by the Air Force Comptroller.
- 2.5.5. Ensure that their safety, fire protection, and health staffs:

2.5.5.1. Develop AFOSH standards supplements for MAJCOM-, FOA-, or DRU-unique operations for which safety and health guidance does not exist. Submit proposed supplements to the applicable agencies for approval.

2.5.5.2. Ensure that AFOSH guidelines agree with OSH guidelines.

2.5.5.3. Help HQ AFSC, HQ AFCESA, and HQ AFMOA develop AFOSH standards.

2.5.5.4. Ensure that OSH guidance is available where it is needed. Provide guidance to subordinate units.

2.5.5.5. Evaluate the management, implementation, and effectiveness of the command's AFOSH program. The evaluation criteria must include a qualitative assessment of the extent to which the AFOSH programs requirements are met. By function (safety, fire protection, and occupational health), provide an end-of-fiscal year analysis summary of formal evaluations done of wing level or above within the command. Include identified trends and problem areas and the status of Air Force and command mishap prevention initiatives. Forward summaries to HQ AFSC/SEG, HQ AFCESA/CEXF, and HQ AFMOA/SGO, by 1 November, as appropriate by topic. (RCS: HAF-SEC(A) 9436, *AFOSH Program Assessment*) This report is designated emergency status code C-3. Continue reporting during emergency conditions precedence delayed. Submit data requirements as prescribed, but they may be delayed to allow the submission of higher precedence reports. Submit by nonelectronic means, if possible. Discontinue reporting during MINIMIZE.

2.5.5.6. Provide information upon request to support the annual occupational safety and health program review and the DoD OSH Annual Report for the DOL.

2.5.5.7. Designate high interest areas and functional managers, as required.

2.5.5.8. Evaluate and process AFOSH standard variances.

2.5.5.9. Incorporate risk management when planning readiness training exercises.

2.5.5.10. Provide training required by this instruction, and supplement it to provide coverage of command-unique interests.

2.5.5.11. Establish procedures for obtaining and recording all OSHA visits to the installation or geographically separated units (GSU) sites where OSHA issues a notice of unsafe or unhealthy working condition. By 1 December each year, submit a summary report of these visit results to HQ AFSC/SEG (RCS: HAF-SE(A) 9446, *AFOSH Inspection Summary*). This report is designated emergency status code C-3. Continue reporting during emergency conditions precedence delayed. Submit data requirements as prescribed, but they may be delayed to allow the submission of higher precedence reports. Submit by nonelectronic means, if possible. Discontinue reporting during MINIMIZE. The summary contents required are:

2.5.5.11.1. Installation, unit, and command.

2.5.5.11.2. Date of inspection.

2.5.5.11.3. Inspector discipline (safety or health).

2.5.5.11.4. Area and organization inspected.

2.5.5.11.5. Copy of citation.

- 2.5.5.11.6. Violation reference.
- 2.5.5.11.7. Assigned RAC of each violation.
- 2.5.5.11.8. Corrective action response forwarded to OSHA.

NOTE:

This summary report supports metrics in AFPD 91-3 (see paragraph 1.2.2).

2.5.6. Ensure the injury compensation program is effectively administrated and an injury compensation program administrator (ICPA) is designated. The ICPA coordinates with the safety and medical staffs for technical advice and assistance in improving work environments and developing cost containment initiatives. The reference for this program is DoD Civilian Personnel Manual, Sub-chapter 8-10.

2.6. HQ Air Force Materiel Command (HQ AFMC):

2.6.1. Ensures that design criteria for HQ AFMC-developed and managed systems, equipment, and facilities follows the latest OSH guidance. Design criteria must comply with OSHA and AFOSH guidelines to the maximum extent possible consistent with military requirements.

2.6.2. Periodically reviews design handbooks, technical orders (TO), military specifications (Mil Specs), military standards (MIL STDS), and TAs to assure safety and health criteria and procedures in those documents comply with OSH guidance.

2.6.3. Verifies through in-process verification and post-publication reviews that safety and health procedures in TOs, Mil Specs, and Mil Stds are adequate.

2.6.4. Verifies by first article inspection on-site review, that occupational safety, fire protection, and health design features for systems and equipment are adequate.

2.6.5. Ensures that proper design criteria for centrally procured (CP) systems and equipment are applied to the end product.

2.6.6. Maintains the Master Hazard Abatement Program for CP systems and equipment. **NOTE:** HQ AFMC manages all CP systems and equipment listed in TO 00-25-115, *Logistics/Maintenance Engineer Management Assignments*. To ensure that systems and equipment possess adequate safety and health features, HQ AFMC must inform using command item management activities of identified hazards. This identification initiates action to alert all Air Force users of the equipment regarding the hazard or deficiency and corrective action.

2.6.7. Represents the Air Force on American National Standards Institute (ANSI), National Fire Protection Association (NFPA), and other national consensus standards committees for standards relating to AFMC-developed and managed systems and equipment. (Coordinate with HQ AFSC, HQ AFCESA, or HQ AFMOA, when activities affect AFOSH programs.)

2.6.8. Monitors the Government-Industry Data Exchange Program, distributes information, and takes corrective action on hazardous products.

2.6.9. Ensures that contractual documents for new acquisitions contain specifications requiring the contractor to provide handbooks, technical manuals, TOs, or commercial data meeting OSH guidelines.

2.6.10. Provides research and development laboratory support, within mission responsibilities, consistent with services furnished by support reimbursement policy.

2.6.11. Provides formal occupational health training of occupational health professionals and technicians through the Air Force School of Aerospace Medicine.

2.6.12. Ensures that Air Force Program Management Directives and Acquisition Management Series Regulations include occupational safety and health requirements.

2.7. HQ Air Education and Training Command (HQ AETC):

2.7.1. Ensures that job safety, fire prevention, and occupational health training are integral parts of technical training.

2.7.2. Coordinates all new and revised specialty and job qualification training and course training standards with HQ AFSC, HQ AFCESA, and HQ AFMOA.

2.7.3. Incorporates AFOSH program orientation into training programs for new military personnel.

2.8. Installation Commanders :

2.8.1. Provide safe and healthful workplaces for all Air Force employees. Require unit commanders, tenant commanders, functional managers, and supervisors to enforce AFOSH program requirements within their areas of responsibility.

2.8.2. Establish an occupational safety and health council.

2.8.3. Ensure qualified safety, fire protection, and bioenvironmental engineering (BE) personnel evaluate hazards and deficiencies and assign RACs.

2.8.4. Ensure personnel OSH compliance is evaluated as part of the performance review required for commanders and military and civilian supervisory personnel. (See paragraph 2.14.17)

2.8.5. Review hazard abatement projects and establish priorities.

2.8.6. Ensure DOL OSHA inspectors are received and accompanied on installations by appropriate staff representatives, i.e., safety, health, etc.

2.8.7. Ensure all personnel have safe and healthful work environments where recognized hazards are eliminated or controlled at acceptable levels. If unsafe and unhealthful working conditions exist, eliminate or control them through engineering, substitution, isolation, administrative controls, revised procedures, special training, or personal protective clothing and equipment (PPE). Refer to AFOSH Standard 48-1, Respiratory Protection, for requirements for respirators. Commanders must provide PPE for Air Force employees if:

2.8.7.1. Other controls are not possible.

2.8.7.2. Development or installation of other controls is pending.

2.8.7.3. Other controls are not practical for nonroutine operations.

2.8.7.4. Emergencies, such as toxic spills, ventilation malfunctions, cleanup operations, emergency egress, or damage control activities are involved.

2.8.8. Ensures that the civilian personnel flight (CPF) has a staff member designated as the ICPA. Ensures that a Federal Employee Compensation Act (FECA) Working Group is formed and meets

periodically (usually quarterly) to analyze FECA costs, trends, plans, etc., and develops cost containment initiatives.

2.9. Installation Ground Safety Managers:

2.9.1. Manage the occupational safety program.

2.9.2. Conduct workplace safety inspections and assessments and report results to appropriate management officials. (See paragraph 8)

2.9.3. Evaluate and process hazard reports and maintain a master hazard report log.

2.9.4. Review worker's compensation claims involving occupational injuries and ensure that mishaps are investigated and reported.

2.9.5. Coordinate mishap investigation information with the ICPA and provide a representative to actively participate in the FECA Working Group.

2.9.6. Maintain records of reportable mishaps and nonreportable but recordable events.

2.9.7. Assign RACs to occupational safety hazards or deficiencies, and coordinate with health and fire protection officials when required.

2.9.8. Assist in establishing funding priorities by using the abatement priority number (APN) system for hazard abatement projects during the budgetary cycle.

2.9.9. Maintain a master file of approved occupational safety, fire protection, and health standards variances and evaluate and process new AFOSH standard variances.

2.9.10. Ensure that AFOSH guidelines do not conflict with OSH and technical order (TO) requirements. Identified discrepancies will be forwarded to OPR through command channels.

2.9.11. Evaluate and monitor the PPE program as it pertains to safety and health related conditions.

2.9.12. Designate safety-related high interest areas.

2.9.13. Maintain a master file of Public Law 91-596, Executive Order 12196, 29 CFR 1960, OSHA standards, AFOSH standards, pertinent Air Force policy directives and instructions, and other safety-related guidelines to effectively manage the AFOSH program. (See AFIND 17, *Index of Air Force Occupational Safety and Health [AFOSH] Standards*, *Department of Labor Occupational Safety and Health [OSHA] Standards*, and *National Institute for Occupational Safety and Health [NIOSH] Publications*) (formerly AFR O-17 and AFIND 2, *Numerical Index of Standard and Recurring Air Force Publications*).

2.9.14. Maintain the installation master occupational hazard abatement file, including AF Forms 3, **Hazard Abatement Plan**, covering occupational safety, fire, and health hazards and deficiencies.

2.9.15. Review work hazards as they apply to EDP requests before final review and action by the CPF. Make recommendations to the CPF regarding EDP. Monitor hazardous conditions and notify the CPF when eliminated.

2.9.16. Act as planner and recorder for the installation AFOSH council. (Also see paragraph 14.1.3)

2.9.17. Function as primary point of contact for all DOL OSHA visits to the installation.

2.9.18. Notify BE and fire prevention sections immediately to attend the OSHA in-brief. Appropriate staff agencies should accompany the OSHA inspector based on area to be inspected.

2.9.19. Develop and conduct supervisor safety training according to paragraph 7.2. Assist supervisors, when requested, in conducting employee safety training.

2.9.20. Assist supervisors in conducting job safety analyses of work processes and tasks when requested. (See attachment 2)

2.10. Medical Group Commanders. Ensure comprehensive and coordinated occupational and environmental health surveillance and education programs are conducted. BE will serve as the cornerstone for surveillance efforts, and Public Health (PH) will be responsible for occupational health education and medical monitoring.

2.10.1. Bioenvironmental Engineering will:

2.10.1.1. Manage the occupational and environmental health surveillance program.

2.10.1.2. Conduct occupational and environmental health evaluations and health risk assessments of workplaces. Perform health hazard assessments.

2.10.1.3. Investigate health hazard reports and coordinate such actions with the installation ground safety personnel.

2.10.1.4. Assign RACs to occupational and environmental health hazards and deficiencies in coordination with safety officials when required.

2.10.1.5. Provide a copy of each AF Form 3 to the installation ground safety manager.

2.10.1.6. Establish funding priorities for hazard abatement projects during budgetary cycle.

2.10.1.7. Maintain files of AF Forms 3 involving occupational and environmental health hazards. Provide semiannual updates on the status of all unabated hazards and deficiencies to the installation ground safety manager, as well as reporting all completed abatement actions.

2.10.1.8. Review civilian employee compensation claims for occupational illnesses involving exposure to chemical, physical, radiological, and biological hazards, and musculoskeletal disorders to assure proper investigation and reporting.

2.10.1.9. Maintain a master file of OSHA standards, AFOSH standards, and other OSH guidelines pertaining to occupational health. (See AFIND 17)

2.10.1.10. Evaluate and process variances to AFOSH standards.

2.10.1.11. Maintain a file of approved applicable variances to occupational and environmental health standards. Provide copies to the installation ground safety manager.

2.10.1.12. Review work hazards involving occupational and environmental health related work conditions relating to EDP requests before final review and action by the CPF. Make recommendations to the CPF on the appropriateness of EDP. Monitor hazardous conditions and notify the CPF when such conditions have been eliminated.

2.10.1.13. Attend all DOL OSHA inspector in-briefs and out-briefs, and accompany inspectors during occupational health inspections.

- 2.10.1.14. Evaluate and monitor the PPE program as it pertains to health-related conditions.
- 2.10.1.15. Review Civil Engineering (CE) work orders to ensure occupational and environmental health issues are addressed.
- 2.10.1.16. Review and coordinate on CE plans and projects to ensure occupational and environmental health issues are addressed.
- 2.10.1.17. Maintain a file of material safety data sheets (MSDS) for all hazardous materials used in the industrial facilities on the installation.
- 2.10.1.18. Maintain a current copy of DoD List 6050.5-L, *Hazardous Material Information System (HMIS) Hazardous Item Listing* on compact disc to ensure the most current MSDS data is available. Also, maintain copies of other MSDSs for items not listed in the HMIS or those locally purchased through base supply, medical supply, or civil engineering supply channels. Refer to AFOSH Standard 48-21, *Hazard Communication* (formerly AFOSH Standard 161-21), for further information on MSDSs.
- 2.10.1.19. Conduct evaluations of workplace hazards to support the Fetal Protection Program. Determine occupational exposure conditions for pregnant workers and forward through Public Health to the appropriate physician for development of work restrictions.
- 2.10.1.20. Provide a representative to actively participate in the FECA Working Group.

2.10.2. Public Health will:

- 2.10.2.1. Report cases of occupational illness to the installation ground safety personnel.
- 2.10.2.2. Identify individuals requiring occupational health examinations based upon the decisions of the Aeromedical Council.
- 2.10.2.3. Conduct the train-the-trainer program of the Air Force Hazard Communication Program (AFHCP) as specified in AFOSH Standard 48-21.
- 2.10.2.4. Provide technical assistance, if required, in conducting the employee training program of the AFHCP.
- 2.10.2.5. Provide technical assistance for other health education and training for Air Force personnel.
- 2.10.2.6. Conduct epidemiological investigations and report adverse trends to the Aeromedical Council.
- 2.10.2.7. Provide a representative to actively participate in the FECA Working Group.

2.10.3. Flight Surgeions/Occupational Medicine Physcians will:

- 2.10.3.1. Determine the need for occupational health examinations in consultation with BE and PH.
- 2.10.3.2. Oversee the administration of occupational health examinations.

2.11. Installation Civil Engineer (CE):

- 2.11.1. Provides cost data and status information on hazard or deficiency abatement actions associated with real property facilities and real property installed equipment.

2.11.2. Includes hazard abatement information in project submittals intended to abate hazardous conditions. (Code hazard abatement projects within the Project by Contract Management System (PCMS) and provide a monthly printout of PCMS data regarding projects that include safety, fire prevention, and health concerns with risk assessment codes (RAC) of 1, 2, or 3 to the installation ground safety manager for use in updating the installation master hazard abatement plan.)

2.11.3. Coordinates hazard abatement project documents.

2.11.4. Obtains review and coordination on new construction, facility modification projects or work request documents from ground safety, fire protection, and BE officials. (Ensures that they are included in associated project approval, design review meetings and acceptance inspections.)

2.11.5. Ensures designs for new construction, equipment, or modifications to existing facilities or equipment meet OSH requirements.

2.11.6. Ensures RACs are incorporated into the Project by Contract Management System (PCMS) for corrective actions.

2.12. Installation Fire Chiefs:

2.12.1. Manage the fire protection program.

2.12.2. Conduct fire protection inspections and assessments.

2.12.3. Evaluate fire hazard reports and coordinate actions with the installation ground safety personnel.

2.12.4. Assign RACs to fire-related occupational and environmental hazards and coordinate with the safety official.

2.12.5. Maintain a file of OSHA, and AFOSH standards, and other AFOSH fire prevention guidelines.

2.12.6. Maintain a file of approved variances to fire-related standards for maintenance in the installation master file.

2.12.7. Maintain files of AF Forms 3 involving occupational fire hazards and provide a copy of each to the ground safety manager for the master file. Provide semiannual updates on status of unabated hazards and deficiencies to the installation ground safety manager and report completed abatement actions.

2.12.8. Review fire-related work conditions involving EDP requests before final review and action by the CPF. Make recommendations to the CPF on EDP. Monitor hazardous conditions and notify the CPF when eliminated.

2.12.9. Monitor and evaluate the PPE program as it pertains to fire-related conditions.

2.13. Civilian Personnel Flights:

2.13.1. Manages the FECA program (processes claims, coordinates light duty assignments, and reemploys persons from long-term compensation rolls).

2.13.2. Designates a staff member as the ICPA. The ICPA will:

2.13.2.1. Serve as the focal point in all aspects of the program, coordinating efforts of occupational safety and health representatives, supervisors, and other management officials and

employee representatives as appropriate.

2.13.2.2. Serve as chairperson of the FECA Working Group and attend meetings of the AFOSH council when compensation trends or experience indicates a need for support.

NOTE:

See the DoD Civilian Personnel Manual, Sub-chapter 8-10 for additional requirements. -

2.13.3. Provides copies of workers' compensation claims forms (Longshoreman LS-201, LS-202, LS-203, Compensation Act CA-1, CA-2, CA-16, and others) within 2 days of receipt to the installation ground safety manager for injury claims and to military public health services for illness claims.

2.13.4. Provides guidance on the application of labor management relations to the AFOSH program.

2.13.5. Coordinates with ground safety, fire protection, and BE staffs and provides advisory service to the Management Negotiating Team during the development of management labor agreements.

2.13.6. Coordinates with ground safety, fire protection, and BE officials on employee grievances in those areas.

2.13.7. Ensures that the orientation program for new civilian employees includes the AFOSH program.

2.13.8. Coordinates with ground safety, fire protection, and BE staffs to provide AFOSH program training to civilian employee representatives.

2.13.9. Provides advice and assistance to supervisors on civilian discipline and performance appraisal requirements in regard to safety and health matters.

2.13.10. Coordinates with ground safety, fire protection, and BE officials on all requests for EDP.

2.13.11. Provides appropriate employee information to installation medical services for occupational health evaluation and physical examination purposes.

2.14. Commanders, Functional Managers, and Supervisors:

2.14.1. Ensure applicable OSH guidance for the workplace and operations are available to personnel.

2.14.2. Ensure compliance with occupational safety, fire prevention, and health program requirements in their areas of responsibility.

2.14.3. Ensure the AFOSH program requirements are part of the measurement of unit commanders and military and civilian supervisory personnel's performance. (See paragraph 2.14.17)

2.14.4. Provide safe and healthful workplaces and conduct periodic self-inspections for hazards or deficiencies. Conduct job safety analyses for each work task not governed by TO or other definitive guidance and anytime a new work task or process is introduced to the industrial or non-industrial workplace to determine potential hazards. Consult the installation ground safety staff and (or) the BE staff when assistance is required. Refer to Attachment 2 for assistance in

conducting a job safety analysis. Job safety or hazard analyses are accomplished by the Air Force Material Command for TOs.

2.14.5. Establish and implement a hazard reporting and abatement programs.

2.14.6. Notify the installation ground safety personnel and the ICPA of the CPF of all mishaps as soon as possible after the occurrence to allow timely investigations to determine reportability and root causes.

2.14.7. Establish procedures for employees to follow in situations of imminent danger.

2.14.8. Provide training for employees in job safety, fire prevention and protection, and health as required by OSH guidelines. Ensure this training is documented according to paragraph 7.3.2.

2.14.9. Notify the installation ground safety staff when a military member or civilian becomes a supervisor for scheduling of required supervisor safety training.

2.14.10. Enforce compliance with OSH guidelines.

2.14.11. Ensure areas and operations that require PPE or other special precautions are identified and posted as necessary. A job safety analysis per paragraph 2.14.4 will be required to identify appropriate PPE. (See AFOSH Standard 91-31, *Personal Protective Equipment* [formerly AFOSH Standard 127-31])

2.14.12. Ensure compliance with PPE program requirements.

2.14.13. Post AFVA 91-307, *Air Force OSH Program Visual Aid*, conspicuously so personnel have reasonable access to it.

2.14.14. Ensure that compliance with the AFHCP as outlined in AFOSH Standard 48-21.

2.14.15. Maintain BE, Safety, and Fire Prevention periodic reports until superseded.

2.14.16. Brief all personnel on the findings and recommendations contained in annual and baseline BE (industrial hygiene) surveys and reports. These reports will be maintained on file in the work place for a minimum of 10 years. A copy of the survey report will be posted on the work place bulletin board for a period of 10 days after receipt to allow all workers free access to the findings.

2.14.17. The performance evaluation and appraisal of commanders, military and civilian managers, and supervisors will include measurement of the extent to which the responsibilities of this instruction are discharged in a manner consistent with specifically assigned duties and authorities. Military and civilian non-supervisory personnel must also be evaluated if occupational safety and health work performance is a significant factor in assigned duties. For civilian personnel, attachments 3 and 4 provide sample performance evaluation and appraisal elements and standards for supervisory and nonsupervisory positions. These elements may be used or modified as appropriate. Such performance evaluations and appraisals will be accomplished according to AFR 36-10, *Officer Evaluation System*, AFI 36-2403, *The Enlisted Evaluation System (EES)* (formerly AFR 39-62), AFI 34-301, and AFI 36-1001, *Managing The Civilian Performance Program* (formerly AFR 40-452).

2.14.18. Schedule employees for occupational medical examinations (pre-employment, periodic, and (or) termination) as required by the installation Aeromedical Council and allow workers duty time to have the exam accomplished.

2.15. Air Force Personnel :

- 2.15.1. Comply with OSH guidance.
- 2.15.2. Promptly report safety, fire, and health hazards and deficiencies.
- 2.15.3. Promptly report injuries and illnesses to the supervisor.
- 2.15.4. Comply with PPE requirements that apply to the work situation, including its use, inspection, and care.
- 2.15.5. Give due consideration to personal safety and the safety of fellow workers while doing assigned tasks.
- 2.15.6. Have the opportunity to:
 - 2.15.6.1. Take part in the AFOSH program without fear of coercion, discrimination, or reprisal.
 - 2.15.6.2. Request inspections of unsafe or unhealthful working conditions or report those conditions to the supervisor, safety manager, fire protection specialist, or BE, including OSHA officials.
 - 2.15.6.3. Have access to applicable OSHA and AFOSH standards, installation injury and illness statistics, safety, fire protection, and health program procedures, and their own exposure and medical records.
 - 2.15.6.4. Decline to perform an assigned task because of a reasonable belief that the task poses an imminent risk of death or serious bodily harm. The person and local management may request an assessment by installation safety, fire protection, or health professionals before proceeding.
 - 2.15.6.5. Use official on-duty time to take part in AFOSH program activities.

Section B—Program Elements

3. OSH Guidance. Establishes the minimum standards necessary to provide a safe and healthful work environment for all Air Force personnel and other DoD employees permanently working on Air Force installations.

4. Sources.

4.1. Regulatory Federal Standards. The Air Force complies with the intent of standards from the DOL OSHA Standards, Environmental Protection Agency, Nuclear Regulatory Commission, and the Department of Transportation Standards by directly referencing the applicable standards or incorporating the standards in AFOSH standards, TOs, or directives. Federal regulatory requirements take precedence over Air Force requirements unless Air Force requirements are more stringent. Refer conflicts between OSHA and AFOSH guidelines to the appropriate MAJCOM, FOA, or DRU for resolution or guidance.

4.2. AFOSH Standards. The Air Force publishes AFOSH standards according to AFI 91-302.
NOTE: AFIND 17 lists AFOSH Standards.

4.3. Air Force Directives and TOs. Safety, fire prevention, and health guidance is most effective when incorporated into functional area instructions and TOs. The office of primary responsibility (OPR) for Air Force directives must assure each directive complies with safety, fire prevention, and health requirements and coordinate with the applicable discipline. The agencies responsible for developing and revising TOs assure the TOs comply with OSH guidance.

4.4. National Consensus Standards. Select committees of federal, industrial, and private sector personnel develop these standards under the sponsorship of one of the national standards-setting organizations. Examples are ANSI, NFPA, and the American Society of Mechanical Engineers (ASME). National consensus standards are not directive unless adopted by a regulatory federal agency or the Air Force. An Air Force implementing authority may authorize deviations.

5. OSHA and AFOSH Standards Applicability.

5.1. Nonmilitary-Unique Situations. OSHA and AFOSH standards apply to nonmilitary-unique workplaces, operations, equipment, and systems. Some guidance contained in AFOSH standards has been tailored to apply to a specific Air Force operation. However, safety principles involved are universal and are not necessarily limited to any particular activity. Example: AFOSH Standard 127-20, *Vehicle Maintenance Shops*, addresses manual handling techniques which are applicable to all lifting activities regardless of organizational function.

5.2. Military-Unique Situations. Under Title 29 CFR 1960 series, OSHA standards do not apply to military-unique workplaces, operations, equipment, and systems. However, according to DoD instruction, they apply insofar as is possible, practicable, and consistent with military requirements. AFOSH standards apply unless specifically exempted by variance or determined to be an acceptable deviation.

6. Variances and Exemptions. Process a request for variance or exemption if situations exist when it is either impractical or impossible to comply with OSHA or AFOSH guidelines due to operational needs, mission impact, or technical reasons. The procedures for processing variance or exemption requests depend upon whether the source of the requirement is OSHA or AFOSH.

6.1. Variance Request. Request a variance when:

- 6.1.1. Compliance with a mandatory Air Force provision in an AFOSH standard is not possible.
- 6.1.2. Compliance would result in increased risk to personnel.
- 6.1.3. Compliance would seriously interfere with mission accomplishment.
- 6.1.4. The hazard has been assigned a RAC 1, 2, or 3 and corrective action requires a long-term funded project. Establish interim control to reduce the risk to an acceptable level and prepare a request for variance. In some situations, the interim control method in the hazard abatement program may be a temporary deviation from the standard, and as such a variance request may not be required (see attachment 1 - Deviation).

6.2. OSHA Standards Exemptions. The Air Force cannot grant exemptions to OSHA standards; DOL has the authority. If compliance with an OSHA standard is not possible, the workcenter must implement interim control measures, and notify the MAJCOM, DRU, or FOA safety, fire protection, or health personnel through the local safety staff. The workcenter develops a special exemption

request with technical assistance from installation ground safety personnel according to paragraph 6.6.

6.3. Technical Orders Variances. Process recommended changes to AFOSH requirements in TOs according to the instructions in TO 00-5-1, *Air Force Tech Order System*. Send a copy of the recommended change to HQ AFMC/SEG and HQ AFSC/SEG.

6.4. Directives Variances. Process requests for changes to AFOSH guidelines contained in Air Force instructions through command channels to the OPR for the directive. Safety, fire protection, or occupational health reviews, as appropriate, are accomplished at each level of command between the requester and the OPR. Send copies of recommended changes to HQ AFSC/SEG for coordination with HQ AFCESA/CEF or HQ AFMOA/SGOE.

6.5. AFOSH Standards Variances. Process requests for variances to AFOSH standards through command channels to HQ AFSC/SEG for safety-related issues, to HQ AFSC/SEG and HQ AFCESA/DF for fire prevention-related issues, and to HQ AFMOA/SGOE and HQ AFSC/SEG for health-related issues. HQ AFSC/SEG processes requests for variances and coordinates with the OPR affected HQ USAF functional manager.

6.6. Processing Variance or Exemption Requests:

6.6.1. The workcenter prepares a written variance or exemption request containing:

6.6.1.1. A description of the situation identifying the OSHA and AFOSH standard and specific provision.

6.6.1.2. The reason why compliance is not possible or practical.

6.6.1.2.1. The number of personnel involved on a regular basis and any major items of Air Force property that may be involved.

6.6.1.2.2. Interim control measures used to protect personnel, equipment, or property.

6.6.2. The workcenter coordinates with installation ground safety, fire protection, health representatives and sends it to the installation functional manager for coordination and commander for approval.

6.6.3. Installation ground safety manager forwards the variance or exemptions request to MAJCOM headquarters through appropriate command safety, fire protection, or health channels.

6.6.4. The MAJCOM staff forwards the requests recommended for approval to HQ AFSC/SEG or HQ AFMOA/SGOE, as appropriate.

6.6.5. The installation ground safety manager maintains a master file of approved variances or exemptions that apply to the installation as long as the variance or exemption is in effect and one year thereafter. The manager distributes copies of the file to fire protection, health, and functional managers, as needed. Functional managers inform affected employees and employee representatives of approved variances or exemptions and of any applicable special procedures and posts notices of variances or exemptions on employee bulletin boards in affected work areas.

7. Occupational Safety, Fire Protection, and Health Training. Training enables Air Force personnel to meet their AFOSH program responsibilities.

7.1. Commander and Functional Manager Briefings. Safety, fire protection, and health, representatives keep commanders and functional managers informed on the implementation of this instruction. They also provide briefings at least annually on the effectiveness of their programs and problems encountered. These briefings may be given during the occupational safety and health council meetings.

7.2. Supervisor Safety Training (SST). Supervisors are the key in the AFOSH program because they are responsible for maintaining safe and healthful environments in their areas. Supervisors must know the OSH requirements for their work areas and enforce compliance. They receive AFOSH training through management and professional development courses, AFHCP train-the-trainer training, MAJCOM-developed training programs, locally developed programs, and completion of the Air Force SST Course. The SST Course provides supervisory personnel with a working knowledge of their basic responsibilities for providing and maintaining safe and healthful working conditions; recognition, reporting, and elimination of hazards; employee safety motivation; mishap investigation; and other required skills to implement the AFOSH program at the working level.

7.2.1. Personnel Required To Attend :

7.2.1.1. Noncommissioned officers and senior airmen when first assigned to a supervisory position.

7.2.1.2. Commissioned officers when first assigned as a supervisor.

7.2.1.3. Civilian personnel upon initial assignment to a supervisory position.

7.2.1.4. Any supervisor needing refresher training or who demonstrates a lack of safety knowledge or initiative.

7.2.2. Administration. Unit commanders identify eligible personnel and arrange course scheduling with the installation ground safety personnel. The installation ground safety representative allocates quotas, giving priority to newly assigned supervisory personnel.

7.2.3. Documenting Training. Supervisors are responsible for documenting completion of SST on the AF Form 55, **Employee Safety and Health Record**, in the individual's training record or personnel file (see paragraph 7.3.2.). Safety staffs conducting SST are responsible for updating the Advanced Personnel Data Systems (APDS). Use computer code Q to reflect SST completion. Using of computer code Q creates eight possible safety codes:

7.2.3.1. Course I, IV, and SST = E.

7.2.3.2. Course I, IV, V, and SST = F.

7.2.3.3. Course I, V, and SST = H.

7.2.3.4. Course I and SST = I.

7.2.3.5. Course IV, V, and SST = L.

7.2.3.6. Course IV and SST = M.

7.2.3.7. Course V and SST = P.

7.2.3.8. SST = Q.

NOTE:

Do not use result codes. Use only entry code Q to update SST.

7.3. Safety, Fire Protection, and Health On-The-Job Training. Supervisors must provide specialized safety, fire protection, and health on-the-job training to all Air Force personnel. Supervisors provide training to newly assigned individuals and if there is a change in equipment, procedures, processes, or safety, fire protection, and health requirements. Safety, fire protection, and health (BE, PH, flight surgeon and (or) occupational medicine physician) officials will provide technical assistance to supervisors in developing an appropriate lesson plan for this training. Supervisors will review lesson plans annually and update whenever equipment, procedures, or the work environment change. Supervisors should review the BE baseline and the most recent annual survey report to ensure the outline is current. The training outline, as a minimum, must address mandatory items listed in attachment 5.

7.3.1. Designated Employee Representatives . The civilian personnel flight will schedule and monitor safety, fire protection, and health training for employee representatives. Upon request, coordinate training for designated representatives of civilian employees to assist in maintaining safe and healthful workplaces. The extent of such training will depend on local needs.

7.3.2. Documentation of Training. AF Form 55 will be used to document safety, fire protection, and health training unless other specific documentation is specified elsewhere. Supervisors must maintain a training outline as specified in Attachment 5 and document dates of initial and, as required, refresher training on AF Form 55, authorized versions, or an equivalent computer-generated product that is a true, reproducible and historically accurate facsimile. Attachment 6 provides instructions for completing AF Form 55. All personnel must have job safety training; however, commanders, functional managers, supervisors, and staff members whose work environment is primarily a low risk, administrative areas do not require documentation. Document job safety training for all other personnel. **NOTE:** Supervisor's, instructor's, and employee's signatures may be required by OSHA and should be included on the AF Form 55. Computer signature verifications on the AF Form 55 is at the discretion of the command.

7.4. Maintenance and Disposition of AF Form 55s.

7.4.1. The supervisor will maintain the AF Form 55 in the workplace and will update training when necessary. For enlisted personnel, this form may be filed with the AF Form 623, On-the-Job Training Record; for civilian personnel, file the form with the AF Form 971; and for all others, file the AF Form 55 where designated by the supervisor.

7.4.2. The AF Form 55 should be provided to individuals to hand carry to the next assignment when they transfer. Destroy the AF Form 55 one year after personnel are separated or retired..

8. AFOSH Evaluations, Assessments, and Inspections. The Air Force conducts evaluations, assessments, and inspections according to OSHA and DoD requirements. AFI 91-202, *The US Air Force Mishap Prevention Program*, explains the evaluation, assessment, and inspection programs in detail.

9. Contractor Operations. This instruction does not apply to employees, or working conditions of employees, of private contractors performing work under government contracts. Contractors are solely responsible for compliance with OSHA standards and the protection of their employees. Air Force inter-

est is to protect Air Force personnel working in or around contractor operations and with Air Force equipment and property. This instruction covers working in or around government contractors.

- 9.1. In such cases, the Air Force ensures a safe and healthful work environment for its personnel.
- 9.2. This is accomplished by contractor abatement of hazardous conditions, application of administrative controls, PPE, or withdrawal of affected employees.
- 9.3. Air Force safety, fire protection, and BE officials may enter a contractor's workplace to verify working conditions of Air Force personnel, provided the administrative contracting officer (ACO) authorizes such action. Accompaniment by the ACO or the ACO's designated representative is preferred.
- 9.4. Air Force safety, fire protection, and BE officials do not have the authority to direct contractor activities unless a condition exists which presents imminent danger to Air Force personnel. In all other situations such inspection findings are forwarded to the ACO for resolution with the contractor.
- 9.5. This instruction does apply to government-furnished facilities or equipment provided to a contractor when known hazards and interim control measures are contained within the contract requirements.

10. DOL Inspections.

10.1. DOL Inspection of Air Force Workplaces and Operations. OSHA officials, as representatives of the Secretary of Labor, may conduct inspections of nonmilitary-unique workplaces and operations where Air Force civilian personnel work. (The inspections may be unannounced.) Such inspections may be in response to a mishap or a complaint from an Air Force employee; may be part of OSHA's annual evaluation of Air Force programs; or may be solely at the Secretary of Labor's discretion.

10.1.1. The DOL may conduct, as part of its evaluation program, annual targeted inspections or program assistance visits of certain Air Force installations based on the comparative incidence of worker compensation claims. The DOL will prescribe special procedures in the notification process. OSHA inspectors may question or privately interview any employee, supervisory employee, or official in charge of an operation or workplace. Installation commanders must:

10.1.1.1. Allow DOL OSHA representatives to conduct inspections. If entry into a restricted area is necessary, they must have an appropriate security clearance (see AFI 31-401, *Information Security Program Management* (formerly AFR 205-1) and DoD 5200.1-R, *DoD Information Security Program, date*). Safety, fire protection, or BE personnel accompany DOL OSHA representatives while on Air Force installations.

10.1.1.2. Have an initial in-brief with DOL OSHA representatives.

10.1.1.3. Upon request, provide available safety, fire protection, and health information on workplaces. Do not provide reports marked "For Official Use Only". (See notes.)

NOTES:

1. OSHA officials may review "For Official Use Only" mishap reports; however, release of copies of the reports must be obtained by DOL from AFSC/SE (see AFI 91-204, *Investigating and Reporting US Air Force Mishaps*).

2. OSHA officials may review employee exposure and medical records. Cooperate with OSHA officials to assure their right to review such records. The official must safeguard the individual's rights to privacy

10.1.2. Provide photographic or video support, if required. Videos or photographs taken on installations fall under the exclusive control of the installation commander. This video or photographic support might include processing the film taken by the inspector or gaining approval to take a picture or video from the commander's representative. Air Force officials may review negatives, photographs, and videos before release if they suspect possible disclosure of classified information without the review.

10.1.3. Arrange a closing conference with the OSHA official if requested and invite employee representatives to attend.

10.1.4. Treat DOL OSHA notices of hazards in the same manner as an Air Force inspector report. Evaluate and assign a RAC code to each hazard identified by OSHA inspectors.

10.1.5. Ensure that inspectors verify DOL inspection results, including all testing. Air Force tests or sampling for future testing should be accomplished at the same time and at the same location as the DOL testing, if at all possible.

10.1.6. Ensure that DOL personnel conducting the inspection receive response to DOL inspection reports from the local level. Provide copies, through command channels, of the inspection report, replies to DOL, and related correspondence to the addressees listed below.

10.1.7. Transmit a message report on investigations or inspection visits within 2 workdays after receiving a DOL OSHA citation. (OPR: Installation safety, fire protection, or health representative.) This applies to Air Force workplaces or facilities, or operations performed by a contractor in which Air Force facilities, equipment, or procedural deficiencies are identified in the citation. Transmit message, by routine precedence, to:

10.1.7.1. SAF Washington DC//MIQ//

10.1.7.2. HQ USAF Washington DC//SE/CE//

10.1.7.3. HQ AFSC Kirtland AFB NM//SEG//

10.1.7.4. HQ AFCESA Tyndall AFB FL//CEXF//

10.1.7.5. HQ AFMOA Bolling AFB DC//SGOE//

10.1.7.6. MAJCOM/FOA/DRU//SEG/SGB/SGPB/CE

10.1.7.7. Intermediate Command//SEG/SGP/CE//

NOTE:

Include the following information:

10.1.7.8. Date of investigation/inspection.

10.1.7.9. Agency of inspector.

10.1.7.10. Workplace visited.

10.1.7.11. Reason for visit.

10.1.7.12. Results of investigation or inspection and violation reference or any notices of

unsafe and unhealthful working conditions with the appropriate RAC.

10.1.7.13. Problems encountered, if any.

10.1.7.14. If significant hazards or deficiencies are identified or problems occur during a DOL OSHA inspection or investigation, call the MAJCOM, FOA, or DRU. The MAJCOM, FOA, or DRU will notify HQ AFSC/SEG.

10.2. DOL Inspection of Contractor Operations:

10.2.1. Authority. Within the 50 states and US territories, Air Force contractors operating from Air Force or privately-owned facilities located on or off Air Force installations are subject to enforcement authority by federal and state safety and health officials. Authorized safety and BE officials from states without OSHA-approved occupational safety and health plans may, subject to the exceptions in this AFI, exercise jurisdiction over contractor operations. At overseas locations, local government agencies may conduct inspections of contractor facilities or operations as stipulated in status of forces or country-to-country agreements.

10.2.1.1. Federal OSHA officials may perform OSH inspections of Air Force contractor workplaces in areas where the US holds exclusive federal jurisdiction.

10.2.1.2. The DOL does not have authority over working conditions for which another federal agency or certain state agencies exercises statutory authority to prescribe or enforce standards or regulations affecting occupational safety and health. Thus, OSHA authority does not extend to working conditions specifically covered by:

10.2.1.3. Any nuclear safety or health standard or instruction implementing Title 42, U.S.C., 2012, 2021, 2121(b), and 2201(b).

10.2.1.4. Any explosives safety standard or instruction implementing Title 10, U.S.C., 172, Ammunition Storage Board.

10.2.1.5. Regardless of whether or not a state has an OSHA-approved plan, state safety and BE officials have no authority in Air Force contractor workplaces located in areas where the US holds exclusive federal jurisdiction.

10.2.1.6. Installation commanders must, as an act of courtesy, advise the applicable state OSHA representative in writing of contractor workplaces located within areas of exclusive federal jurisdiction.

10.2.1.7. Authorized safety and BE officials from states without OSHA-approved OSH plans may exercise jurisdiction over contractor workplaces only when there are no OSHA standards that apply to the work in progress.

10.2.2. Standards Enforced. Safety and health standards are enforceable by federal or state officials as follows:

10.2.2.1. Federal OSHA officials will enforce only federal OSHA standards in contractor workplaces.

10.2.2.2. State OSHA officials, operating under a federally approved plan and subject to the terms of any variance, tolerance, or exemption granted by DOL, may enforce state OSHA standards in contractor workplaces.

10.2.3. Procedures:

10.2.3.1. Contractors do not receive advance notice of federal or state OSHA inspections except:

10.2.3.1.1. In cases of apparent imminent danger to any Air Force or contractor employee.

10.2.3.1.2. When requested by federal or state OSHA officials.

10.2.3.2. Federal and state OSHA officials may access contractor workplaces on Air Force installations without delay at reasonable times during regular working hours. Other times may be agreed upon by concerned officials.

10.2.3.3. Federal or state OSHA officials must present identifying credentials and state the purpose of the visit to the installation commander or authorized representative before conducting an inspection of a contractor workplace on an Air Force installation.

10.2.3.4. When federal or state OSHA officials require entry to a classified or restricted area, the following procedures must apply:

10.2.3.4.1. The contractor must immediately notify the OSHA official and the Air Force activity exercising security supervision over the contractor's workplace of the need for personal security clearance or security escort.

10.2.3.4.2. If required, the security activity takes appropriate security actions to ensure that federal or state OSHA officials are granted access to classified or restricted areas.

10.2.3.4.3. Federal or state OSHA officials must have access to, and upon request, be provided with copies of records or reports pertinent to specific contractor mishap investigations unless prohibited from release by provisions of the Freedom of Information Act, 5 U.S.C. 552, or the *Privacy Act of 1974*.

10.2.3.4.4. If DOL reports nonconformance of government-furnished property, facilities, or equipment to OSHA standards or a contractor under an Air Force contract, the contracting officer must verify the report with assistance from appropriate Air Force installation OSH officials and advise the appropriate contracting activity. The procuring contracting officer or other designated authority must:

- Recommend contractor request variance from pertinent DOL standard when alternate safety measures provide adequate protection.
- Negotiate replacement with contractor-owned property.
- Replace with other suitable government property.
- Authorize modification of government property at contractor expense with the understanding that title to any nonseverable modification rests with the government.
- Authorize modification by the contractor at government expense only if continued use of the property is essential to support a major program. Necessary funding approvals are required under appropriate regulations.

10.2.3.4.5. The DoD contractor is responsible for resolving issues related to citations or requests for delays, variations, tolerances, or exemptions of applicable occupational safety and health standards.

10.2.3.4.6. The general principles contained in this subsection apply to safety and health

officials from states which do not have OSHA-approved occupational safety and health plans when exercising authority previously described.

11. NIOSH Evaluations. NIOSH is an independent research agency belonging to the Centers for Disease Control and Prevention, Public Health Service, US Department of Health and Human Services. NIOSH does not have inspection authority nor are its people DOL representatives. If NIOSH personnel request an evaluation at an Air Force installation, channel the request from installation level through the appropriate MAJCOM safety or health agency to HQ AFSC/SEG or HQ AFMOA/SGO, as applicable. Any NIOSH health evaluation must have its protocol submitted for review against AFI 40-402, *The Use of Human Subjects in Research, Development, Test, and Evaluation* (formerly AFR 169-3).

12. Hazard Reporting. Detecting unsafe or unhealthful working conditions at the earliest possible time and abating hazards promptly at the lowest possible working level are essential elements of the AFOSH program. The hazard reporting program provides a system of reporting hazardous conditions and for investigating and correcting those hazards. AFI 91-202 explains the hazard reporting program in detail.

12.1. Employee appeal procedures are as follows:

12.1.1. Employees have the right of appeal if they are not satisfied with local action on a hazard report submitted according to AFI 91-202. Managers or supervisors will not discriminate against an employee who exercises this right. If an employee is dissatisfied with actions taken on a hazard report, he or she should resubmit the report to the appropriate installation safety, fire protection, or bioenvironmental engineering representative, requesting that the alleged hazard be reinvestigated, and stating the reasons why. The representative must respond within 10 workdays.

12.1.2. If the employee is still dissatisfied, they may appeal to a higher level of safety, fire protection, or health representative in the following sequence:

12.1.2.1. Each intermediate headquarters.

12.1.2.2. MAJCOM, DRU, or FOA headquarters.

12.1.2.3. HQ AFSC/SEGO (safety hazards), HQ AFCESA/DF (fire hazards), or HQ AFMOA/SGOE (health hazards).

12.1.2.4. AF/SEP.

12.1.2.5. SAF/MIQ

12.1.2.6. DUSD (ES) (This is the final review for reports that originate at installations in foreign countries, from military personnel, or involve military-unique operations or equipment).

12.1.2.7. Office of Federal Agency Safety Programs, US Department of Labor.

12.1.3. Appeals are reviewed promptly and a reply sent to the employee within 20 days. If a reply is not received within 20 days or if the employee is dissatisfied with the reply, they may appeal to the next higher level. Each reply to an appeal will advise the employee of this right and will include the office symbol and address of the next higher level of appeal. If requested, the installation safety, fire protection, or bioenvironmental engineering representatives will assist the employee in obtaining technical information for clarification or for processing the appeal.

12.1.4. Employees may submit appeals directly to the Office of Federal Agency Safety Programs, US Department of Labor. However, the procedures outlined in the paragraphs above are encouraged as the most expeditious means of correcting hazardous conditions.

12.1.5. The procedures outlined above do not prevent the use of agency or negotiated grievance procedures.

13. Mishap Investigation and Reporting. The Air Force is responsible to investigate occupational injuries and illnesses to Air Force personnel as defined in AFI 91-204. Refer to AFI 91-204, Chapter 4, for requirements for annual reporting of summary of occupational injuries.

14. Occupational Safety and Health Councils.

14.1. Installation Occupational Safety and Health Council. Establish AFOSH councils at installations with more than 300 assigned personnel. The council is a forum for discussing OSH problems, advising the commander on OSH-related matters, and recommending solutions of OSH problems to the commander. Organize the council as a separate council or integrate it with the installation safety council. The council shall meet at least once per quarter.

14.1.1. The council is chaired by the installation commander or by the commander's designee, a senior management official.

14.1.2. Membership includes functional managers, civilian employee representatives, and representatives from civil engineering, financial management, civilian personnel flight, safety, fire protection, public health, and BE. Representatives from tenant units should be invited if deficiencies affect their operations. Representatives of all recognized employee organizations may take part, unless representation is otherwise covered under management-labor agreements. Invite the ACO where deficiencies occur which may affect contractor operations.

14.1.3. The installation ground safety manager makes all council arrangements, establishes the schedule, develops and distributes the agenda in advance, and records and publishes council meeting minutes. The council chairperson or a designated senior management official approves the minutes. All council members receive copies of the minutes. OPRs are identified for items requiring action.

14.1.4. Council communications stay within Air Force channels. Areas for discussion at the council meetings may include, as appropriate:

14.1.4.1. Review of changes in AFOSH program guidelines.

14.1.4.2. Analysis of hazard reports.

14.1.4.3. Analysis of mishap experience.

14.1.4.4. Summary of AFOSH inspections and evaluations.

14.1.4.5. At least annually, the installation master hazard abatement program, including all unabated safety, fire, and health hazards.

14.1.4.6. The installation EDP program as it relates to AFOSH program.

14.1.4.7. The ICPA briefing on compensation Program charge-back costs and continuation of pay (COP) costs and report from the FECA Working Group.

14.1.4.8. The Occupational Health Medical Examination Program.

14.1.4.9. Status of AFHCP activities.

14.1.4.10. Review of the Air Force annual occupational safety, fire protection, and occupational health goals and objectives.

14.2. Field Federal Safety and Health Councils. Normally, one management representative, preferably from ground safety, fire protection, or health; and one civilian employee representative represents the installation. Additional representation is at the installation commander's discretion.

14.3. Federal Safety and Health Conferences. Attendance and participation of Air Force OSH personnel in regional and national conferences are beneficial for program updates and mishap prevention initiatives. Where Air Force organizations sponsor OSH seminars or workshops, i.e., *Air Force Annual Ground Safety Seminar*, such activities should be scheduled in conjunction with a regional or national conference such as the National Safety Council Congress and Exposition.

15. Goals and Objectives. HQ AFSC, in coordination with HQ AFCEA and AFMOA must formulate annual program goals and objectives. MAJCOMS and subordinate commands provide input to these goals and develop complementary goals and objectives based on their mission, organizational structure, and problem area.

Section C—Hazard Abatement

16. Risk Assessment Code (RAC). Evaluate each occupational hazard or deficiency and assign a RAC (Table 1). Qualified safety, fire protection, and health personnel evaluate and assign RACs. Determine the mishap probability and severity for occupational safety and fire hazards and safety deficiencies according to the procedures in paragraphs 16.1 and 16.2. Determine the RAC by plotting the probability (A, B, C, or D) that a mishap will occur and the potential mishap severity (I, II, III, or IV) if it does happen. Attachment 7 provides procedures for determining RACs for health hazards or deficiencies. Attachment 8 provides procedures for determining RACs for fire deficiencies. Implementing interim control measures to reduce the level of risk associated with a particular hazard or deficiency will not affect the assigned RAC for corrective action purposes.

Table 1. Risk Assessment Code (RAC) Matrix.

SEVERITY ↓	MISHAP PROBABILITY			
	A	B	C	D
I	1	1	2	3
II	1	2	3	4
III	2	3	4	5
IV	3	4	5	5

RISK ASSESSMENT CODE
←

16.1. Mishap Severity. An assessment of the potential consequence if a hazard or deficiency results in a mishap. It is the degree of injury, occupational illness, resource loss, or fire damage that could occur. The severity categories are:

16.1.1. I - Death or permanent total disability, resource loss or fire damage more than \$1,000,000.

16.1.2. II - Permanent partial disability, temporary total disability in excess of 3 months, resource loss or fire damage from \$200,000 but less than \$1,000,000.

16.1.3. III - Lost workday mishap, resource loss or fire damage from \$10,000 but less than \$200,000.

16.1.4. IV - First aid or minor medical treatment, resource loss or fire damage less than \$10,000, or a violation of a requirement in a standard.

16.2. Mishap Probability. An assessment of the likelihood that a hazard or fire deficiency will result in a mishap. Categorize mishap probabilities as:

16.2.1. A - Likely to occur immediately or within a short period of time.

16.2.2. B - Probably will occur in time.

16.2.3. C - Possible to occur in time.

16.2.4. D - Unlikely to occur.

16.3. RAC Descriptions:

16.3.1. 1 - Imminent Danger.

16.3.2. 2 - Serious.

16.3.3. 3 - Moderate.

16.3.4. 4 - Minor.

16.3.5. 5 - Negligible.

17. Imminent Danger Situations. Bring imminent danger situations to the attention of the supervisor in charge immediately. The supervisor must take immediate action to eliminate or reduce the hazard or cease operations and withdraw exposed personnel until action is taken.

18. Posting Hazards. The workplace supervisor must post notices identifying RAC 1, 2, and 3 hazards to alert employees to the hazardous condition, any interim control measures in effect, and permanent corrective actions underway or programmed. Use AF Form 1118, **Notice of Hazard**, to post notices for facilities or AF Form 979, **Danger Tag**, for equipment. (See AFOSH Standard 127-45, *Hazardous Energy Control and Mishap Prevention Signs and Tags*.) **NOTE:** AF Form 979 is for use on equipment, but may be used temporarily in place of the AF Form 1118.

18.1. Location. Posting locations for hazard notices depends on the nature of the hazard and workplace operations. Post notices on, at, or as near as possible to the hazard. However, where the nature of the hazard or workplace is such that this is not practical, post notices in a prominent place where they can be seen by all affected employees.

18.2. Removal. Do not remove notices until the hazard has been corrected or for 3 days, whichever is greater. Remove notices only after verification by the issuing authority that the identified hazard has been satisfactorily corrected.

18.3. AF Form 1118 Procedures. Qualified safety, fire protection, and BE officials are the sole issuing authorities for AF Form 1118. Unit inspection reports must include a Notice of Hazard for each identified RAC 1, 2, or 3 hazard not corrected immediately on-site. Those who issue the notice must

provide it to the workplace supervisor for posting no later than 30 days after completion of the inspection. If these time constraints cannot be met tell the workplace supervisor. If required information is not known at the time of issuance, advise the supervisor it will be provided as it becomes available. The workplace supervisor must post the notice immediately upon receipt and may then remove the AF Form 979 if it was posted as a temporary notice (see AFOSH Standard 127-45). If adverse conditions are present, enclose the notices in a suitable protective cover.

18.3.1. Instructions for Preparing AF Form 1118. The safety, fire protection, or health official issuing the notice must complete all items possible with the exception of "Date Posted." The workplace supervisor fills in the date at the time of posting.

18.3.1.1. Control Number. The AF Form 1118 receives a control number. The numbers are sequential and annotated adjacent to the "Notice of Hazard" title. The numbering system coincides with the corresponding Air Force Hazard Abatement Plan (AF Form 3). Record the hazard or deficiency information on an AF Form 3, or the aerospace safety automation program (ASAP) computerized version, and make it part of the master hazard abatement plan if the hazard or deficiency is not corrected within 30 calendar days.

18.3.1.2. Location. Note the building number, room number, and function involved, where the hazard is located, and nomenclature of the hazardous item or procedure. (Example: Building 18, Room 217, Civil Engineering [CE] Carpenter Shop, Table Saw.)

18.3.1.3. Hazardous Condition. Describe in detail the nature of the hazard, including a reference to the standard or requirement violated, if any.

18.3.1.4. Risk Assessment Code. List RAC, followed by RAC description. (Example: "I [Imminent Danger].")

18.3.1.5. Interim Control Measures. Identify temporary measures needed to reduce the degree of risk associated with the hazard to an "acceptable" degree (RAC 4 or below) until permanent corrective actions are implemented. (Example: "Wear Type II Respirator" or "DO NOT USE.")

18.3.1.6. Permanent Corrective Action. List those actions in progress that will permanently eliminate the identified hazard. Include associated document number. (Examples, "Install new exhaust system [CE work order and project number]" and "replace grinder [supply requisition number].")

18.3.1.7. Contact Point. Note the name, grade, office symbol, and telephone number of individual responsible for elimination of the hazard.

18.3.1.8. Estimated Completion Date (ECD). Self-explanatory.

18.3.2. Status of Changes. When issuing the notice of hazard, all pertinent information may not be available. In addition, the status of identified hazards may change. The functional manager or a designated representative must notify the issuing authority of any changes in status concerning the identified hazard. Upon notification of such changes, the issuing authority issues an updated notice for the workplace supervisor to post.

18.4. Abatement of Hazardous Conditions. Each installation establishes a program to abate hazards and deficiencies, based on a priority system. The functional manager is responsible for abating

hazardous conditions. Send projects beyond the capability of local commanders to the parent MAJ-COM or DRU or FOA. To abate hazardous conditions:

18.4.1. Assign priorities, funds, and abate hazards in military-unique equipment, systems, and operations through established systems for modification and upgrade. Examples of these systems are the Product Quality Deficiency Reporting Program (TO 00-35D-54, *USAF Material Deficiency Report and Investigation System*) and Flight Manual Changes (AFI 11-215, *Flight Manual Procedures* [formerly AFR 60-9]).

18.4.2. Remember that hazard abatement in nonmilitary-unique workplaces must:

18.4.2.1. Abate RACs 1, 2, and 3 hazards as soon as practical.

18.4.2.2. Identify abatement actions for RACs 4 and 5 hazards and deficiencies. Abatement may be deferred pending scheduled repair or replacement, but maintain a record until abatement is completed. Use the AF Form 3 or ASAP version to record RAC 4 or 5 hazards or deficiencies, but they need not be part of the master hazard abatement plan.

18.4.3. Select an abatement method or interim corrective action based on the following priority:

18.4.3.1. Substitute less hazardous materials or less hazardous process.

18.4.3.2. Eliminate hazards through engineering changes or control.

18.4.3.3. Isolate hazardous operations to minimize exposure.

18.4.3.4. Provide work-around procedures.

18.4.3.5. Provide administrative controls to reduce length of exposure.

18.4.3.6. Provide PPE.

18.4.4. Other factors that affect decisions on abatement actions are:

18.4.4.1. Technical feasibility and cost of available options.

18.4.4.2. Number of personnel exposed and length of time exposed.

18.4.4.3. Previous mishap experience.

18.4.4.4. Future use of facility or equipment.

18.4.4.5. Available alternative methods to control the hazard or protect personnel.

18.4.4.6. Interim control procedures in effect.

18.4.5. The abatement priority number (APN) is the RAC and the cost effectiveness index (CEI). CEI measures cost effectiveness of a hazard abatement project and represents a ratio of the project cost and its potential effectiveness. Compute APN:

18.4.5.1. Step 1. Determine RAC from table 1 based on mishap severity and probability of occurrence.

18.4.5.2. Step 2. Determine the severity probability multiplier (M) from the matrix in table 2, using the same severity and probability used to determine the RAC. **NOTE:** The multipliers in table 2 represent a proportional distribution of the annual cost and frequency of mishaps and are derived from actual Air Force mishap experience.

Table 2. Severity and Probability Multiplier Matrix.

SEVERITY ↓	MISHAP PROBABILITY				SEVERITY PROBABILITY MULTIPLIER ←
	A	B	C	D	
I	188	53	21	7	
II	53	21	7	2	
III	21	7	2	1	
IV	7	2	1	0.26	

18.4.5.3. Step 3. Determine exposure (E), or the average number of personnel exposed daily to the hazard or deficiency during the course of the year.

18.4.5.4. Step 4. Determine the total abatement project cost (C). If actual costs are not known, use best available estimate.

18.4.5.5. Step 5. Compute the CEI by dividing the C for abatement by the product of M and E, or $CEI = C/(M)(E)$.

18.4.5.6. Step 6. Determine APN by listing the RAC followed by the CEI in parenthesis, or $APN = RAC(CEI)$.

18.4.5.7. Step 7. Determine relative priority of abatement projects by comparing the CEI of projects within identical RACs. **NOTE:** The lower the CEI, the higher its relative priority within the same RAC.

18.4.6. To use APNs to establish a priority list of projects, follow these steps:

18.4.6.1. Step 1. Determine RAC. Assumptions: Given a hazard that will probably occur in time (Probability B) and would result in a permanent partial disabling injury (Severity II) if it resulted in a mishap. Therefore, the assigned RAC from table 1 would be 2.

18.4.6.2. Step 2. Determine multiplier (M). Plot mishap probability (B) versus hazard severity (II) on table 2 to obtain a multiplier of 21.

18.4.6.3. Step 3. Determine exposure (E). Assumption: the functional manager or supervisor determined that on an average day 25 people are exposed to the hazard.

18.4.6.4. Step 4. Determine the total cost of project (C). Assumption: the total cost of the project to abate the hazard as provided to the functional manager by civil engineering is \$2,100.

18.4.6.5. Step 5. Determine cost effectiveness index (CEI). $CEI = C/(M)(E)$; $(M)(E) = 21 \times 25$, therefore $CEI = 2100/(21)(25) = 4$.

18.4.6.6. Step 6. Determine APN. The APN will be $(RAC)(CEI) = (2)(4)$.

18.4.6.7. Step 7. Determine relative priority. The APN will now be used to prioritize this project in relation to other RAC 2s for which APNs have been computed. A hypothetical priority listing containing this project is shown in table 3.

Table 3. Abatement Priority Number Index.

RAC	CEI	APN	Priority
1	(3)	1(3)	1
1	(113)	1(113)	2
2	(4)	2(4)	3
2	(15)	2(15)	4
2	(96)	2(96)	5
3	(11)	3(11)	6
3	(180)	3(180)	7
3	(240)	3(240)	8
3	(350)	3(350)	9

NOTE: The APN system cannot be used to compare projects of two different RACs.

18.5. Installation Hazard Abatement Plans:

18.5.1. Enter RAC 1, 2, or 3 hazard that requires more than 30 calendar days from the date it is identified for correction into the installation's formal hazard abatement plan using AF Form 3. Close out individual hazard reports and inspection reports when action is transferred to AF Form 3. Instructions for completing AF Form 3 are in Attachment 9. Safety managers may use the Aerospace Safety Automation Program (ASAP) to prepare AF Form 3 information.

18.5.2. Have the functional manager prepare AF Form 3 using hazard information provided by the safety, fire protection, or BE officials and others, including supervisors, civil engineering, and supply. The completed AF Form 3 is then sent to the installation organization having oversight responsibility for the identified hazard for validation: safety, fire protection, or health. After validation, send the AF Form 3 to the installation ground safety representative for incorporation into the formal plan. Enter only one hazard on each copy of the AF Form 3. If several facilities have the same hazard, enter only one facility on each AF Form 3. Enter projects to correct hazards with RACs 1, 2, or 3 on AF Form 3, if not abated within 30 days. Use of AF Form 3 for RACs 4 and 5 hazards or deficiencies is optional.

18.5.3. Note that the host installation ground safety manager maintains a complete set of AF Forms 3, or ASAP version, which is the installation master hazard abatement plan.

18.5.4. Note that it is mandatory for the functional managers to review AF Forms 3 pertaining to their areas of responsibility at least semiannually. The functional manager must notify the safety personnel of any changes in hazard abatement status and annotate the review in block 22 of AF Form 3 or after the last item on the ASAP version. If safety was not the RAC assigning agency, then safety must notify the fire protection or BE officials, as appropriate, that the review is completed and inform them of any change in status.

18.5.5. Remember the OSH council reviews the installation hazard abatement plan at least once a year. Address project delays and other problems on a semiannual basis.

18.5.6. Have the ground safety representative send the installation hazard abatement plan to the installation commander once a year for review and approval of priorities for projects.

18.5.7. When abatement project is completed, ensure the responsible functional manager requests the appropriate agency; safety, fire, or health, to certify the hazard has been adequately abated.

18.5.8. Make sure the ground safety representative makes the installation hazard abatement plan available for review locally by representatives of recognized employee organizations if such organizations exist.

18.5.9. Record RAC 4 and 5 hazards or deficiencies, but they need not be a part of the installation master hazard abatement plan. MAJCOMs must determine if AF Form 3 may be used for this purpose.

18.5.10. If abatement actions involving RAC 1, 2, or 3 hazards exceed local funding authority, send copies of AF Forms 3 to the parent MAJCOM ground safety representatives, to coordinate within their command. MAJCOM ground safety personnel send copies of AF Form 3 received from subordinate installations or units to HQ AFSC/SEG and HQ AFMOA/SGOE or HQ AFC-ESA/DF, if appropriate, when MAJCOM, DRU or FOA funding authority for abatement action is exceeded.

18.6. Funding for Hazard Abatement:

18.6.1. Remember budget personnel determine sources for funding hazard abatement projects. Installations should plan and program hazard abatement projects so that they can compete for the necessary funds within the planning, programming, and budgeting system framework.

18.6.2. Incorporate safety, fire protection, and health requirements into construction and modernization projects. Many hazards or deficiencies are abated as byproducts of new construction justified for other reasons. Military construction projects to abate occupational hazards or deficiencies normally do not involve new construction but usually consist of retrofit of one or more facilities, such as the installation or replacement of ventilation systems.

18.6.3. Send projects that exceed local funding authority to the parent MAJCOM, DRU or FOA for centralized programming. Identify the portion of project cost attributable to hazard abatement.

18.6.4. Make sure functional managers establish procedures to account for actual expenditures for abatement projects to correct hazards in their areas of responsibility. Civil engineering must provide actual cost data for abatement of hazards in facilities and real property installed equipment to the functional manager. The functional manager consolidates the information and sends it to the installation ground safety representative at least once a year for centralized reporting. Forward a mandatory End-of-FY report (close-out 30 September) to reach the installation safety representative by 5 October each year.

18.6.5. Note that each installation safety representative obtains information from installation civil engineering and functional managers in order to submit an End-of-FY Annual Hazard Abatement Survey report to their MAJCOM safety representative by 15 October each year. Attachment 10 contains format and instructions for the report. MAJCOM safety representatives, in turn, submit a consolidated Annual Hazard Abatement Survey report to HQ AFSC/SEG no later than 1 November each year. This report is to consist of information derived from Attachment 10 and Table 3 for all RAC 1s. Integrate data from individual installations into a consolidated report for each MAJCOM (RCS: HAF-SEC(A)9363). FOAs and DRUs are not to submit the annual survey report if the host installation reports their hazard abatement actions through a MAJCOM.

19. Forms Prescribed. AF Form 3, Hazard Abatement Plan; AF Form 55, Employee Safety and Health Record; AF Form 1118, Notice of Hazard.

ORIN L. GODSEY, Brig General, USAF
Chief of Safety

Attachment 1

GLOSSARY OF REFERENCES, ABBREVIATIONS, ACRONYMS, AND TERMS

References

- Air Force Instruction (AFI) 11-215, *Flight Manual Procedures* (formerly AFR 60-9).
- AFI 31-401, *Information Security Program Management* (formerly AFR 205-1).
- AFI 32-1031, *Operations Management*.
- AFI 34-301, *Nonappropriated Fund (NAF) Personnel Management* (formerly AFR 40-7).
- AFI 36-701, *Labor-Management Relations* (formerly AFR 40-711).
- AFI 36-1001, *Managing the Civilian Performance Program* (formerly AFR 40-452).
- AFI 36-1201, *Discrimination Complaints* (formerly AFR 40-1613).
- AFI 36-2402, *Officer Evaluation System* (formerly AFR 36-10).
- AFI 36-2403, *The Enlisted Evaluation System (EES)* (formerly AFR 39-62).
- AFI 40-202, *The Use of Human Subjects in Research, Development, Test, and Evaluation* (formerly AFR 169-3).
- AFI 91-202, *The US Air Force Mishap Prevention Program*.
- AFI 91-204, *Investigating and Reporting US Air Force Mishaps*.
- AFI 91-302, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Standards* (formerly AFR 8-14).
- Air Force Index (AFIND) 17, *Index of Air Force Occupational Safety and Health [AFOSH] Standards, Department of Labor Occupational Safety and Health [OSHA] Standards, and National Institute for Occupational Safety and Health [NIOSH] Publications* (formerly AFR O-17).
- AFIND 2, *Numerical Index of Standard and Recurring Air Force Publications* (formerly AFR 02).
- Air Force Occupational Safety and Health (AFOSH) Standard 48-1, *Respiratory Protection* (formerly AFOSH Standard 161-1)
- AFOSH Standard 48-21, *Hazard Communication* (formerly AFOSH Standard 161-21).
- AFOSH Standard 91-31, *Personal Protective Equipment* (formerly AFOSH Standard 127-31).
- AFOSH Standard 127-45, *Hazardous Energy Control and Mishap Prevention Signs and Tags*.
- Air Force Policy Directive (AFPD) 91-3, *Occupational Safety and Health*.
- Department of Defense (DoD) Instruction (DODI) 6055.1, *DoD Occupational Safety and Health Program*.
- DoD List 6050.5-L, *Hazardous Material Information System (HMIS) Hazardous Item Listing, With Change 1, November 1992*.
- DoD 5200.1-R, *DoD Information Security Program, date*.
- DoD Civilian Personnel Manual, Sub-chapter 8-10.

Occupational Safety and Health Administration (OSHA) Standard 1960.25, *Qualifications of Safety and Health Inspectors and Agency Inspections*.

OSHA Standard 1960.79, *Self-Evaluation of Occupational Safety and Health Programs*.

Technical Order (TO) 00-5-1, *Air Force Tech Order System*.

TO 00-25-115, *Logistics/Maintenance Engineer Management Assignments*.

TO 00-35D-54, *USAF Material Deficiency Report and Investigation System*.

Abbreviations and Acronyms

AAFES—Army-Air Force Exchange Service

ACGIH—American Conference of Governmental Industrial Hygienists

ACO—Administrative Contracting Officer

AER—Alternate Exposure Route

AETC—Air Education and Training Command

AFCESA—Air Force Civil Engineering Support Agency

AFHCP—Air Force Hazard Communication Program

AFI—Air Force Instruction

AFIND—Air Force Index

AFMC—Air Force Materiel Command

AFMOA—Air Force Medical Operations Agency

AFOSH—Air Force Occupational and Environmental Safety, Fire Prevention, and Health

AFPD—Air Force Policy Directive

AFR—Air Force Regulation

AFRES—Air Force Reserve

AFSC—Air Force Safety Center

ANG—Air National Guard

ANSI—American National Standards Institute

APDS—Advanced Personnel Data Systems

APN—Abatement Priority Number

AQ—The Assistant Secretary of the Air Force for Acquisition

AQC—Deputy Assistant Secretary (Contracting)

ASAP—Aerospace Safety Automation Program

ASME—American Society of Mechanical Engineers

BE—Bioenvironmental Engineer

C—Cost

CA—Compensation Act

CE—Civil Engineering

CECORS—Civil Engineering Contract Operations Reporting System

CEI—Cost Effectiveness Index

CFR—Code of Federal Regulations

CGA—Compressed Gas Association

cm²—Square Centimeters

COP—Continuation of Pay

CP—Centrally Procured

CPF—Civilian Personnel Flight

CT—Component (US Air Force) Threshold (such as milli-watts/cm², dB, or parts per million) that triggers surveillance actions

DASHO—Designated Agency Safety and Health Official

dB—Decibel

DECA—Defense Commissary Agency

DFAS—Defense Finance and Accounting Service

DoD—Department of Defense

DoDI—Department of Defense Instruction

DOL—Department of Labor

DP—Deputy Chief of Staff, Personnel

DRU—Direct Reporting Unit

DUSD(ES)—Deputy Under Secretary of Defense (Environmental Security)

E—Exposure

ECD—Estimated Completion Date

EDP—Environmental Differential Pay

EO—Executive Order

FECA—Federal Employee's Compensation Act

FM—Assistant Secretary of the Air Force (Comptroller)

FMB—Deputy Controller Budget

FOA—Field Operating Agency

FPM—Federal Personnel Manual

FSD—Fire Safety Deficiency

FWS—Federal Wage System
FY—Fiscal Year
GFE—Government-Furnished Equipment
GM—General Manager
GS—General Schedule
GSU—Geographically Separated Units
HHSC—Health Hazard Severity Category
HMIS—Hazardous Material Information System
HQ USAF—Headquarters, United States Air Force
ICPA—Injury Compensation Program Administrator
LS—Longshoreman
M—Multiplier
MAJCOM—Major Command
MCP—Military Construction Program
MI—The Assistant Secretary of the Air Force for Manpower, Reserve Affairs, Installations, and Environment
MIQ—The Deputy Assistant Secretary for Environment, Safety, and Occupational Health
MIL SPEC—Military Specification
MIL STD—Military Standard
MPC—Mishap Probability Category
MSDS—Material Safety Data Sheet
NAF—Nonappropriated Fund
NFPA—National Fire Protection Association
NIOSH—National Institute of Occupational Safety and Health
O&M—Operation and Maintenance
OPR—Office of Primary Responsibility
OSH—Occupational Safety, Fire Protection, and Health
OSHA—Occupational Safety and Health Administration
PCMS—Project by Contract Management System
PDP—Program Decision Package
PH—Public Health
PPE—Personal Protective Clothing and Equipment

RAC—Risk Assessment Code

SAF/—A symbol used prior to a series of letters indicating a specific office within the Offices of the Secretary of the Air Force

SE—Safety

SECAF—Secretary of the Air Force

SES—Senior Executive Service

SG—Surgeon General

SST—Supervisor Safety Training

STD—Applicable Exposure Limit (such as threshold value and permissible exposure limit)

TA—Table of Allowances

TO—Technical Order

USAF—United States Air Force

USAFR—United States Air Force Reserve

U.S.C.—United States Code

Terms

Abatement Priority Number (APN)—A two-part code, consisting of RAC and Cost Effectiveness Index (CEI), used to determine the relative priority of abatement actions.

Air Force Civilian—Senior executive service (SES), general manager (GM), general schedule (GS), and federal wage system (FWS) employees, including ANG and USAFR technicians; scientific and technical; administratively determined; US citizen employees in Panama; nonappropriated fund employees; Youth and Student Assistance Program employees; and foreign nationals employed by the Air Force under a direct or indirect hire arrangement. **NOTE:** Army-Air Force Exchange Service (AAFES), Defense Commissary Agency (DECA), and Defense Finance and Accounting Service (DFAS) employees are not covered by this instruction.

Air Force Hazard Communication Program (AFHCP)—The AFHCP (AFOSH Standard 48-21) is the implementation of the Occupational, Safety, and Health Administration Hazard Communication Standard (29 CFR 1910.1200). The purpose of the AFHCP is to reduce the incidence of chemically induced illnesses and injuries. It informs employees of the hazards and proper preventive measures to be taken when using or handling hazardous materials in the workplace. A major component of this program is personnel training using the Federal Hazard Communication Training Program or Air Force Medical Operations Agency approved program.

Air Force Military—All military personnel on active duty with the US Air Force; ANG and USAFR personnel on active duty or in drill status; US Air Force Academy cadets; Reserve Officers' Training Corps cadets when engaged in directed training activities; and foreign national military personnel assigned to the US Air Force.

Air Force People—All Air Force military and civilian personnel performing duty on or off Air Force installations.

Alternate Standard—A standard developed in place of an existing regulatory standard. An alternate standard must provide equal or greater protection to exposed personnel than the prescribed standard and can be approved only by the Secretary of Labor.

Assessment—Assessments determine safety program implementation and effectiveness below wing or installation levels. They measure the program and facilities status as gauged against the AFOSH program requirements. Assessments are optional. (See AFI 91-202.)

Cost Effectiveness Index—A measure of the cost effectiveness of an abatement action which relates cost and exposure.

Designated Employee Representative—An individual selected by civilian employees, either directly or through an exclusive representation bargaining agreement, to represent them as a member of the occupational safety and health council and to take part in other activities as outlined in this instruction.

Deviation—An exception to a safety standard that will only apply to a specific operation, process, or piece of equipment where, a qualified safety, fire protection, or occupational health official has provided interim guidance to control the operation at an acceptable safe level. The interim control of an identified hazard would be a deviation. Deviations may not be issued for a period in excess of 90 days. An unabated deviation after the 90-day period will require a request for variance or exemption if process is continued.

Environmental Differential Pay and Hazard Pay Differential—Special pay given to employees for exposure to unusual hazards and working conditions. EDP terminology applies to FWS personnel; hazard pay differential terminology applies to GS employees (see Federal Personnel Manual (FPM) Supplement 53-1, Appendix J). EDP for nonappropriated fund employees is covered in FPM Supplement 532-2, Appendix J.

Exemption, OSHA Standards—The process of obtaining DOL approval when compliance with an OSHA standard is not possible.

Fire Prevention—Measures directed toward avoiding the inception of fire.

Fire Protection—Methods used to control or extinguish a fire.

Fire Safety Deficiency (FSD)—A condition which reduces fire safety below the acceptable level, including noncompliance with standards, but by itself cannot cause a fire to occur. See occupational deficiency.

Functional Manager—The senior operating official at all levels exercising managerial control of an activity or operation. This individual usually can acquire and commit resources for the abatement of occupational safety and health hazards. Functional managers are designated by MAJCOM or installation commanders.

Hazard Abatement Program—A systematic, priority program to manage, assess, and monitor abatement actions.

Hazard and Deficiency Severity—An assessment of the expected results, defined by degree of injury, illness, or resource loss or damage that could occur if an occupational hazard or deficiency results in a mishap.

High Interest Areas—Work areas or operations that require additional attention or added inspections because of increased mishap potential due to the nature of work performed, physical conditions, type of

materials handled or increased mishap experience. These areas are designated by MAJCOM or installation safety, fire protection, or BE officials as high interest areas.

Imminent Danger—Conditions or practices in a workplace which could reasonably be expected to cause death or severe physical harm immediately or before such dangers can be eliminated through normal abatement procedures. *NOTE:* RAC 1 hazards are classified as imminent danger.

Interim Control Measures—Temporary measures taken to reduce the degree of risk associated with an occupational hazard or deficiency pending completion of an abatement program. These measures should reduce the risk to a level equal to, or less than, a RAC 4 condition. The interim control may be a deviation to a safety standard.

Military-Unique Equipment, Systems, Operations, and Workplaces—Equipment and systems that are unique to the national defense mission, including the operation, testing, and maintenance procedures dictated by the design configuration. Examples are military weapons, aircraft, marine vessels, missiles and missile sites, early warning systems and sites, military space systems, ordnance, and tactical vehicles. Operations or workplaces that are uniquely military include field training exercises, tactical and strategic deployment, military flight and missile operations, associated research, test, and development activities, and actions required under emergency conditions. *NOTE:* Operations or workplaces comparable to those in the civilian sector or any operation performed by federal civilians or contractor personnel are not considered military-unique. Examples include: facilities and work involved in the maintenance, servicing, repair, and overhaul of weapons, aircraft, or vehicles; construction, except under combat conditions; supply services; civil engineering work; medical services; and office work. Air Force work accomplished under contract is not military-unique.

Mishap Probability—An assessment of the likelihood that, given exposure to an occupational hazard or deficiency, a mishap will occur.

National Consensus Standards—Standards published by recognized standards organizations such as the ANSI, NFPA, American Conference of Governmental Industrial Hygienists (ACGIH), Compressed Gas Association (CGA), and NIOSH. National consensus standards adopted by OSHA are part of OSHA standards.

Notice of Hazard—A written warning of a condition, procedure, or practice which constitutes an occupational hazard. As used in the context of this instruction, "Notice of Hazard" refers to AF Form 1118.

Occupational Deficiency—Conditions, procedures, and practices that are in non-compliance with OSHA or AFOSH requirements, but do not, in themselves, create a potential for producing an occupational injury or illness mishap. Deficiencies may, however, create a potential for secondary injuries or illnesses or may contribute to the severity of an injury or illness that has already occurred. Examples include lack of fire detection or suppression equipment and systems, broken smoke alarm, lack of exit signs, and railings which are two inches below standard height. A clear distinction between hazards and deficiencies may not always be possible; therefore, the judgment and experience of qualified safety, fire protection, and health personnel must be relied upon. Occupational deficiencies include fire deficiencies and should not be assigned RAC 1, 2, or 3.

Occupational Hazard—Conditions, procedures, and practices directly related to the work place that can create a potential for producing occupational injuries, property or equipment damage, or illnesses. These hazards are normally assigned RAC 1, 2, or 3.

Occupational Hazard Abatement—The elimination or permanent reduction of an occupational hazard or deficiency by bringing it into compliance with applicable safety, fire prevention, and health requirements or by taking equivalent protective measures.

Occupational Safety, Fire Prevention, and Health Guidance—Occupational safety, fire prevention, and health requirements that are included in OSHA standards; AFOSH standards; technical orders; Air Force directives; national consensus standards; or other regulatory federal standards or directives.

Qualified Safety, Fire Protection, and BE Officials—Air Force civilian and military personnel assigned to full time positions for the respective disciplines. Air Force civilian personnel who meet the Office of Personnel Management standards for safety and occupational health manager or specialist, safety engineering technician, safety engineer, fire protection engineer or specialist, medical officer, health physicist, industrial hygienist, occupational health nurse or environmental health technician. Air Force military personnel who possess a safety, fire protection, bioenvironmental, aerospace medicine, or occupational medicine air force specialty code. Individuals will be equipped and qualified to recognize and evaluate hazards of the working environment and to suggest general abatement procedures. Safety, fire protection, and health personnel with experience or up-to-date training in occupational safety, fire protection, and health hazard recognition and evaluation are considered as meeting the qualifications of safety, fire protection, and health inspectors (see 29 CFR 1960.25, *Qualifications of Safety and Health Inspectors and Agency Inspections*). Normally, civilians are fully qualified at the GS-9 and military at the Air Force Specialty Code 7-level.

Risk Assessment—A method of evaluating the occupational mishap potential, based upon severity and mishap probability associated with an identified occupational hazard or deficiency.

Risk Assessment Code (RAC)—An expression of the degree of risk associated with an occupational hazard or deficiency that combines hazard severity and mishap probability into a single numeric identifier.

Standards—Include the following:

- **OSHA Standards**--Occupational safety and health standards (including emergency temporary standards) issued under the OSH Act of 1970. This includes national consensus standards adopted by OSHA by reference.
- **AFOSH Standards**--Air Force standards that implement OSHA standards and further prescribe Air Force occupational and environmental safety, fire protection, and health requirements issued under a special publication system established by AFI 91-302.
- **Supplementary Standard**--An emergency, temporary or permanent standard developed or adopted for application to working conditions for which no appropriate regulatory standards exist.

Supervisor—A military member or civilian employee designated to lead, direct, and supervise the work of others.

Variance—An approved temporary or permanent change to a procedure, criterion, or rule prescribed in AFOSH standards which provides the same degree of protection to personnel.

Workplace—The physical location where work is performed for the Air Force by Air Force personnel or where Air Force operations take place.

Attachment 2

JOB SAFETY ANALYSIS GUIDE

JOB: _____ DATE: _____

WORKCENTER: _____ SUPERVISOR: _____

TITLE OF WORKER WHO DOES TASK: _____

REQUIRED PERSONAL PROTECTIVE EQUIPMENT (PPE): _____

ANALYSIS BY: _____ REVIEWED BY: _____

1. SEQUENCE OF BASIC STEPS:

Break the task down into its basic steps. For example, what is done first, what is done next, and so on. You can do this by: (1) observing the task, (2) discussing it with workers, (3) using your experience and knowledge of the task, or (4) a combination of all three. Record the steps in the task in their normal order of occurrence. Describe what is done; not the details or how it is done. Three or four words are normally enough to describe each step in the task.

2. POTENTIAL MISHAP CAUSES OR HAZARDS:

For each task step, ask yourself what mishap could happen to workers performing the task and what the probability would be of the mishap occurring. Get the answers by: (1) observing the task, (2) discussing the task with workers, and (or) (3) using "lessons learned" from other mishaps. Ask the questions:

- a. Can workers be struck by or contacted by anything?
- b. Can they strike against or come in contact with any item which can cause injury?
- c. Can they be caught in or between anything?
- d. Can they fall?
- e. Can they overexert?
- f. Are they required to do repetitive lifting or heavy lifting?
- g. Are they exposed to potential hazards such as toxic gases, chemicals, radiation or noise?

3. RECOMMENDED SAFE TASK PROCEDURE:

For each identified potential mishap cause or hazard, consider the following questions:

- a. How should the workers do the task step to avoid the mishap or eliminate the potential hazard?
- b. What can be done to eliminate or mitigate the hazard by redesigning the workarea or equipment?
- c. How can the procedure be modified to eliminate the hazard?

Be sure to describe in detail the precautions workers must take and ensure that these steps are placed in the task procedure or checklist. Take special care that important steps or details are not inadvertently omitted from the task. Ensure that the guidance is clear and specific and easily understood by workers.

Attachment 3

PERFORMANCE EVALUATION AND APPRAISAL STANDARDS AND ELEMENTS FOR SUPERVISORS (EXAMPLES ONLY)

1. Element: Ensures Job Safety Analyses are conducted on all work processes to identify potential hazards, determine appropriate personal protective equipment (PPE), and include preventative measures in procedures to mitigate the hazards.

Standard: No injuries experienced during the year because of unidentified hazards in work procedures.

2. Element: Provides sufficient quantities of PPE and enforces its use.

Standard: No more than two separate, valid, documented PPE discrepancies per quarter are permitted in the form of employee complaints or found during inspections or surveys.

3. Element: Conducts occupational and environmental safety, fire prevention, and health self-inspections of the workplace.

Standard: Self-inspections of workplaces are conducted and documented. Shop areas are to be inspected frequently, at least monthly, and administrative areas quarterly. Two failures to conduct monthly inspections per year is acceptable. One failure to conduct quarterly inspections per year is acceptable. Any injury incurred by personnel that could have been prevented by the self-inspection is unacceptable.

4. Element: Conducts occupational safety, fire prevention, and health on-the-job training for employees as required by AFI 91-301.

Standard: Ensures new employees receive training within 15 days of assignment or of job environment changes that require retraining. Documents training on the AF Form 55 within 30 days of completion.

5. Element: Enforces good housekeeping standards.

Standard: No more than two documented complaints on housekeeping deficiencies per quarter from any source, i.e., employee, supervision, inspections, surveys.

6. Element: Enforces standards on handling, storing, controlling of hazardous chemicals and makes all pertinent material safety data sheets (MSDS) available to affected employees.

Standard: No more than four documented complaints or inspection findings are permitted per year.

7. Element: Initiates corrective action on hazards identified in mishap reporting documents and performs necessary follow-up actions.

Standard: No more than two verifiable repeat deficiencies will be reported from any source per year.

8. Element: Enforces requirements and policies against the wearing of finger rings, other jewelry and metal objects in selected work areas or during specific work processes.

Standard: No more than two documented complaints on employees violating this criteria are permitted. A lost-time injury caused by failure to comply is unacceptable.

9. Element: Enforces published requirements on handling, storing, and controlling explosive items in the workplace.

Standard: No more than two documented complaints or inspection findings per year allowed.

Attachment 4

PERFORMANCE EVALUATION AND APPRAISAL STANDARDS AND ELEMENTS FOR NONSUPERVISORY PERSONNEL (EXAMPLES ONLY)

1. Element: Uses required personal protective equipment.

Standard: May receive no more than two valid, documented complaints per year from supervisory spot checks or self-inspections.

2. Element: Complies with all applicable safety and health requirements and directives.

Standard: May receive no more than one valid, documented complaint per quarter from supervisory spot checks or self-inspections.

3. Element: Complies with requirements and policies pertaining to the wearing of finger rings and other jewelry or metal objects in selected work areas or during specific work processes.

Standard: May receive no more than two valid, documented complaints per quarter from supervision or inspections.

4. Element: Reports work-related personal injuries and government property damage to the supervisor.

Standard: No more than one failure to report during a 1-year period.

Attachment 5

JOB SAFETY TRAINING OUTLINE

A5.1. Items that, as a minimum, must be covered during Job Safety Training are:

- A5.1.1. Hazards of the job tasks and safety procedures to be followed.
- A5.1.2. Hazards of the work areas to include physical and chemical.
- A5.1.3. OSH standards and guidance that apply to job and work place.
- A5.1.4. Personal protective equipment needed and how, when and where to use it.
- A5.1.5. Location and use of emergency and fire protection equipment.
- A5.1.6. Emergency procedures that apply to job and work place, including evacuation procedures, fire reporting procedures, and location of fire alarms and extinguishers.
- A5.1.7. Reporting unsafe equipment, conditions or procedures to supervisor immediately.
- A5.1.8. Location, submission procedures, and purpose of the AF Form 457. (AFI 91-202)
- A5.1.9. Mishap reporting procedures.
- A5.1.10. Emergency telephone numbers.
- A5.1.11. Location and required review of appropriate safety bulletin boards, AFVA 91-307.
- A5.1.12. Location of medical facilities and procedures for obtaining treatment.
- A5.1.13. Requirements for documentation and notification of occupational injury or illness.
- A5.1.14. Purpose and function of the AF Form 1118, *Notice of Hazard*
- A5.1.15. Individual responsibilities for ensuring own safety.
- A5.1.16. Required use of safety belts.
- A5.1.17. Personal rights and responsibilities under OSH guidance. (AFI 91-301, Para. 2.15)
- A5.1.18. Air Force Hazard Communication Program Requirements.
- A5.1.19. Any occupational medical examination required.
- A5.1.20. Confined space requirements.
- A5.1.21. Manual lifting guidance. (AFOSH Standard 91-46)
- A5.1.22. Jewelry safety. (AFOSH Standard 91-66, Chapter 2)
- A5.1.23. Principles of risk management.
- A5.1.24. Potential hazards associated with the surrounding local area if operational activities require travel off-base.

A5.2. Changes to this outline will be required when equipment, procedures, or processes change or when safety, fire protection, and health requirements change.

Attachment 6

INSTRUCTIONS FOR COMPLETING AF FORM 55, EMPLOYEE SAFETY AND HEALTH RECORD

Items 1 and 2. Self-explanatory.

Item 3. Employee's duty section mailing symbol.

Item 4. Self-explanatory.

Item 5. Employee's duty title as established by job description.

Item 6. Briefly describe hazards the employee will encounter on the job, such as chemicals used and electrical hazards.

Item 7. Indicate if duties require occupational health medical examination and frequency.

Section I. Mandatory Items. Each new employee is briefed by his or her supervisor on the items identified in the job safety training outline and any other particular items of concern. (Supervisors should list mandatory items only in Section I and use Section VI or a continuation sheet if additional space is needed.)

Section II. Personal Protection Issued. Indicate any items issued to personnel for their sole use by make or type. When any item is issued, a briefing is prepared on the reasons or tasks requiring the item. It shall be made known to the employee that the use of protective clothing or equipment, when required, is a condition of employment and not an option.

Section III. Personal Protection Provided in Work Area. Indicate the items provided in the work area for general use by task, such as face shields or goggles for grinding. As these items are checked off, indicate the type and reasons for use. It must be made known to the employee that the use of these items, when required, is not an option but is a condition of employment.

Section IV. Date Specialized OSH Training Was Provided. Indicate specific safety training provided, as required.

Section V. Columns A and B. Record employee Safety, Fire Prevention and Protection, and Occupational Health On-The-Job Training. Record both generalized and specific hazard communication training required by AFOSH Standard 48-21.

Section V. Columns C and D. Record in Column C name of supervisor or trainer/instructor. Supervisor's or trainer's/instructor's, and employee's signatures when required by OSHA and (or) at the discretion of the command.

Attachment 7.

INSTRUCTIONS FOR DERIVING RACS FOR HEALTH HAZARDS AND DEFICIENCIES

STEP 1. Using the following procedures to assess points, determine the health hazard severity category (HHSC). The HHSC reflects the magnitude of exposure to a physical, chemical, or biological agent and the medical effects of exposure.

- A. Exposure Points Assessed. Use the following guide to determine exposure points:

		EXPOSURE CONDITIONS				Points
		<CT	Occasionally >CTAI-ways <STD	>CT< STD	>STD	
AER	No	0	3	5	7	←
Possible?	Yes	1-2	4	6	8	

NOTES:

- AER = Alternate exposure route, such as skin absorption, ingestion.
- CT = DoD component threshold that triggers surveillance actions, such as milli-watts/square centimeters (cm²), decibel (dB), parts per million.
- STD = DoD exposure limit, such as Threshold Limit Value and Permissible Exposure Limit.

- Medical Effects Points Assessed:

Condition Points

- 0: No medical effect, such as nuisance noise and nuisance odor.
- 1-2: Temporary reversible illness requiring supportive treatment, such as eye irritation and sore throat.
- 3-4: Temporary reversible illness with a variable but limited period of disability, such as metal fume fever.
- 5-6: Permanent, nonsevere illness or loss of capacity, such as permanent hearing loss.
- 7-8: Permanent, severe, disabling, irreversible illness or death, such as asbestosis and lung cancer.
- C. Determining the HHSC. Determine the HHSC by totaling the Points Assessed and using the following guide:

Total Points(Sum of A and B Above)	HHSC
13 to 16	I
9 to 12	II
5 to 8	III
0 to 4	IV

STEP 2. Using the following guides to assess points, determine the mishap probability category (MPC) for health hazards. The probability of mishap reflects the duration of exposure and the number of exposed personnel.

- A. Duration of Exposure Points Assessed:

		1 TO 8 HR/WK	>8 HR/WK (NOT CONTINUOUS)	CONTINUOUS
TYPE OF EXPOSURE	IRREGULAR, INTERMITTENT	1 to 2	4 to 6	--
	REGULAR, PERIODIC	2 to 3	5 to 7	8

- B. Number of Exposed Personnel Points Assessed:

- | | |
|-------------------|--------|
| • less than 5 | • to 2 |
| • to 9 | • to 4 |
| • to 49 | • to 6 |
| • greater than 49 | • to 8 |

- C. Determining the MPC. Determine the MPC for health hazards by totaling the points assessed and using the following guide:

Total Points (Sum of A and B Above)	MPC
14 to 16	A
10 to 13	B
5 to 9	C
less than 5	D

STEP 3. Determine the RAC for health hazards by using Table 1 in Section C to measure health severity and mishap probability factors

- A. Compute CEI as follows:
 - ²Find severity probability multiplier (M) from the matrix in Table 2 and record below:
 - ²Record the average or equivalent number of persons exposed (E) daily to the hazard during the course of a year.
 - ²Obtain the estimated total cost of the abatement project (C).

- ²Compute the cost effectiveness index (CEI): $C/(M)(E)$
- B. Combine RAC and CEI to obtain the APN: $(RAC)(CEI) = APN$. **NOTE:** The multipliers in this matrix represent a proportional distribution of the annual cost and frequency of DoD mishaps and are derived from an analysis of actual DoD experience. (See paragraph 17.4.3.).

Attachment 8

INSTRUCTIONS FOR DERIVING RACS FOR FIRE SAFETY DEFICIENCIES

I. Computations:

- **Step 1.** Fire safety deficiencies (FSD) require a subjective analysis to determine the priority required for the corrective action. They are prioritized according to their seriousness. Each identified FSD requires that the appropriate code be assigned. These codes (I, II, III, IV, or V) are used to prioritize the FSDs and highlight the more serious ones for correction. These codes are used in the same manner as risk assessment codes (RAC).
 - Code I. A severe deficiency that would result in a catastrophic loss of mission capability, facility or contents, or high loss of life.
 - Code II. A serious deficiency that would have a significant impact on mission capability, facility or contents, or a significant probability of loss of life.
 - Code III. A deficiency that may constitute a risk to life or property.
 - Code IV. A deficiency that may contribute to only minor damage or a slight risk to personnel.
 - Code V. A deficiency that has little impact on personnel, facilities, or contents.
- **Step 2.** Conduct an analysis based on fire probability and loss severity. This analysis cannot be used for establishing legal liability relating to a fire incident.
 - **Fire Probability.** Assess the likelihood that a fire will occur. Consider, as a minimum, the following factors: contents, processes, arrangement of contents, occupancies, operations conducted in the area, construction classes/types/ages, and hours of operation. Assign one of the following categories:
 - A - Likely to occur immediately or within a short period of time.
 - B - Probably will occur in time.
 - C - Possible to occur in time.
 - D - Unlikely to occur.
 - **Loss Severity.** Assess the expected loss should a fire occur. Consider, as a minimum, the following factors: contents, processes, occupancies, constructions, installed fire safety features, and impacts of the FSD during a fire. Assign one of the following categories:
 - Loss of life: major monetary loss (more than \$5,000,000) or major mission impact.
 - Permanent disability: severe monetary loss (\$1,000,000 to \$5,000,000) or curtailed mission capability.
 - Injury: slight monetary loss (\$100,000 to \$1,000,000) or limited mission impact.
 - No injury or mission impact and minimal monetary loss (less than \$100,000).
- **FSD Code Matrix.** Determine the FSD code from table A8.1 based on the fire probability category (A, B, C, or D) and the loss severity category (1,2,3, or 4).

Table A8.1. Fire Safety Deficiency Code Matrix.

LOSS SEVERITY ↓	FIRE PROBABILITY			
	A	B	C	D
1	I	I	II	III
2	I	II	III	IV
3	II	III	IV	V
4	III	IV	V	V

← FIRE SAFETY DEFICIENCY CODE

II. Corrective Action on FSDs:

- Code I
 - Prepare AF Form 1487, **Fire Prevention Visit Report**, describing the FSD and specific corrective actions required.
 - The unit commander is responsible for correction of Code I FSDs. If immediate correction is not possible, interim measures shall be initiated to reduce the fire risk, such as the following: evacuating the building or facility, suspending all operations that could ignite a fire, or establishing a 24-hour fire watch.
 - The unit commander or his representative shall enter the necessary corrective action on AF Form 1487 and return the form to the fire organization. The form shall be maintained until the FSD is corrected.
 - The fire organization should assist in completion of AF Form 332, **Civil Engineering Work Request**, to ensure that the deficiency and corrective action are adequately described and justified.
- Code II.
 - Prepare AF Form 1487 describing the FSD and specific corrective action required.
 - The unit commander shall correct the Code II FSD and enter the necessary corrective action on AF Form 1487. The form shall be returned to the fire organization and maintained until the FSD is corrected.
 - The fire organization should assist in the completion of AF Form 332 to ensure that the deficiency and corrective action are adequately described and justified.
- Codes III, IV, and V. The command shall establish management procedures for these FSDs.

III. Reporting Requirements. When the appropriate FSD code has been established and assigned, the code is reported on AF Form 1487 and is used in the same manner as a RAC, when assigning special work priorities according to AFI 32-1031, *Operations Management*. The report shall describe the deficient condition, interim measures taken, and necessary action for permanent correction.

- Code I. An immediate report shall be made to the installation commander by the unit commander upon identification of a Code I FSD.
- Codes I and II. FSDs shall be reported annually to the installation commander by the fire organization. The report shall describe every Code I and II not corrected and any that were corrected during the preceding year.
- Codes III, IV, and V. The major command shall establish procedures for reporting of Codes III, IV, and V FSDs.

Attachment 9

INSTRUCTIONS FOR COMPLETING AF FORM 3, HAZARD ABATEMENT PLAN

A9.1. Note that the AF Form 3 is the instrument by which an identified RAC 1, 2, or 3 hazard requiring more than 30 calendar days to abate is entered into the installation's formal hazard abatement plan. This does not prevent its use for RAC 4 or 5 hazards or deficiencies. The ASAP Hazard Abatement Program may also be used.

A9.2. Prepare AF Form 3 in an original and two copies.

A9.3. Prepare a separate AF Form 3 for each individual hazard.

A9.4. The functional manager initiates AF Form 3 by completing Parts I and II in as much detail as possible and sends it to the installation safety, fire protection, or health office:

A9.4.1. Top of Form, Heading Blocks:

- Type of Action. Indicate whether the action is an occupational hazard. Indicate whether this is an initial input of a recently identified hazard, a revision of a previously submitted AF Form 3, or a record of a completed hazard abatement action.
- Date. Self-explanatory.
- To. Address AF Form 3 to the installation agency (safety, fire protection, or health) having oversight responsibility concerning the hazard. Include organization, office symbol, and installation.
- From. Enter functional manager's organization, office symbol, and installation.
- Point of Contact. Enter the name, organization, office symbol, and phone number of the workplace supervisor where the hazard or deficiency is located.

A9.4.2. Part I—Hazard Information:

- Item 1 (Control Number). Note that the control number is issued by the installation agency (safety, fire protection, or health) responsible for monitoring the hazard. **NOTE:** The functional manager will leave this blank for a new input unless an AF Form 1118 has been posted. The control numbers on the AF Form 3 and AF Form 1118 for the same hazard will be identical.
- Item 2 (RAC). Enter RAC 1, 2, or 3 as provided by safety, fire protection, or BE officials.
- Item 3 (Category). Self-explanatory.
- Item 4 (Discovery). Give date and method by which the hazard was originally identified. For "inspection" designate type, such as, self, unit, or OSHA. Include hazard report numbers, suggestion numbers, and other such data for cross-reference.
- Item 5 through 8 (Location). Self-explanatory.
- Item 9 (Standard Violated). Note that this can include safety, fire protection, or health requirements of AFOSH, national consensus standards, OSHA standards, regulations, or TOs.

- Item 10 (Exposure). Enter the average number of personnel exposed to the hazard or deficiency daily.
- Item 11 (Description). Give a word description of the hazard to illustrate its potential impact if not abated.

A9.4.3. Part II—Abatement Information:

- Item 12 (Description). Give a description of the permanent abatement action taken or programmed to eliminate or reduce the hazard.
- Item 13 (Method). List the work method or avenue by which the hazard is to be abated. Examples include self-help, civil engineering work order, contract, and local purchase.
- Item 14 (Project Number). Include document numbers associated with work requests, work orders, job orders, or projects. Also include supply requisitions and maintenance work orders.
- Item 15 (Completion Date). If programmed in current fiscal year (FY), provide month and year. If programmed in future FY, indicate FY. If abatement has been completed, indicate actual completion date.
- Item 16 (Cost). Indicate whether estimated for unabated hazards or deficiencies or actual for completed abatement actions.
- Item 16a (Project Cost). Indicate total cost associated with project identified in item 14.
- Item 16b (Abatement Cost). If the cost to abate the hazard or deficiency is not the total cost of the project, enter only the cost associated with correction of the hazard. For example, a \$500,000 facility renovation project will correct hazardous electrical wiring estimated to cost \$25,000. Item 16a would show \$500,000 while item 16b would show \$25,000.
- Item 17 (Status). Indicate status of project identified in item 14; include major milestones, reasons for delay, percent complete. Other examples include "in design," "in procurement," "under construction," "awaiting materials," and "closed."
- Item 18 (Interim Control Measures). List temporary measures taken to reduce the risk associated with the hazard pending completion of permanent abatement action. Examples include issuance of personal protective equipment (specify type), termination of operations, and work around procedures (specify).
- Items 19 through 21. (Functional Manager; Signature; Date). Self-explanatory.
- Item 22 (Review Record). Use this area for functional manager and commander reviews.

A9.4.4. The qualified safety, fire protection, or health official assigns a control number for new inputs and completes items 23 through 32 of AF Form 3 based on information furnished by the functional manager in Parts I and II. Retain one copy and send the second copy to the installation safety office to be included in the installation master hazard abatement plan.

- Item 23 (Severity). See Table 1.
- Item 24 (Probability). See Table 1.
- Item 25 (Severity and Probability Multiplier). See Table 2.
- Item 26 (Exposure). State the average number of personnel exposed daily to the hazard (from item 10).
- Item 27 (Project Cost). Estimated cost from item 16a.

- Item 28 Risk Assessment Codes (RAC). RACs 1, 2, or 3.
- Item 29 Cost Effectiveness Index (CEI). Note that the CEI equals total cost (item 27) divided by the product of the multiplier (item 25) and exposure (item 26).
- Item 30 through 32. (Qualified Official; Signature; Date). Self-explanatory. These items will be completed on each hazard abatement plan. When the form indicates completed abatement actions, the fully qualified safety, fire protection, or health official's signature in item 31 indicates certification of completed abatement actions.

Attachment 10

ANNUAL HAZARD ABATEMENT SURVEY REPORT (RCS: HAF-SEC(A) 9363)

A10.1. Purpose.

A10.1.1. The OSHA of 1970, EO 12196, and 29 CFR 1960, require that federal agencies provide workplaces free from identified hazards and to establish procedures for identifying, prioritizing, and allocating resources to correct such hazards. DoDI 6055.1 requires that components establish systematic priority programs to identify and correct hazardous conditions in all workplaces. In addition, DoD guidelines require each service to program funds to eliminate the workplace safety and health hazards.

A10.1.2. EO 12196 and 29 CFR 1960, also require an annual evaluation and report of federal agency OSH programs to DOL and the President. As a part of this evaluation, the Air Force conducts an annual program review that includes hazard abatement program data.

A10.2. Instructions.

- Figure A10.1 provides for a summary of data that occurred in the FY being reported. The required information is to determine the percentage of funded projects given RACs 1, 2, and 3 and sufficient information to monitor the hazard abatement in the workplace.
 - Consolidate Figure A10.1 listings at each MAJCOM, DRU and FOA for submission to HQ AFSC/SEG.
 - Coordinate survey response with fire protection and health agencies at each organizational level.
 - Section A shows the total number of abatement actions, total project cost, and abatement cost in thousands of dollars during that FY.
 - Section B is the total number of hazards, total project cost, and abatement cost which include all funded programs for that FY.
 - Section C is the same as Sections A and B except it includes all projects programmed but unfunded in the FY. Do not record projects programmed and projected for the new fiscal year.
- Table A10.1 provides specific information on RAC 1 hazards that were not funded or not corrected in that FY. This figure provides more details on the unabated RAC 1 unfunded hazards. It includes the RAC 1 projects that are listed in Figure A10.1, Section C.
 - Item 1. List Installation, State, Country where hazard is located.
 - Item 2. Enter Hazard Control Number of the hazards to be abated by this project.
 - Item 3. Project Identification:
 - Project Title.
 - Project Number and CE Control Number for Military Construction Program (MCP) Projects.
 - Program Decision Package (PDP). Required for MCP projects and include Cost Effectiveness Index.

- Total Project Cost and Abatement Cost.
- Item 4. Give a narrative description of project scope and justification. Provide interim controls of identified RAC 1 hazards.

Figure A10.1. Format, Annual Hazard Abatement Survey Report.

ANNUAL HAZARD ABATEMENT PROGRAM SURVEY REPORT
(RCS: HAF-SEC(A) 9363)
MAJCOM--FOA--DRU

SECTION A--HAZARDS ABATED DURING FY__

	NUMBER OF HAZ- ARDS ABATED	TOTAL PROJECT COST (\$000)	ABATEMENT COST (\$000)
MCP	RAC 1 _____	_____	_____
	RAC 2 _____	_____	_____
	RAC 3 _____	_____	_____
OPERATIONS AND MAINTENANCE (O&M)	RAC 1 _____	_____	_____
	RAC 2 _____	_____	_____
	RAC 3 _____	_____	_____
	TOTAL	_____	_____

SECTION B--ABATEMENT ACTIONS UNDERWAY (FUNDED)

MCP	RAC 1 _____	_____	_____
	RAC 2 _____	_____	_____
	RAC 3 _____	_____	_____
O&M	RAC 1 _____	_____	_____
	RAC 2 _____	_____	_____
	RAC 3 _____	_____	_____
	TOTAL	_____	_____

SECTION C--ABATEMENT ACTIONS PROGRAMMED (UNFUNDED)

MCP	RAC 1 _____	_____	_____
	RAC 2 _____	_____	_____
	RAC 3 _____	_____	_____
O&M	RAC 1 _____	_____	_____
	RAC 2 _____	_____	_____
	RAC 3 _____	_____	_____
	TOTAL	_____	_____

(MAJCOM/FOA /DRU)

ANNUAL HAZARD ABATEMENT SURVEY REPORT (RCS: HAF-SEC(A) 9363)

OSH HAZARDS - PROGRAMMED (UNFUNDED) RAC 1

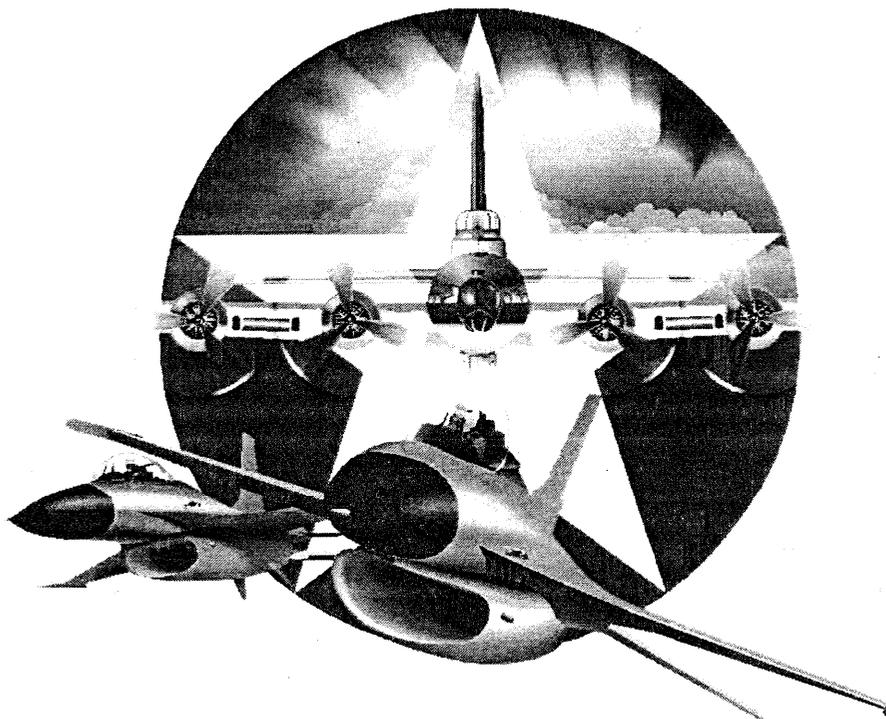
Table A10.1.-Format, RAC 1 Annual Hazard Abatement Survey Report.

1	2	3 PROJECT IDENTIFICATION					4 NARRATIVE	
BASE	HAZ- ARD TO BE ABAT- ED	A TITLE	B PROJEC T NUM- BER	C PDP	D PRO- GRAM FY	E COST (\$000)		
		(1) TO- TAL	(2) ABAT E-ME NT					

24

United States Air Force

Fiscal Year 1999



**Annual Report on
Occupational Safety and Health**

AGENCY FISCAL YEAR 1999 ANNUAL REPORT ON OCCUPATIONAL SAFETY AND HEALTH

Agency Name: Department of the Air Force

Address: SAF/MI
1660 Air Force Pentagon
Washington DC 20330-1660

Number of employees covered by this report: 164,934 (Average Strength)

NOTE: This report is for the USAF civilian employees covered by the Federal Employee Compensation Act (FECA). However, overall Air Force safety and occupational health mishap prevention efforts focus on both military and civilian personnel and material resources.

RESPONSIBLE OCCUPATIONAL SAFETY AND HEALTH OFFICIAL:

Ms. Ruby B. DeMesme

Assistant Secretary of the Air Force (Manpower, Reserve Affairs, Installations, and Environment)

(703) 697-2302

Staff Point of Contact: Lt Col Kelli Ballengee, SAF/MIQ, (703) 695-5978

1. a. Data in Attachment 1, Table 1 indicates the number of civilian occupational injuries and illnesses experienced by Air Force installations worldwide for FY97 – FY99. Attachment 1, Table 2 reflects the OWCP case rate information for FY95 - FY99.

b. The Air Force FY99 chargeback costs are shown in Attachment 1, Table 3.

c. Occupational Injury: The Air Force continues to be a pacesetter for successful Environmental, Safety, Occupational Health, and Fire Prevention Programs. By focusing on the elimination of hazardous conditions and environments through an effective hazard recognition and abatement program and mitigating potential exposures by conducting comprehensive Operational Risk Management and Job Safety Analysis Programs, mishap rates have continued on the desired downward trend during FY99. The Air Force sustained two civilian on-duty occupationally related fatalities in FY99. An additional 5 deaths were recorded as a result of injuries/illnesses sustained in prior years during FY99. The lost-time rate was 1.76 per 100 employees, which is less than the previous four years (Tables 1 and 2).

In FY99 the Air Force experienced 781 lost time civilian injury mishaps as defined by DoDI 6055.7, down from the FY98 total of 925 lost time mishaps -- a reduction of 16 percent. During this period the Air Force civilian population decreased by ten percent. Additionally, industrial related mishaps decreased by 14 percent for FY99 and a total of

33 percent since FY96 (Attachment 1, Chart 1). Since FY96 the Air Force experienced a 36 percent reduction in the number of lost workdays (Attachment 1, Chart 2) and a 43 percent reduction in the number of injuries related by activity (Attachment 1, Chart 3). Most significant is a 47 percent reduction in lifting mishaps (Attachment 1, Chart 3).

Civilian injuries by body part for FY99 showed an overall decrease of 15 percent over FY98 (Attachment 1, Chart 4). Chart 5 reflects that sprains and strains continue to be the primary type of injury, however there was a 16 percent decrease in this area. Among Air Force civilian workers, judgment and complacency respectively continue as the reason mishaps occur (Attachment 1, Chart 6).

Occupational Illnesses: As of 1 Jan 96 the information at Attachment 1, Table 4 has been entered into the Air Force Reportable Events Surveillance System (AFRESS) at each of the reporting bases. The data show the occurrence of occupational illnesses in the Air Force is remaining relatively stable for both military and civilian personnel. While a slight increase in disease of the lungs was noted in fiscal year 1999, further investigation revealed no association with a specific chemical or physical exposure. The cases were scattered among several locations and types of occupational workplaces.

Work-related hearing losses are one of the most common occupational illnesses among Air Force workers. Hearing losses currently account for approximately one-third of all reported occupational illnesses in the Air Force. From July 1, 1998 to June 30, 1999, Federal Employees Compensation costs for hearing loss amounted to \$5.5M or 4.51% of all workers' compensation costs paid by the Department of Labor on behalf of the USAF. Hearing loss may be due to traumatic injury or hazardous noise exposure in the workplace.

Fire Protection: Fire Department Occupational Safety and Health Program. It is Air Force Policy that each Air Force Fire Department implement and maintain an active and effective firefighter occupational safety and health program. Air Force Instruction (AFI) 32-2001, *The Fire Protection Operations and Fire Prevention Program*, was revised to include reporting procedures for the installation fire departments using National Fire Protection Association (NFPA) 1500, *Standard on Fire Department Occupational Safety and Health Program*. Within this standard is a checklist of over 300 line items ranging from administrative plans to fire station compliance with life and safety code requirements. The first reports were consolidated in October 1999, and the overall percentage for all Air Force Fire Departments was 97%, with the Air Force goal being 95%. For non-compliant areas, an operational risk management plan must be developed by the base fire chief and approved by the installation commander. The lowest rated area throughout the Air Force Fire Departments is Facility Safety, which had an overall rating of 87%. The largest contributing factors to this low rating are exhaust systems, carbon monoxide detectors, and hardwired smoke detectors which do not meet the standard.

SECTION 2

In the hazard abatement arena, there were 573 hazards abated at a cost of \$353,106,500; which represents 45 percent of the 1268 hazards identified as of 1 October 1999. Abatement actions were underway or funded for elimination of an additional 249 identified hazards with an estimated total cost of \$59,833,600 (Attachment 2).

During FY99 the Air Force continued its efforts to institutionalize the Operational Risk Management (ORM) Program which is continuing to evolve. The primary intent of the program is to provide Air Force decision makers at all levels with a systematic step by step process that assesses the risks associated with operational tasks and missions. In this effort we have provided our commanders, supervisors, and individuals with the tools, methods and devices to eliminate or minimize risk by providing a means of quantifying risk in the operation and making prudent "go" or "no go" decisions. Most important, it creates a mindset that will foster a continuing awareness of risk and the corresponding action to eliminate, control or minimize its effect. The risk management process has yielded dividends in a number of areas, as is evidenced by our continued downward trend in the number of mishaps experienced. To date, approximately 80 percent of the Air Force population has received Operational Risk Management training.

During FY 99 the Air Force implemented a new data input system, Safety Automated System (SAS), for reporting occupational safety mishaps. The new system's primary purpose is to enable United States Air Force safety personnel the ability to enter mishap reporting data directly from an operating location real time using the Internet. Occupational Safety (Ground) was selected as the first Air Force Safety discipline to baseline the system. An HTML was chosen to implement SAS providing worldwide access, low cost of deployment and maintenance, software requirements are not imposed on the user and updates to the programs are transparent and instantaneously distributed to the user. SAS is a workflow system that allows levels of authority for performing work within the system. An e-mail is built into the system to route notifications, approvals and rejections of inputs. Each controlling, editing or approving official of the mishap report is controlled with the organizational hierarchy before release of the mishap report.

In FY95 the Air Force established the Ground Safety Corporate Committee, composed of senior Headquarters United States Air Force and Major Command safety managers. This forum meets semi-annually to discuss ground safety management issues to better implement the occupational safety and health program throughout the Air Force.

Local Bioenvironmental Engineering, Public Health, and Safety personnel investigate the reportable occupational illnesses. They make recommendations to local commanders to correct hazards where it is both technically and economically feasible to do so. If an engineering solution is not available or feasible, they may recommend personal protective equipment. In addition, workers receive training on work place hazards and on procedures to minimize risks and exposures.

Employees' medical conditions, which result from occupational illnesses, are managed on a case-by-case basis. Employees may be temporarily removed from their jobs, or placed on light duty, until they recover from an occupational illness and their medical condition allows them to return to their job. Employees whose occupational illness results in a condition that does not allow them to perform their job are retrained into a different skill.

The prevention of injuries and illnesses is a matter of interest and involvement at all levels of command within the United States Air Force. Corporate review and decisions occur at Headquarters Air Force via the Environment, Safety, and Occupational Health Committee. This committee's membership consists of the senior functional leaders and is co-chaired by the Deputy Assistant Secretary of the Air Force (Environmental, Safety, and Occupational Health) and the Assistant Vice Chief of Staff.

Ergonomics:

In FY99, the Air Force continued efforts to develop and implement a comprehensive ergonomics program that prevents and eliminates the most significant causes of work-related musculoskeletal disorders (WMSD), and reduces WMSDs and their related cost and mission impacts. The Air Force Ergonomics Program Development Plan identifies the projects and activities required to execute this program. Of 30 identified tasks, 9 are complete, 14 are in progress, and 7 are awaiting funding or policy-making. Notable accomplishments include:

- Formation of an Air Force Materiel Command (AFMC) Health Care Management Working Group, charged with developing guidelines for managing work-related musculoskeletal disorder cases for use by health care providers.

- Initiation of a project to automate the Level I Ergonomics Assessment Methodology Guides into a software tool, providing bioenvironmental engineers and ground safety personnel assistance in recognizing, identifying, evaluating and controlling ergonomic hazards.

- Revision of ergonomics course materials used at the USAF School of Aerospace Medicine to train the bioenvironmental engineering personnel to execute their duties under the Air Force Ergonomics Program.

- Initiation of a project to develop a computer-based ergonomics course for USAF personnel.

- Completion of one pilot project, and initiation of a second, to demonstrate the cost-savings potential of environment, safety and occupational health (ESOH) improvements (including ergonomic improvements) to the line of the Air Force.

- Development of ergonomic criteria for use by procurement specialists when making major hand tool purchases.

Permanent Threshold Shift Occupational Illness:

Noise induced hearing loss is totally preventable through an effective Hearing Conservation Program (HCP). The USAF Hearing Conservation Program (HCP) has

been rated an "excellent" program (Adera, 1998) and has less than 3% of its noise exposed population experiencing a permanent threshold shift.

Good communication and understanding between workers, supervisors, commanders and HCP managers are a must for effective HCPs, particularly the role of the supervisor. The USAF requires annual education and training on the effects of hazardous noise and use of personal hearing protection devices. Both supervisors and HCP managers are involved in these activities. The USAF also requires exposed personnel to receive a baseline audiogram within 30 days of first being exposed, to receive an annual audiogram as long as they remain in a noise exposed occupation, and to receive a termination audiogram upon leaving hazardous noise duties. Additionally, local HCP managers are required to report their audiometric data to the AF Hearing Conservation Data Registry (HCDR) on a monthly basis. The HCDR staff analyzes the data to determine trends and to develop intervention techniques. The HCDR staff also provides assistance to local HCP managers, advising them on proper testing protocols, equipment calibration, and data reporting. It is Air Force policy that engineering controls shall be the primary means of eliminating personnel exposure to potentially hazardous noise. Local installation bioenvironmental engineering personnel evaluate work place noise exposures and recommend engineering controls for facilities and equipment when they are technically and economically feasible. However, existing aircraft systems and ground support equipment cause exposures for which such controls are not feasible. In these cases, bioenvironmental engineers select and recommend the most effective hearing protection.

The HCDR continues to stress commander, supervisor, and worker annual education and training through installation level HCP managers, safety managers, and HCP training classes taught by HCDR staff with a focus on personal accountability. AFOSH Standard 48-20, *Hearing Conservation Program*, is currently being updated and coordinated to provide clearer and more current guidance on hearing conservation. The HCDR is currently involved with the DOD Defense Occupational Health Readiness System (DOHRS) in a Tri-Service effort to consolidate hearing conservation databases into one "corporate" database.

Potential Exposure to JP-8 Fuel:

In a collaborative effort, sponsored by Congress's Strategic Environmental Research and Development Program (SERDP), Air Force researchers and over a dozen scientists from universities and other government agencies will be investigating the risks associated with exposure to jet fuel propellant eight (JP-8) in the work environment. The study will measure the environmental exposure levels, the amount of JP-8 absorbed by the body, and the worker's ability to perform certain health related tests. Jet fuel workers, specifically those involved in fuel-cell maintenance, are being asked to participate. Additionally, Air Force members not normally exposed to fuels or solvents, as part of their jobs or hobbies, will be recruited. Those not normally exposed to JP-8 will serve as a comparison group and aid the scientists in determining the effects, if any, of jet fuel exposure.

JP-8 is the battlefield fuel for all United States military operations. The Department of Defense uses approximately 5 billion gallons every year. Civilian companies use over 25 billion gallons of Jet A and Jet A-1, the commercial equivalent, annually in the United States. Given the vast quantities required for operations, JP-8 is the most common chemical to which military personnel are exposed. With a higher flash point the kerosene-based JP-8 is much less of a fire hazard than the gasoline-based predecessor JP-4. JP-8 also has a stronger kerosene odor and an oily feel. Workers exposed to JP-8, report being able to taste and smell the chemical long after leaving the work area. Despite the large amounts of JP-8 used by the military and civilian industry, little is known of its health effects. While no adverse health outcomes from JP-8 are known, the tendency of the chemical to persist on the body after exposure has troubled many medical researchers and prompted further study.

Those who volunteer for the study will undergo a series of tests as they conduct their normal duty during a typical workday. Each person will complete a questionnaire and will receive a monitor that will measure their exposure to JP-8. Samples of their breath, urine, and blood will be taken. Dermal absorption will be measured by placing a piece of tape on their skin. All those involved in the study will also take a series of tests to measure their balance, reaction time, and ability to make decisions. Each person will also receive a special eye exam.

The results of this study are expected to significantly increase the overall understanding of how JP-8 impacts the human health and performance. Scheduled for completion in late 2000, study results will be made available throughout the Department of Defense and to the public. It is anticipated the biomarkers and performance measures developed and validated during this study will be used to enhance on-going occupational health programs for jet fuel workers.

Safety Training:

Air Force supervisors are required to attend Supervisors Safety Training which is conducted by installation safety offices. This training provides supervisors with information that allows them to train their subordinates in identify and eliminating hazards associated with on and off the job activities, risk management, and unique situations associated with their activities. Unit safety representative training is also available and conducted for those individuals who are selected to oversee the organizational safety program. Training covers hazard recognition, mishap reporting requirements, internal safety walk-thru type inspections, and Air Force & OSHA standards. Training is documented on Air Force Form 55, Employee Safety and Health Record. These records are checked by inspectors/evaluators during Occupational Safety and Health inspections and related evaluations.

Oversight of program:

Qualified safety, health, and fire protection personnel inspect and evaluate safety and health programs and facilities. Inspections/evaluations are conducted periodically but not

less than once every three years utilizing evaluation criteria which includes command and functional manager support, compliance with program directives, and effectiveness of mishap prevention programs, including an analysis of mishap reports and other management indicators. Written reports are prepared and provided to the commander of the organization inspected/assessed. During FY99 a total of 119 safety and health inspections/evaluations were performed with no major discrepancies noted.

The Air Force Hazard Reporting Program is detailed in Air Force Instruction 91-202, *The US Air Force Mishap Prevention Program*, Chapter 4 (<http://afpubs.hq.af.mil>) and AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection and Health (AFOSH) Program*, paragraph 12 (<http://afpubs.hq.af.mil>). Every Air Force employee receives training in hazard reporting procedures and Air Force Form 457, USAF Hazard Report, is readily available to all employees.

Recognition:

Air Force Instruction 36-2833, *Safety Awards* (<http://afpubs.hq.af.mil>), describes the Air Force Safety Awards Program. This program recognizes outstanding safety acts and achievements. Commanders at all levels of command are encouraged to develop and establish recognition systems that complement the USAF Safety Awards Program.

Managers, supervisors, and non-supervisory personnel accountability and performance standards are detailed in AFI 91-301, attachments 3 and 4 (<http://afpubs.af.mil>). These performance standards are included in each employees annual evaluation of performance. This same instruction identifies employee responsibilities relative to safety; i.e., comply with OSH guidance, PPE requirements, reporting mishaps, and the opportunity to take part in the AFOSH program without fear of coercion, discrimination, or reprisal, request inspections of unsafe or unhealthful working conditions. Employees also have the right to decline to perform an assigned task because of reasonable belief that the task poses an imminent risk of death or serious bodily harm. Additionally, employee representatives are scheduled for training and have the right to accompany safety and health inspectors during inspections (see paragraph 2, 7.3.1, 13, and 14, and attachments 2 and 6 of subject AFI (<http://afpubs.hq.af.mil>)).

SECTION 3

The Ground Safety Appendix to the US Air Force Safety Strategic Plan, Safety Vision 2010 (<http://www-afsc.saia.af.mil/AFSC/RDBMS/Ground/library.html>), describes our plan to move Ground Safety into the 21st Century. It defines Air Force Ground Safety goals and objectives and provides benchmarks for evaluating Air Force Ground Safety performance. This plan enables all levels of command to plan, target mishap prevention efforts, and leverage resources.

The Air Force has a number of efforts on-going which will enable us to meet the goals of the President's Federal Worker 2000 initiative. In January 1999, Air Force Policy Directive 90-8, *Environmental, Safety, and Occupational Health*,

(<http://afpubs.hq.af.mil>), was published, which establishes the Air Force goal of zero occupational illnesses and injuries. We have an on-going Operational Risk Management (ORM) Program to help achieve this goal. The Air Force is also actively participating in the DoD Injury/Occupational Illness Prevention Committee (IOIPC). The committee is specifically chartered to address the same issues addressed by Federal Worker 2000, and the DoD IOIPC Action Plan has parallel goals as those of the Federal Worker 2000 injury reduction goals.

The Air Force Strategic Plan has injury and illness prevention goals as part of the Air Force Performance Management Rating System (AFPMRS). The AFPMRS applies to all commanders from the Chief of Staff of the Air Force to each Wing Commander throughout the Air Force. Focus and oversight exists within the US Air Force for injury and illness prevention.

SECTION 4

Installation safety staffs are encouraged to attend and participate in Federal Safety and Health councils (Attachment 5). There have been no known problems or barriers .

A problem area that exists is the capture of employee Continuation of Pay (COP) cost. The Air Force has no single point of contact nor a requirement to capture COP costs. This deficiency has been noted in past annual reports and continues to be a problem area for completion of these DOL reporting requirements.

Attachments:

1. Injury/Illness Data
2. Hazard Abatement Summary

ATTACHMENT 1

Table 1

OWCP CASE CREATES FY 97-99
(Average Year Strength) TOTAL EMPLOYEES FY 99 = 164,934

FY	FIRST AID	NLT	LT	FATAL
1997	24	3,626	3,241	6
1998	28	3,411	3,234	12
1999	63	3,643	2,900	7

OWCP CASE CREATES BY MONTH FY 99
(Average Year Strength) TOTAL EMPLOYEES FY 99 = 164,934

MONTH	FIRST AID	NLT	LT	FATAL
OCT	3	257	279	1
NOV	3	260	231	0
DEC	4	301	227	*1
JAN	5	241	207	1
FEB	4	298	266	0
MAR	5	392	268	0
APR	2	319	241	0
MAY	5	300	242	*1
JUN	8	296	238	*1
JUL	9	325	202	1
AUG	5	327	248	0
SEP	10	327	251	1
TOTALS	63	3,643	2,900	7

NLT = No Lost Time

LT = Lost Time

*Could not find evidence to validate these as occupational-related deaths, therefore the Air Force is not tracking these as occupational fatalities. However because an OWCP claim was filed, the case create is reported here.

TABLE 2

**DEPARTMENT OF THE AIR FORCE
OWCP CASE RATE**

FY 1995 Rate

$$7,234 \text{ (Cases) X } \frac{100 \text{ (Employees)}}{186,429 \text{ (Total Employees)}} = 3.88 \text{ (Total Case Rate)}$$

$$4,015 \text{ (Cases) X } \frac{100 \text{ (Employees)}}{186,429 \text{ (Total Employees)}} = 2.15 \text{ (Lost Time Case Rate)}$$

Fatal Cases = 8

FY 1996 Rate

$$6,836 \text{ (Cases) X } \frac{100 \text{ (Employees)}}{183,724 \text{ (Total Employees)}} = 3.72 \text{ (Total Case Rate)}$$

$$3,448 \text{ (Cases) X } \frac{100 \text{ (Employees)}}{183,724 \text{ (Total Employees)}} = 1.88 \text{ (Lost Time Case Rate)}$$

Fatal Cases = 0

FY 1997 Rate

$$6,897 \text{ (Cases) X } \frac{100 \text{ (Employees)}}{179,184 \text{ (Total Employees)}} = 3.85 \text{ (Total Case Rate)}$$

$$3,241 \text{ (Cases) X } \frac{100 \text{ (Employees)}}{179,184 \text{ (Total Employees)}} = 1.81 \text{ (Lost Time Case Rate)}$$

Fatal Cases = 6

FY 1998 Rate

$$6,685 \text{ (Cases) X } \frac{100 \text{ (Employees)}}{172,845 \text{ (Total Employees)}} = 3.87 \text{ (Total Case Rate)}$$

$$3,234 \text{ (Cases) X } \frac{100 \text{ (Employees)}}{172,845 \text{ (Total Employees)}} = 1.87 \text{ (Lost Time Case Rate)}$$

Fatal Cases = 12

FY 1999 Rate

$$6,613 \text{ (Cases) X } \frac{100 \text{ (Employees)}}{164,934 \text{ (Total Employees)}} = 4.01 \text{ (Total Case Rate)}$$

$$2,900 \text{ (Cases) X } \frac{100 \text{ (Employees)}}{164,934 \text{ (Total Employees)}} = 1.76 \text{ (Lost Time Case Rate)}$$

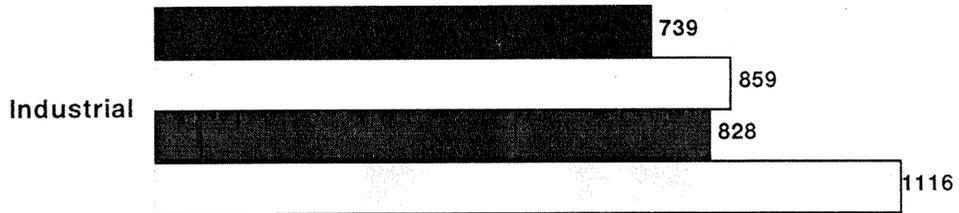
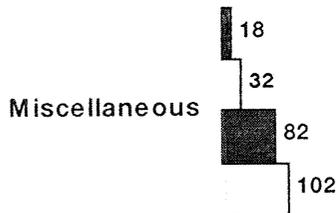
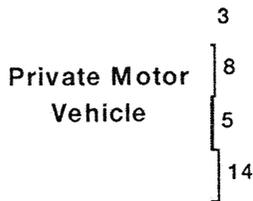
Fatal Cases = 7

TABLE 3**UNITED STATES AIR FORCE
WORKERS COMPENSATION COSTS**

Fiscal Year	Chargeback	Continuation of Pay
1990	\$ 108,819 K	\$ 4,291 K
1991	\$ 110,083 K	\$ 3,917 K
1992	\$ 114,417 K	\$ 4,200 K
1993	\$ 114,196 K	\$ 3,969 K
1994	\$ 115,993 K	\$ 3,817 K
1995	\$ 119, 184 K	\$ 2,978 K
1996	\$116, 141 K	\$ 2,655 K
1997	\$ *	\$ *
1998	\$ *	\$ *
1999	\$ 122,565 K	\$ *

* Information is not available.

USAF Civilian Injuries By Category



FY	Total Activity Injuries	Strength
99	780*	164,934**
98	925	172,845
97	943	179,845
96	1,265	183,724

*38% injury reduction from FY96
 **10% reduction in strength from FY96

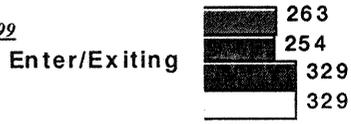
Miscellaneous Contains
 Commercial Carrier
 Combat Training
 Industrial Aircraft
 Special Purpose Vehicle
 & Miscellaneous

Chart 1

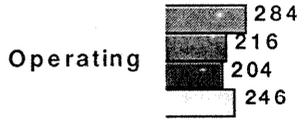
USAF Civilian Lost Workdays By Activity

FY96 to FY99

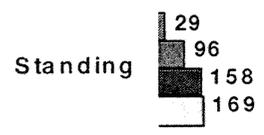
Down
20%



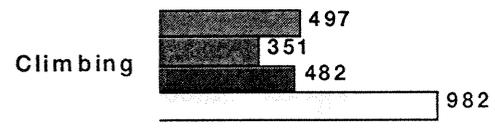
Up
15%



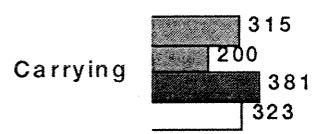
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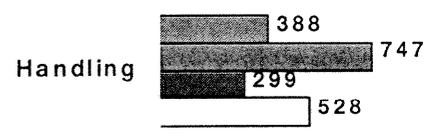
Down
49%



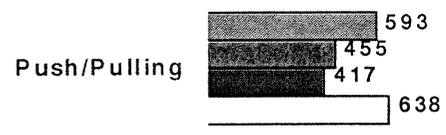
Up
2%



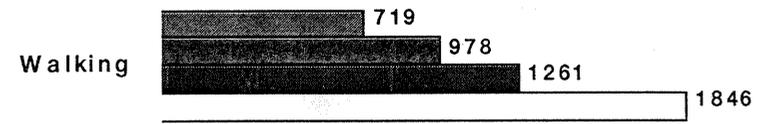
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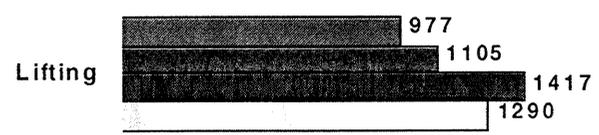
Down
7%



Down
61%



Down
24%



FY	Total Lost Workdays	Strength
99	4,065*	164,934**
98	4,402	172,845
97	4,948	179,845
96	6,351	183,724

*36% reduction in lost workdays from FY96
**10% reduction in strength from FY96

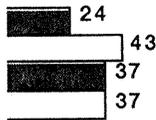
Chart 2

USAF Civilian Injuries By Activity

FY96 to FY99

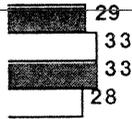
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35%*

Enter/Exiting



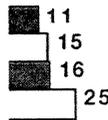
*Up
4%*

Operating



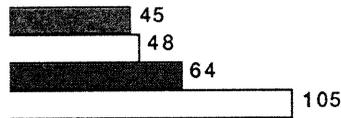
*Down
66%*

Standing



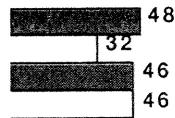
*Down
57%*

Climbing



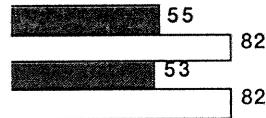
*Up
4%*

Carrying



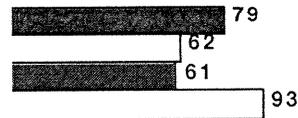
*Down
33%*

Handling



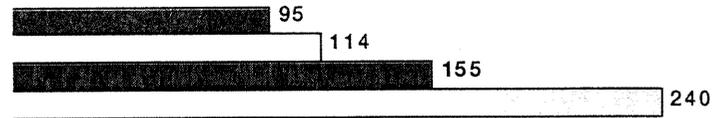
*Down
15%*

Push/Pulling



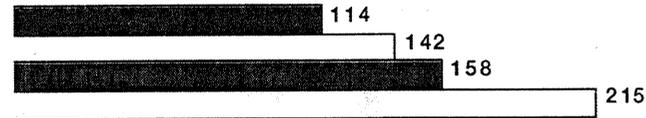
*Down
60%*

Walking



*Down
47%*

Lifting



*Total
Activity*

FY	Injuries	Strength
99	500*	164,934**
98	571	172,845
97	623	179,845
96	871	183,724

**43% mishap reduction from FY96
**10% reduction in strength from FY96*

Chart 3

USAF Civilian Injuries Primary Body Part

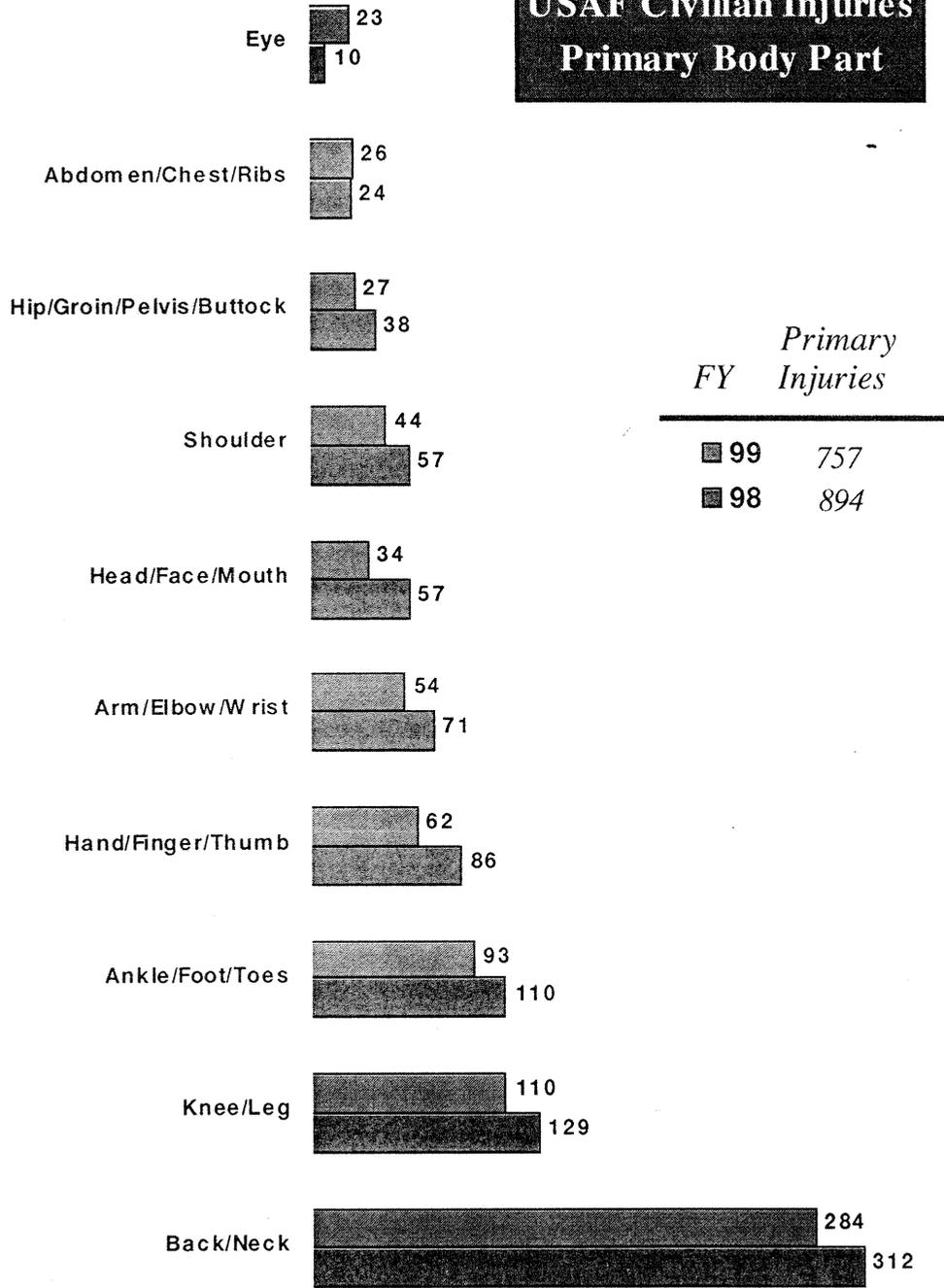
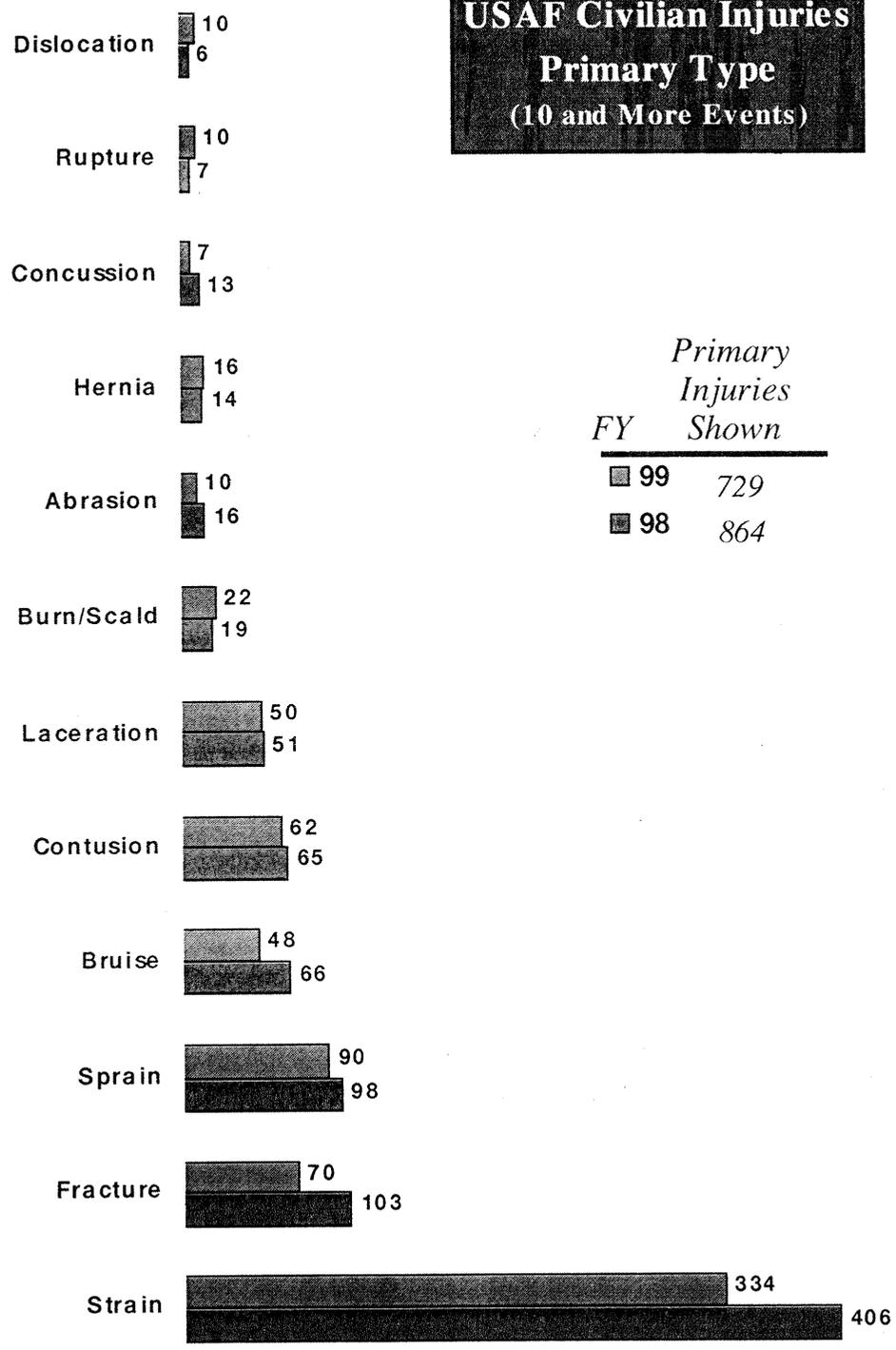


Chart 4

**USAF Civilian Injuries
Primary Type
(10 and More Events)**



Primary Injuries Shown

FY	Shown
99	729
98	864

Chart 5

USAF Civilian Injuries Cause/Reason Count Investigator's Conclusions

(Single Mishaps Can Multiple Cause/Reasons)

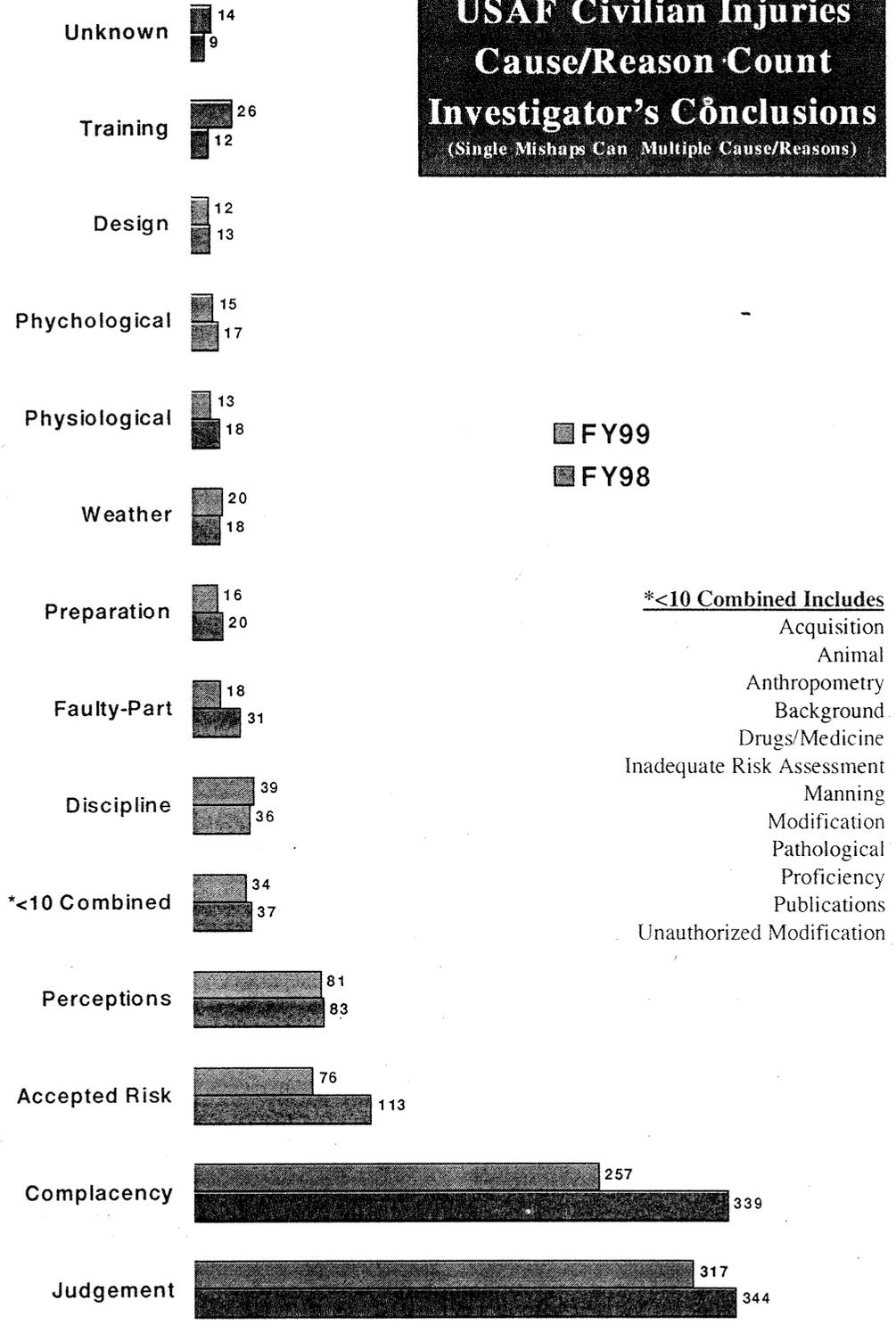


Chart 6

Table 4

	1991			1992			1993			1994			1995		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Occupational Illnesses by OSHA Code															
21-Skin Disorders	85	31	116	55	34	89	51	20	71	40	35	75	32	14	46
22-Dust Disease of the Lungs	1	0	1	1	0	1	3	3	6	4	0	4	4	1	5
23-Respiratory Disorders	39	14	53	45	16	61	22	5	27	30	18	48	7	14	21
24-Systemic Intoxications	29	18	47	12	17	29	2	17	19	11	15	26	21	17	38
25-Disorders due to Physical Agents	11	26	37	4	19	23	6	31	37	4	52	56	6	16	22
26A-Hearing Loss	71	172	243	87	145	232	112	136	248	88	150	238	126	169	295
26B-Repetitive Trauma	271	6	277	409	31	440	467	38	505	458	60	518	451	46	497
29-Other Disorders	55	8	63	64	4	68	53	18	71	48	17	65	42	30	72
Total Occupational Illnesses	562	275	837	677	266	943	716	265	981	683	347	1030	689	307	996
Fatalities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Illnesses With Days Away From Work															
Days	266	23	289	184	57	241	736	65	801	733	112	845	407	66	473
Cases	16	12	28	25	18	43	39	14	53	47	36	83	33	17	50
Illnesses With Restricted Duty															
Days	2886	213	3099	4065	966	5031	8314	812	9126	13114	2056	15170	3753	699	4452
Cases	182	19	201	232	30	262	245	34	279	261	58	319	231	26	257
Illnesses Without Lost Days or Restricted Duty															
Days	291	74	365	336	77	413	330	85	415	283	114	397	301	97	398

	1996			1997			1998			1999		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Occupational Illnesses by OSHA Code												
21-Skin Disorders	47	28	75	50	29	79	51	32	83	47	43	90
22-Dust Disease of the Lungs	1	1	2	2	2	4	1	2	3	9	5	14
23-Respiratory Disorders	33	34	67	28	13	41	41	32	73	11	24	35
24-Systemic Intoxications	11	16	27	4	23	27	1	3	4	1	14	15
25-Disorders due to Physical Agents	1	44	45	1	19	20	10	30	40	10	26	36
26A-Hearing Loss	125	193	318	171	290	461	197	165	362	291	151	442
26B-Repetitive Trauma	479	76	555	608	120	728	367	178	545	387	243	630
29-Other Disorders	43	144	187	83	111	194	64	180	244	130	219	349
Total Occupational Illnesses	740	536	1276	947	607	1554	732	622	1354	886	725	1611
Fatalities	0	0	0	0	0	0	0	0	0	0	0	0
Illnesses With Days Away From Work												
Days	611	99	710	1204	425	1629	755	98	853	648	132	780
Cases	26	18	44	31	21	52	21	50	71	37	40	77
Illnesses With Restricted Duty												
Days	5424	4080	9504	5667	1531	7198	4851	3419	8270	3786	2697	6483
Cases	249	46	295	225	29	254	199	67	266	190	69	259
Illnesses Without Lost Days or Restricted Duty												
Days	277	188	465	162	136	298	322	370	692	361	394	755

ATTACHMENT 2

SUMMARY, FY99

ABATEMENT ACTIONS COMPLETED

		NUMBER ABATED	PROJECT COST	ABATEMENT COST
MCP*	RAC1	6	5,389.6K	2,826.4K
	RAC2	30	8,844.5K	6,855.8K
	RAC3	38	54,476.8K	7,642.5K
TOTALS:		74	68,710.9K	17,324.7K

*Military Construction Program

		NUMBER ABATED	PROJECT COST	ABATEMENT COST
O&M**	RAC1	26	63,088.3K	63,088.3K
	RAC2	259	38,091.0K	28,273.7K
	RAC3	200	247,612.0K	243,942.6K
TOTALS:		485	348,791.3K	335,304.6K

** Operations and Maintenance

		NUMBER ABATED	PROJECT COST	ABATEMENT COST
OTHER	RAC1	0	0K	0K
	RAC2	7	48.2K	48.2K
	RAC3	14	477.2K	477.2K
TOTALS:		21	525.2K	525.2K

TOTAL ABATEMENT ACTIONS COMPLETED IN FY99: 573

TOTAL ABATEMENT EXPENDITURES COMPLETED IN FY99: 353,106.5K

ABATEMENT ACTION IN PROCESS (Funded)

	NUMBER	PROJECT COST	ABATEMENT COST
MCP RAC1	1	.7K	.7K
RAC2	27	28,366.2K	9,671.4K
RAC3	27	51,503.0K	48,152.3K
TOTALS:	55	79,869.9K	57,823.4K

	NUMBER	PROJECT COST	ABATEMENT COST
O&M RAC1	15	7,414.6K	6,594.6K
RAC2	73	27,762.5K	23,597.3K
RAC3	84	13,946.8K	11,564.8K
TOTALS:	172	49,123.9K	41,756.7K

	NUMBER	PROJECT COST	ABATEMENT COST
OTHER RAC1	0	0K	0K
RAC2	7	930.0K	930.0K
RAC3	15	3,477.9K	3,477.9K
TOTALS:	22	4,407.9K	4,407.9K

TOTAL ABATEMENT ACTIONS IN PROGRESS: 249

TOTAL ABATEMENT COST IN PROCESS: 59,833.6K

ABATEMENT ACTIONS PROJECTED (Unfunded)

	NUMBER	PROJECT COST	ABATEMENT COST
MCP RAC1	0	0K	0K
RAC2	34	62,362.7K	58,275.3K
RAC3	57	349,659.2K	339,888.2K
TOTALS:	91	412,021.9K	398,163.5K

	NUMBER	PROJECT COST	ABATEMENT COST
O&M RAC1	3	1,285.0K	604.9K
RAC2	161	87,904.6K	84,719.2K
RAC3	188	51,181.2K	41,384.3K
TOTALS:	353	140,370.8K	126,708.4K

TOTAL UNFUNDED ABATEMENT ACTIONS: 446

TOTAL UNFUNDED ABATEMENT COSTS: 528,668.9K

Note: Air Force policy requires interim control measures be instituted until such time as the final abatement action can be funded and completed. For example, the unfunded RAC1's above include lead overexposures during sanding operations due to an inadequate ventilation system. The final abatement action included here is for replacement of the ventilation system. The interim control measures in place include respiratory protection and other appropriate personal protective equipment.

AIR FORCE AUDIT AGENCY



SAFETY OF LIFE IN CONFINED SPACES



AUDIT REPORT

99051007

28 February 2000

Executive Summary

INTRODUCTION

The Occupational Safety and Health Act requires employers to provide a safe and healthful working environment. To comply with the Act, the Air Force implemented the Ground Safety Program to identify and control hazards and prevent mishaps. As an integral segment of the Ground Safety Program, confined spaces are areas with limited or restricted entry/exit, such as sewer manholes and fuel containment structures, and are not designed for continuous employee occupancy. The Confined Spaces Program ensures that work areas are safe to enter and remain as necessary to perform the required work.

Based on audit results, we estimate approximately 100,000 confined spaces exist at the 80 major Air Force installations. The Air Force spent an estimated \$1.2 million (ground safety office personnel and operating support costs) in Fiscal Year 1998 to administer the Confined Spaces Program. (Reference Appendix I for additional background information.)

OBJECTIVES

We performed this audit at the request of the Deputy Assistant Secretary, Environment, Safety, and Occupational Health (SAF/MIQ), to evaluate the effectiveness of the Confined Spaces Program. Specifically, we determined whether organization supervisors identified and classified confined spaces; processed entry permits; tested confined space as appropriate for hazardous condition changes prior to entry; and conducted annual rescue exercises. We completed audit field work in August 1999 and provided the draft report to management in November 1999. (Reference Appendix II for detailed audit scope and prior audit coverage information.)

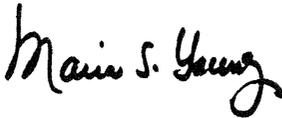
CONCLUSIONS

Air Force safety and organization supervisors had implemented the Confined Spaces Program in accordance with existing guidance. However, increased management attention would further improve the safety of confined space working conditions. Specifically, at the sites tested, organization supervisors did not identify and classify at least 584 confined space locations; coordinate entry permits for work at confined spaces; test for hazardous condition changes prior to entering a confined space; or perform annual rescue exercises. (Results-A, page 1)

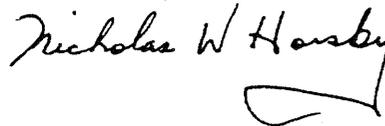
Executive Summary

RECOMMENDATIONS We made three recommendations to the Assistant Secretary of the Air Force, Manpower, Reserve Affairs, Installations, and Environment (SAF/MI), in coordination with the Air Force Chief of Safety (AF/SE), to clarify program requirements and increase oversight. (Reference the Results section for the specific recommendations.)

MANAGEMENT'S RESPONSE Management officials agreed with the overall audit results, and actions taken and planned are responsive to the issues and recommendations included in this report.



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Results - A

Program Management

BACKGROUND

From December 1978 to January 1990, six Air Force employees died from hazardous conditions within confined spaces. In an effort to protect employees from such hazards, the Air Force implemented the Confined Spaces Program in November 1990 (the Occupational Safety and Health Administration [OSHA] did not publish the Permit-Required Confined Spaces Standard 1910.146 until 1993). Since program establishment, no confined space fatalities have occurred.

The Air Force Occupational Safety and Health (AFOSH) Standard¹ classifies confined spaces as either non-permit or permit-required areas. Areas not requiring a permit have limited entry and exit openings, minimal size, and no known hazardous contaminants. Areas requiring entry permits contain hazardous environments capable of causing death or serious physical harm. These spaces meet the following criteria: (a) contain, or have the potential to contain, a hazardous atmosphere exposing an individual to the risk of death, incapacitation, impairment of ability for self-rescue, injury, or acute illness from flammable gas or vapor or any other condition that is immediately dangerous to life or health; (b) contain a material that has the potential for engulfing an entrant causing death by respiratory failure, or exerting enough force on the body causing death by strangulation, constriction, or crushing; (c) configured such that an entrant could be trapped or asphyxiated; or (d) contain any other recognized serious safety or health hazard.

Safety and organization personnel use the permits for several purposes. First, a permit describes the location, type (e.g., fuel bladder, communication pit), and space configuration (including restricted access and obstructions inhibiting or interfering movement, ventilation, and rescue or fire fighting efforts). A permit also identifies the existing hazards and the protective equipment employees must wear and the protective measures employees must take to protect themselves. Finally, a permit specifies the rescue equipment and procedures needed to evacuate employees in case of an emergency.

PROGRAM MANAGEMENT

Air Force safety and organization managers at 7 of 10 installations reviewed did not effectively comply with Confined Spaces Program requirements. As noted in Table A-1, the six locations failed to comply with at least two of four critical areas reviewed.

¹ The AFOSH Standard 91-25, Confined Space, 1 February 1998.

Results - A

Program Management

Providing a more comprehensive Confined Spaces Program would further diminish employee risk of serious injury or loss of life. Details of the conditions identified are summarized in Table A-1 and discussed in the following subparagraphs.

Installation	Identification and Classification	Entry Permits	Pre-Entry Tests	Rescue Exercises and Equipment
Davis-Monthan AFB		X		X
Edwards AFB	X		X	X
Eglin AFB	X			X
Grand Forks AFB				
Hickam AFB				
Keesler AFB				X
McConnell AFB				X
Nellis AFB	X		X	X
Patrick AFB		X	X	
Randolph AFB		X		X

Table A-1. Installations Reviewed and Deficiencies Identified.

Identification and Classification. At 10 locations, organization supervisors had identified 12,672 confined spaces while at least 584 remained undetected at three locations (at least 555 at Nellis, 29 at Edwards, and an undetermined number at Eglin). Supervisors identified broad categories of confined space areas (e.g., storage bins, fuel tanks) but did not define the specific number and location of each space. As a result, ground safety and bioenvironmental personnel did not test the specific spaces for hazardous conditions and determine the entry permit classification.

Entry Permits. At three locations, employees did not follow entry permit requirements. Specifically, fire department records indicated 550 instances tested where employees entered hazardous areas; however, for 453 of these instances, organization records indicated the individuals did not obtain a permit authorizing them to enter the area.² Also, 19 of 87 master entry plans that allowed supervisors to monitor recurring employee entry into confined spaces were overdue (up to 608 days) an annual update. Directives³ require plan updates to determine the changes in hazardous conditions and corresponding modifications in protective measures. Without entry permits and updated master entry plans, employees could enter confined spaces without taking necessary safety precautions.

² Notifying the fire department (rescue team) is only one part of executing a permit. A fully executed permit includes a corporate (fire department, bioenvironmental, and safety personnel) professional assessment that conditions are safe for employees entering and working within the confined space.

³ AFOSH Standard 91-25.

Results - A Program Management

Pre-Entry Tests. At three locations, supervisors did not document whether pre-entry tests were performed prior to 564 of 1,106 employee entries into permit-required confined spaces. Pre-tests identify hazardous condition changes (e.g., excessive oxygen levels increasing the danger of fire or explosion) since last entry or initial testing. As a result, workers could have been exposed to hazardous conditions causing serious injuries. However, in all 42 entries (at two locations) requiring welding, cutting, and brazing type work, supervisors and members of the Confined Spaces Program team tested the space for atmospheric conditions, and monitored the concentration of toxic materials during the work.

Rescue Exercises and Equipment. Functional managers and supervisors did not document annual rescue exercises at 8 of 35 organizations performing work in confined spaces. Also, organization personnel did not inspect and test 152 of 244 rescue equipment pieces to ensure equipment was safe and ready to accomplish the necessary task. Rescue exercises familiarize rescue personnel with the location's hazardous conditions, and the equipment and techniques or procedures necessary for employee evacuation, thereby reducing the risk of life or injury.

These conditions occurred for several reasons.

Guidance. AFOSH 91-25 did not include adequate guidance. Specifically, the guidance did not:

- Require identification of individual confined spaces. Chapter 2, paragraph 2.10.1., states "Identification may be done by type for a large number of confined spaces, such as manholes, pits, and underground vaults." As a result, organization supervisors identified broad categories of spaces.
- Identify potential sources of training. Chapter 2, paragraph 2.12.2., states "...functional managers and supervisors will ensure that all personnel ...are properly trained..., and that the training is documented..." Chapter 5, paragraph 5.2, also gives supervisors the training responsibility. However, the directive does not provide supervisors potential sources of training.
- Emphasize major command (MAJCOM) involvement. Chapter 2, paragraph 2.6, requires that MAJCOMs provide program oversight as necessary and, accordingly, they scheduled installation inspections on a 3-year cycle. Although these inspections provided some oversight, MAJCOMs did not have visibility over program performance during the interim periods. However, MAJCOM officials are in the best positions to

Results - A

Program Management

assess installation Confined Spaces Program performance because of their exposure to multiple results (e.g., significant differences between the number of confined spaces at two similar installations).

Training. Supervisors at 21 (seven locations) of 49 (all 10 locations) organizations requiring work in confined space locations did not develop effective training programs. Specifically, 9 supervisors did not prepare training plans, and 12 developed incomplete plans lacking data such as the space specific hazards and the protective measures necessary for safe entry. Further, four locations that did not always perform rescue exercises also did not have adequate training plans.

Inactive Confined Spaces Program Team. At one location, team members were not appointed, and at another four locations, team members were appointed but did not meet during Fiscal Year 1998. We identified a strong correlation between program weaknesses and team activity. For instance, three of the four locations that did not perform rescue exercises had inactive Confined Spaces Program teams. On the other hand, two locations with active teams (Grand Forks and Hickam AFBs) had effective programs.

Ground Safety Oversight. At one location, safety office personnel gave low priority to the Confined Spaces Program. For example, safety personnel had not surveyed the installation to identify confined spaces. At another location, the safety office Confined Spaces Program manager was absent for several months because of extended temporary duty and leave but no alternate manager was appointed. Consequently, the program received little oversight at these locations.

RECOMMENDATION.

A.1. The SAF/MI, in coordination with AF/SE, should amend AFOSH Standard 91-25 to:

- a. Require organizational supervisors, in coordination with the Confined Spaces Program team, to specifically identify the number, location, and description of all confined spaces.
- b. Identify specific Confined Spaces Program training sources for employees, such as OSHA Course 226, Permit Required Confined Space Entry, available from the OSHA Institute.

c. Require installation safety personnel to report Confined Spaces Program status to MAJCOMs at least quarterly for monitoring and action. The reporting should include, as a minimum, the number and type of identified confined spaces; summaries of Confined Spaces Program team minutes; and the number of entry plans and master entry plans approved.

d. Emphasize MAJCOM involvement; for example, require that MAJCOMs monitor installation program status, perform data analyses, and take necessary actions to improve installation performance.

MANAGEMENT COMMENTS. The SAF/MI concurred and stated:

a. "Air Force Safety Center, Ground Safety Division (AFSC/SEG) plans to conduct a Tiger Team review of AFOSH Standard 91-25 with appropriate representation from safety, bioenvironmental, and fire protection agencies. The Tiger Team will revise the standard to ensure managers are required to identify the number, location, and type of all confined spaces within their organization. The review will also ensure requirements are value-added to the Air Force program, within Federal regulatory guidelines, and clearly stated to promote a standardized Air Force program. Estimated completion date: 1 June 2000.

b. "OSHA Course 226, Permit-Required Confined Space Entry, will be included in the revised standard as an appropriate initial training program for confined space program managers and workers. Lack of training was previously identified as a shortfall in the Air Force Confined Space Program, not because organizational personnel were unaware of the OSHA 226 course, but because of lack of funding and available class slots. To meet this need, AFSC has entered into a joint venture with the OSHA training Institute, Des Plaines, IL, and the Department of Energy, Central Training Academy, Kirtland AFB NM, to develop OSHA Course 226 in the satellite distance learning environment for broadcast to Air Force installation-level personnel at their sites. This will eliminate both course availability and funding problems. Additionally, the Institute for Environment, Safety and Occupational Health Risk Analysis (IERA), Brooks AFB TX, in cooperation with AFSC/SEG and Air Force Civil Engineer Support Agency (AFCESA), Tyndall AFB FL, is contracting for production of a confined space computer-based training program that will address the requirements of AFOSH Standard 91-25. Together, these initiatives will provide the majority of the required confined space training to both the Confined Space Program Team and confined space workers (supervisors, attendants, entrants, and rescuers). Neither will negate the requirement for additional specialized training at the organizational level that addresses space specific hazards, entry procedures, personal protective equipment (PPE) requirements, etcetera, presently outlined in AFOSH Standard 91-25, Chapter 5. Estimated completion date: 1 June 2000.

Results - A

Program Management

c. "We believe a temporary increase in this reporting requirement from the installation to MAJCOM to AFSC is appropriate. The Tiger Team will address the best timing and methodology and incorporate it into the revised standard. Increased reporting will remain as long as necessary to ensure the program is improved. Estimated completion date: 1 June 2000.

d. "AFOSH Standard 91-25, paragraph 2.6 already requires MAJCOMs, field operating agencies (FOAs), and direct reporting units (DRUs) to provide program oversight. The Tiger Team will address clarifying the AFOSH Standard requirement to further describe oversight responsibilities specific to the Confined Spaces Program. Estimated completion date: 1 June 2000."

RECOMMENDATION.

A.2. The SAF/MI, in coordination with AF/SE, should request the Air Force Inspector General include the Confined Spaces Program as an inspection special interest item, to specifically include review of unit training plans, Confined Spaces Program team minutes, and organizational rescue exercises.

MANAGEMENT COMMENTS. The SAF/MI concurred and stated: "SAF/MI will request the Air Force Inspector General (SAF/IG) establish a special interest item to provide the appropriate short-term emphasis on the Confined Spaces Program. Estimated completion date: 1 April 2000."

RECOMMENDATION.

A.3. The SAF/MI in coordination with AF/SE should emphasize to safety personnel the importance of providing adequate and sufficient priority and attention to the Confined Spaces Program, including the importance of an active Confined Spaces Program team.

MANAGEMENT COMMENTS. The SAF/MI concurred and stated: "AF/SE issued a message to publicize the results of the audit and emphasize the importance of placing the required priority on the Confined Spaces Program. The message was addressed to MAJCOM deputy commanders (CVs), chiefs of safety (SEs), surgeon generals (SGs), and civil engineers (CEs), with a request to provide the widest dissemination within their command. Closed."

EVALUATION OF MANAGEMENT COMMENTS

Management comments addressed the issues raised in the finding, and management actions taken and planned should correct the problem.

PROGRAM RESPONSIBILITIES

Installation ground safety personnel have overall responsibility for Confined Spaces Program management. However, units or organization functional managers having tasks requiring work in confined spaces are primarily responsible for those portions of the program involving entering and exiting confined spaces. These responsibilities include identifying the confined spaces; performing initial testing and evaluation of confined space conditions; classifying the location as either non-permit or permit-required; testing of the confined space prior to entry; and securing training for employees regarding confined space working conditions.

Functional managers and supervisors initiate the process to obtain confined space entry permits by using an Air Force Form 1024, Confined Spaces Entry Permit, or similar document. Supervisors describe the location, the purpose and duration of the entry, the location hazards, the equipment needed for entry, the individuals requiring entry, and the procedures for rescue if necessary. The supervisor then obtains approval for entry from the Confined Spaces Program team members (ground safety, bioenvironmental engineering, fire department personnel). The coordination provides assurance entry conditions are acceptable.

Installation fire chiefs must provide rescue support and assist functional managers in obtaining training for supervisors, employees, and organizational rescue team members. The fire chief also assists in selecting protective equipment for permit-required confined space work and rescue and coordinating approval of entry permits. Installation bioenvironmental engineering personnel provide supervisors training on the use, calibration, and care of atmosphere testing and monitoring equipment. This function also certifies the capability of unit employees to test permit-required confined spaces prior to entry.

Air Force Safety Center officials provide confined space safety advice, guidance, and oversight. Center personnel also perform mishap final evaluation, provide lessons-learned to Air Force units, and maintain liaison with governmental and nongovernmental national consensus standards and mishap prevention committees and organizations.

Audit Scope and Prior Audit Coverage

AUDIT SCOPE

We performed this review at 10 Air Force installations (11 organizations) (Appendix III). Because SAF/MIQ officials asked that we include bases from all the major commands within the continental United States, we judgmentally selected installations representing each command, five of them with over 1,000, and five with less than 850 identified permit-required confined spaces. These officials also requested we include Hickam AFB.

To determine whether organizational managers or commanders identified and classified all confined spaces, we reviewed installation safety confined spaces listings and compared the information to an audit developed list compiled from bioenvironmental engineering office shop or case files. These files contained data regarding a unit's hazardous working conditions. At the 10 installations, we judgmentally (no specific criteria) selected 1,106 entry permits (AF Form 1024), issued during Fiscal Year 1998, to determine whether atmospheric testing was accomplished prior to entry into permit-required confined spaces. To determine whether personnel obtained entry permits for every entry, we obtained Calendar Year 1998 fire department incident and hot work log books and traced the data to the units. At the organizations, we asked for the applicable entry permit. To determine whether organizations performed annual rescue exercises, we interviewed the installation Confined Spaces Program manager and reviewed documents to identify organizations with in-house confined spaces rescue teams. We then visited 35 organizations and asked for documentary evidence supporting the annual exercise.

We judgmentally (no specific criteria) selected, at the 10 locations, 244 rescue-related pieces of equipment and asked unit personnel for documentary evidence of calibration and testing. Finally, we obtained and reviewed 49 organizations' confined spaces training plans to assess whether lesson plans were complete and overall confined spaces training was adequate. We did not rely on computer-generated data.

We accomplished the audit in accordance with generally accepted government auditing standards and, accordingly, included tests of management controls related to Confined Spaces Program management including identification, classification, and training. We performed the audit from February through August 1999 and reviewed documentation dated January 1997 through March 1999.

PRIOR AUDIT COVERAGE

We did not identify any Air Force Audit Agency, DoD Inspector General, or General Accounting Office reports issued within the past 5 years that addressed the same or similar objectives as this audit.

Locations Audited/ Reports Issued

<u>Organization/Location</u>	<u>Installation-Level Reports Issued</u>
 <u>Air Combat Command</u>	
Air Warfare Center Nellis AFB NV	WN000014 4 Nov 99
355th Wing Davis-Monthan AFB AZ	WN000010 26 Oct 99
 <u>Air Education and Training Command</u>	
12th Flying Training Squadron Randolph AFB TX	WR099050 22 Jul 99
81st Training Wing Keesler AFB MS	EB099072 18 May 99
 <u>Air Force Materiel Command</u>	
Air Armament Center Eglin AFB FL	DE099038 15 Jun 99
Air Force Flight Test Center Edwards AFB CA	DD099015 31 Aug 99
738th Engineering Installation Squadron Keesler AFB MS	EB099095 3 Aug 99
 <u>Air Force Space Command</u>	
45th Space Wing Patrick AFB FL	EB099077 4 June 99
 <u>Air Mobility Command</u>	
22d Air Refueling Wing McConnell AFB KS	EO099050 10 Sep 99
319th Air Refueling Wing Grand Forks AFB ND	EO099038 21 Jun 99

**Locations Audited/
Reports Issued**

Organization/Location

**Installation-Level
Reports Issued**

Pacific Air Forces

15th Air Base Wing
Hickam AFB HI

WH099064
22 Jun 99

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Safety & Health Statistics



Table 1. Incidence rates of nonfatal occupational injuries and illnesses by selected industries and case types, 1998

TABLE 1. Incidence rates(1) of nonfatal occupational injuries and illnesses by selected industries and

Industry(2)	SIC code(3)	1998 Annual average employment(4) (000's)	Injuries and illnesses			
			Total cases	Lost workday cases		Cases without lost work-days
				Total(5)	With days away from work(6)	
Private industry(7).....		104640.7	6.7	3.1	2.0	3.
Agriculture, forestry, and fishing(7).....		1,815.1	7.9	3.9	3.0	4.
Agricultural production(7).....	01-02	772.6	8.4	4.1	2.8	4.
Agricultural production--crops(7).....	01	586.2	7.7	3.6	2.4	4.
Agricultural production--livestock(7).....	02	186.4	10.7	5.6	4.1	5.
Agricultural services.....	07	1,004.9	7.6	3.9	3.1	3.
Forestry.....	08	26.4	7.3	2.6	2.3	4.
Fishing, hunting, and trapping.....	09	11.3	6.4	3.2	2.7	3.
Mining(8).....		588.6	4.9	2.9	2.2	2.
Metal mining(8).....	10	48.8	5.2	2.9	1.8	2.
Coal mining(8).....	12	92.1	8.2	6.0	5.6	2.
Oil and gas extraction.....	13	337.7	4.1	2.0	1.4	2.
Nonmetallic minerals, except fuels(8).....	14	110.1	4.6	3.0	2.2	1.
Construction.....		5,949.5	8.8	4.0	3.3	4.
General building contractors.....	15	1,370.6	8.4	3.9	3.1	4.
Heavy construction, except building.....	16	827.9	8.2	4.1	3.2	4.
Special trade contractors.....	17	3,751.0	9.1	4.1	3.3	5.
Manufacturing.....		18,807.1	9.7	4.7	2.3	5.
Durable goods.....		11,209.1	10.7	5.0	2.5	5.
Lumber and wood products.....	24	816.0	13.2	6.8	3.8	6.
Furniture and fixtures.....	25	532.2	11.4	5.7	2.7	5.
Stone, clay, and glass products.....	32	562.1	11.8	6.0	3.3	5.
Primary metal industries.....	33	714.2	14.0	7.0	3.5	7.
Fabricated metal products.....	34	1,509.9	13.9	6.5	3.4	7.
Industrial machinery and equipment.....	35	2,207.8	9.5	4.0	2.2	5.
Electronic and other electric equipment.....	36	1,707.7	5.9	2.8	1.3	3.
Transportation equipment.....	37	1,894.8	14.6	6.6	2.7	8.
Instruments and related products.....	38	869.6	4.0	1.9	.8	2.
Miscellaneous manufacturing industries.....	39	394.9	8.1	3.9	2.2	4.
Nondurable goods.....		7,598.0	8.2	4.3	2.0	3.
Food and kindred products.....	20	1,686.7	13.6	7.5	2.9	6.
Tobacco products.....	21	40.2	6.4	3.1	2.1	3.
Textile mill products.....	22	596.5	6.7	3.4	1.3	3.
Apparel and other textile products.....	23	762.5	6.2	2.6	1.2	3.
Paper and allied products.....	26	678.6	7.1	3.7	2.0	3.
Printing and publishing.....	27	1,556.4	5.4	2.8	1.7	2.
Chemicals and allied products.....	28	1,039.7	4.2	2.1	1.0	2.
Petroleum and coal products.....	29	138.9	3.9	1.8	1.1	2.
Rubber and miscellaneous plastics products.....	30	1,013.9	11.2	5.8	2.7	5.
Leather and leather products.....	31	84.6	9.8	4.5	2.2	5.
Transportation and public utilities(8).....		6,367.4	7.3	4.3	3.2	3.

Railroad transportation(8).....	40	-	3.4	2.5	2.1	.
Local and interurban passenger transit.....	41	448.5	8.8	4.4	3.5	4.
Trucking and warehousing.....	42	1,739.0	8.4	4.6	3.8	3.
Water transportation.....	44	184.4	7.5	3.9	3.4	3.
Transportation by air.....	45	1,196.0	14.5	10.0	7.4	4.
Pipelines, except natural gas.....	46	13.6	2.2	.7	.6	1.
Transportation services.....	47	452.7	3.4	1.8	1.1	1.
Communications.....	48	1,475.2	3.0	1.6	1.2	1.
Electric, gas, and sanitary services.....	49	856.5	6.3	3.3	1.8	3.
Wholesale and retail trade.....		29,087.1	6.5	2.8	1.8	3.
Wholesale trade.....		6,816.1	6.5	3.3	2.1	3.
Wholesale trade--durable goods.....	50	4,047.4	5.9	2.8	1.7	3.
Wholesale trade--nondurable goods.....	51	2,768.7	7.4	4.1	2.6	3.
Retail trade.....		22,271.0	6.5	2.7	1.8	3.
Building materials and garden supplies.....	52	945.2	8.9	4.4	2.7	4.
General merchandise stores.....	53	2,723.6	9.0	4.7	2.6	4.
Food stores.....	54	3,470.6	8.4	3.6	2.4	4.
Automotive dealers and service stations.....	55	2,325.5	5.8	2.2	1.7	3.
Apparel and accessory stores.....	56	1,160.1	3.2	1.3	.8	1.
Furniture and homefurnishings stores.....	57	1,029.2	4.7	2.2	1.4	2.
Eating and drinking places.....	58	7,763.5	6.3	2.1	1.5	4.
Miscellaneous retail.....	59	2,853.3	3.9	1.7	1.1	2.
Finance, insurance, and real estate.....		7,218.8	1.9	.7	.5	1.
Depository institutions.....	60	2,037.8	1.5	.4	.3	1.
Nondepository institutions.....	61	660.9	1.2	.4	.3	.
Security and commodity brokers.....	62	644.1	0.6	0.2	0.1	0.
Insurance carriers.....	63	1,442.7	1.9	.6	.4	1.
Insurance agents, brokers, and service.....	64	744.9	1.1	.4	.4	.
Real estate.....	65	1,460.9	4.0	1.8	1.4	2.
Holding and other investment offices.....	67	227.5	1.7	.5	.4	1.
Services.....		34,624.4	5.2	2.4	1.5	2.
Hotels and other lodging places.....	70	1,776.9	7.3	3.6	2.0	3.
Personal services.....	72	1,201.4	3.1	1.6	1.1	1.
Business services.....	73	8,590.9	3.6	1.6	1.1	1.
Auto repair, services, and parking.....	75	1,144.1	5.2	2.2	1.7	3.
Miscellaneous repair services.....	76	379.2	6.4	3.3	2.5	3.
Motion pictures.....	78	571.7	3.5	.9	.6	2.
Amusement and recreation services.....	79	1,650.1	8.2	3.5	1.8	4.
Health services.....	80	9,816.5	7.7	3.6	2.2	4.
Legal services.....	81	973.7	.8	.4	.3	.
Educational services.....	82	1,603.8	3.1	1.2	.9	1.
Social services.....	83	2,571.2	6.4	2.9	2.0	3.
Museums, botanical, zoological gardens.....	84	93.0	8.1	4.5	2.0	3.
Membership organizations.....	86	1,030.0	2.9	1.1	0.9	1.
Engineering and management services.....	87	3,170.3	2.1	.8	.5	1.

1 The incidence rates represent the number of injuries and illnesses per 100 full-time workers and where

N = number of injuries and illnesses
 EH = total hours worked by all employees during the calendar year
 200,000 = base for 100 equivalent full-time workers (working 40 hours per week, 50 weeks per year).

2 Totals include data for industries not shown separately.

3 Standard Industrial Classification Manual, 1987 Edition.

4 Employment is expressed as an annual average and is derived primarily from the BLS-State Covered Employment in private households (SIC 88) is excluded.

5 Total lost workday cases involve days away from work, or days of restricted work activity, or both.

6 Days-away-from-work cases include those which result in days away from work with or without restriction.

7 Excludes farms with fewer than 11 employees.

8 Data conforming to OSHA definitions for mining operators in coal, metal, and nonmetal mining and for transportation are provided to BLS by the Mine Safety and Health Administration, U.S. Department of Labor Administration, U.S. Department of Transportation. Independent mining contractors are excluded from these industries.

NOTE: Because of rounding, components may not add to totals.

- Indicates data not available.

SOURCE: Bureau of Labor Statistics, U.S. Department of Labor

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FROM HQ USAF KIRTLAND AFB NM //SE//
TO AIG 508//CV/SE/SG/CE//
HQ USAF BOLLING AFB DC //SG//
HQ USAF WASHINGTON DC //IL//
SAF WASHINGTON DC //MI//
INFO AFAA MARCH AFB CA //FSP//

SUBJECT: AIR FORCE AUDIT AGENCY AUDIT OF "AIR FORCE SAFETY OF LIFE IN
CONFINED SPACES" DRAFT (PROJECT 99051007)

1. THE AF AUDIT AGENCY CONDUCTED AN AUDIT OF THE AF CONFINED SPACE
PROGRAM (CSP). THE PURPOSE OF THE AUDIT WAS TO ENSURE AF PERSONNEL
ARE PROTECTED FROM THE POTENTIALLY SERIOUS HAZARDS THAT CAN EXIST
WHILE WORKING IN CONFINED SPACES. THE AUDIT CANVASSED 10 ACTIVE
DUTY INSTALLATIONS AND OCCURRED MAR-JUN 99.

2. AF DATA REFLECTS THAT FATALITIES ARE NOT OCCURRING IN AF CONFINED
SPACE OPERATIONS. HOWEVER, A DRAFT COPY OF THE AUDIT REPORT
INDICATED THAT AF PEOPLE ARE NOT FULLY COMPLYING WITH ALL CSP
REQUIREMENTS AND IN SOME SITUATIONS PEOPLE ARE EXPOSED TO
UNNECESSARY RISK AS A RESULT. OPPORTUNITIES FOR IMPROVEMENT EXIST
TO BETTER PROTECT AF EMPLOYEES FROM THE DANGERS OF CONFINED SPACE
WORK. THE DRAFT AF AUDIT REPORT HIGHLIGHTED SEVERAL SPECIFIC ITEMS
FOR IMPROVEMENT:

A. IDENTIFICATION OF SPACES: CSP COORDINATORS AND CSP TEAMS HAVE NOT
IDENTIFIED ALL CONFINED SPACES. RECOMMENDATION: EACH INSTALLATION,
TO INCLUDE TENANT ORGANIZATIONS, REVIEW PROCEDURES FOR IDENTIFYING
AND CLASSIFYING INSTALLATION CONFINED SPACES. ENSURE A LISTING OF
ALL PERMIT REQUIRED CONFINED SPACES (PRCS) AND NON-PRCS IS
MAINTAINED.

B. TESTING: ADDITIONALLY, ENTRY SUPERVISORS AND ENTRANTS DID NOT
ALWAYS CONDUCT ATMOSPHERIC TESTS BEFORE ENTRY INTO PRCS. THREE OF

TEN BASES AUDITED REVEALED 584 UNIDENTIFIED CONFINED SPACES, AND 564 PRCS ENTRIES DONE WITHOUT PRIOR ATMOSPHERIC TESTING. THIS EQUATED TO 51% OF THE 1,106 ENTRIES REVIEWED. RECOMMENDATION: EACH INSTALLATION, TO INCLUDE TENANT ORGANIZATIONS, REVIEW PROCEDURES REGARDING ATMOSPHERIC TESTING PRIOR TO PRCS ENTRY.

C. TRAINING: INSTALLATION LEVEL ORGANIZATION TRAINING PROGRAMS WERE FOUND INADEQUATE. TWENTY-THREE OF FORTY-FOUR (52%) ORGANIZATIONS REVIEWED AT SEVEN OF THE TEN BASES HAD INCOMPLETE OR NO CSP TRAINING PLANS. EMERGENCY AND RESCUE TRAINING WAS NOT ADEQUATELY IMPLEMENTED. SEVEN OF TWENTY-FIVE (28%) INSTALLATION LEVEL ORGANIZATIONS, AT THREE BASES, DID NOT CONDUCT ANNUAL RESCUE EXERCISES AS REQUIRED. RECOMMENDATION: EACH INSTALLATION, TO INCLUDE TENANT ORGANIZATIONS, REVIEW CSP TEAM ACTIVITIES TO DETERMINE IF ADEQUATE TRAINING PROGRAMS EXIST FOR ENTRY SUPERVISORS. DETERMINE IF LESSON PLANS ADEQUATELY ADDRESS SUCH ITEMS AS CONFINED SPACE HAZARD RECOGNITION, PROPER USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE), INCLUDING RESPIRATOR TRAINING, WHEN APPLICABLE. DETERMINE IF RESCUE TECHNIQUES ARE ADEQUATE. CONSIDER IF BOTH ORGANIZATIONAL AND INSTALLATION FIRE DEPARTMENT RESCUE TEAM MEMBERS ARE ADEQUATELY TRAINED AND GETTING HANDS-ON EXPERIENCE AT REQUIRED TRAINING INTERVALS.

D. RECORDS: EIGHT OF FORTY-FOUR (18%) ORGANIZATIONS AT FIVE OF TEN BASES HAD INCOMPLETE OR NO RECORDS TO DOCUMENT COMPLETION OF REQUIRED TRAINING. RECOMMENDATION: EACH INSTALLATION, TO INCLUDE TENANT ORGANIZATIONS, REVIEW PROCEDURES TO ENSURE CSP TRAINING IS PROPERLY DOCUMENTED ON AN AF FORM 55, EMPLOYEE SAFETY AND HEALTH RECORD.

E. EQUIPMENT TESTING: SIX OF TEN BASES HAD ORGANIZATIONAL EMERGENCY RESCUE EQUIPMENT THAT HAD NOT BEEN TESTED. THIS EQUATED TO 68% OF THE RESCUE EQUIPMENT REVIEWED. RECOMMENDATION: EACH INSTALLATION, TO INCLUDE TENANT ORGANIZATIONS, DETERMINE IF RESCUE EQUIPMENT IS

PROPERLY INSPECTED AND TESTED. DETERMINE IF TRAINING, TESTING, AND CALIBRATION FOR ATMOSPHERIC TESTING AND MONITORING EQUIPMENT IS PROPERLY ACCOMPLISHED AND RECORDED.

F. ENTRY PERMITS AND MASTER ENTRY PLANS (MEP): INSTALLATION LEVEL ORGANIZATIONS MADE PRCs ENTRIES WITHOUT REQUIRED OR COMPLETED ENTRY PERMITS. IN SOME CASES ENTRIES OCCURRED WITH MEPS LACKING REQUIRED ANNUAL REVIEW. THE AUDIT IDENTIFIED 460 PRCs ENTRIES (85%), AT THREE OF TEN BASES, MADE WITHOUT REQUIRED ENTRY PERMITS. AT FOUR OF THE TEN BASES 487 INCOMPLETE MEPS WERE FOUND FOR A TOTAL OF 68%. NINETEEN MEPS LACKING AN ANNUAL REVIEW WERE FOUND AT TWO OF TEN BASES FOR A TOTAL OF 31% OF MEPS REVIEWED. RECOMMENDATION: EACH INSTALLATION, TO INCLUDE TENANT ORGANIZATIONS, REVIEW MEPS TO ENSURE THEY ARE COMPLETE AND CURRENT. DETERMINE IF PRCs ENTRIES HAVE COMPLETE AND PROPERLY CERTIFIED ENTRY PERMITS. EVALUATE PROCEDURES TO ENSURE ENTRY PERMITS RECEIVE AN ANNUAL REVIEW.

3. TO CLARIFY EXISTING CSP REQUIREMENTS, ADDRESS ISSUES HIGHLIGHTED IN THE AUDIT REPORT (DRAFT), AND SOLICIT INPUT FOR IMPROVING CURRENT GUIDANCE, A CROSSFUNCTIONAL TEAM HEADED BY AFSC WILL REVIEW AFOSH STANDARD 91-25, CONFINED SPACES.

4. UNTIL SPECIFIC ACTION ITEMS ARE DETERMINED, RECOMMEND EACH INSTALLATION, TO INCLUDE TENANT ORGANIZATIONS, REVIEW ITS CSP AND CS ENTRY PROCEDURES IN EACH OF THE PROBLEM AREAS IDENTIFIED ABOVE. REQUEST COMMANDERS MAKE CSP COMPLIANCE A SPECIAL INTEREST ITEM AT THE QUARTERLY OCCUPATIONAL SAFETY AND HEALTH COUNCIL UNTIL ALL LOCAL DISCREPANCIES ARE RESOLVED. MAJCOMS SHOULD CONSIDER CREATING A SIMILAR SPECIAL INTEREST ITEM AT ENVIRONMENT, SAFETY AND OCCUPATIONAL HEALTH COMMITTEE OR OTHER APPROPRIATE MEETINGS.

5. DIRECT QUESTIONS CONCERNING THE CSP TO THE FOLLOWING INDIVIDUALS:
HQ AFSC (SAFETY): MS KAREN KINKLE OR MSGT KEVIN ENNIS, DSN 246-0829/0827.
IERA/RSHI (INDUSTRIAL HYGIENE): MAJ BRIAN BLAZICKO, DSN 240-6047. HQ

AFCESA (FIRE PROTECTION/ RESCUE): CMSGT CARL GLOVER, DSN 523 6112. WR-
ALC/LEM (FUEL SYSTEMS MAINTENANCE) MR ALLEN MEYERS, DSN 468-4074.

6. THE GOAL OF THE AF CSP TEAM IS TO HELP ENSURE INSTALLATIONS
DEVELOP AND EXECUTE CSPS THAT COMPLY WITH REQUIREMENTS AND
MINIMIZE UNNECESSARY WORKER RISK. REQUEST YOU DISSEMINATE THIS
INFORMATION AND RECOMMENDATIONS TO SUBORDINATE UNITS. THIS IS A
COORDINATED AF/SE, AF/SG, AND AF/IL MESSAGE.

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DEPARTMENT OF THE AIR FORCE
WASHINGTON DC

Office Of The Assistant Secretary

22 MAR 2000

MEMORANDUM FOR SAF/IGI

FROM: SAF/MIQ

SUBJECT: AFAA Audit of Air Force Safety of Life in Confined Spaces

AFAA has recently conducted audits of the confined spaces program at active duty installations and ANG units. These audits identified a number of potentially serious deficiencies in this critical safety and health program. One of the recommendations from the active duty audit was to request the IG establish the confined spaces program as a Special Interest Item (SII). In particular, review of unit training plans, confined space program team minutes, and organization rescue exercises would be required to provide the necessary oversight to ensure the program is brought back on track.

Although your Health Services Inspections currently include criteria related to the confined spaces program, these criteria only address the Bioenvironmental Engineering responsibilities within the program. However, those areas were not the areas identified as deficient by the audit.

Request your assistance in placing additional priority on this program through a SII. A proposed inspection guide and SII information are attached. My point of contact is, Lt Col Kelli Ballengee, SAF/MIQ, 695-5978.

A handwritten signature in black ink, appearing to read "Tom McCall", written over a horizontal line.

THOMAS W. L. MCCALL, JR.
Deputy Assistant Secretary of the Air Force
(Environment, Safety, and Occupational Health)

Attachments:

1. SII Information
2. SII Inspection Guide

cc:

AF/SEI/SEP/SEG
AF/SGO
AF/ILE

AIR FORCE SPECIAL INTEREST ITEM # _____
IMPLEMENTATION OF THE AIR FORCE
CONFINED SPACE PROGRAM

SUBJECT: Air Force Occupational Safety and Health (AFOSH) Standard 91-25, Confined Spaces

PURPOSE: Place special emphasis on unit confined space programs to ensure requirements of the AFOSH Standard are implemented.

SII CATEGORY: Long Term SII

BACKGROUND: During FY 98, the Air Force Medical Operations Agency requested an Air Force Audit Agency (AFAA) review of the Air Force Reserve Command Respiratory Protection Program. At the same time, the AFAA provided a limited assessment of the Reserve Command Confined Space Program. Based on deficiencies noted during this assessment and needs identified by the Environment, Safety, and Occupational Health (ESOH) Technical Planning Integrated Product Team (TPIPT), SAF/MIQ requested an Audit Agency review of the Air Force and Air National Guard Confined Space Programs. The Audit Agency report identified similar deficiencies at ten active Air Force bases and five Guard units. The SII is a result of an AFAA recommendation and addresses the critical deficiencies noted in the AFAA report.

REPORTING REQUIREMENTS: MAJCOM IGs forward consolidated quarterly and final reports with SII results to SAF/IGI, 1140 Air Force Pentagon, Washington DC 20330-1140, safigig@pentagon.af.mil, DSN 227-7050. Submit the first quarterly report NLT _____; second quarterly report NLT _____; third quarterly report NLT _____; final report NLT _____. Reports should include:

- a. Unit inspected, location, and date of inspection.
- b. A copy of the inspection guide results for the unit with problems identified.
- c. Extracts of inspection reports addressing the SII.
- d. Any additional inspector comments that may be of value in determining improvements to the standard.

INSPECTION PERIOD: _____ - _____

POCs: Lt Col Kelli Ballengee, SAF/MIQ, DSN 225-5978

Ms Karen Kinkle, HQ AFSC/SEGS, DSN 246-0829

GRADING CRITERIA: This SII will be rated satisfactory or unsatisfactory. A response of "no" to any one of the four critical questions will result in an unsatisfactory SII rating.

AFOSH STANDARD 91-25 INSPECTION GUIDE

WING/BASE AND UNIT COMMANDERS (INCLUDING TENANT UNITS)

1. Objective: Determine full implementation of requirements of AFOSH Standard 91-25, Confined Spaces, in units whose personnel are required to enter confined spaces.

a. Critical Question: Have functional managers, in coordination with the installation Confined Space Program Team (CSPT), identified, initially evaluated, and classified each confined space in the organization, and is a list of all confined spaces, both permit-required and non-permit, maintained by the organization?

b. Critical Question: Have functional managers ensured personnel with permit-required confined space (PRCS) responsibilities are trained using CSPT-approved lesson plans, and is training documented on an AF Form 55, Employee Safety and Health Record, or other authorized computerized system? (Includes initial training for entry supervisors, entrants, attendants, testers, and rescue personnel and annual hands-on rescue training exercises)

c. Critical Question: Have AF Forms 1024, Confined Spaces Entry Permit, been completed for all PRCS entries, to include identification of all hazards, implementation of controls measures, and results of pre-entry and periodic atmospheric testing and monitoring?

d. Critical Question: Does the Confined Space Program Team (CSPT) review the installation Confined Space Program annually to include a review of all Master Entry Plans and an assessment of training, rescue procedures, qualifications of entry supervisors, and review of expired and revoked entry permits?

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BIOGRAPHY

UNITED STATES AIR FORCE

SAF/IGQ
Washington, D.C. 20330-1140

LIEUTENANT COLONEL TIMOTHY M. RUSSELL

Lt Col Timothy M. Russell is Chief, Operations Division, Inquiries Directorate in the Secretary of the Air Force Office of the Inspector General.

He enlisted in the Air Force in 1978 after receiving a Bachelor of Science Degree in Health and Physical Education from East Carolina University in 1977. After completion of basic training (honor graduate) and training at technical school (Class Leader {Red Rope}), he was assigned as a jet engine mechanic on C-141A/B aircraft at McChord Air Force Base, Washington. He applied for and was accepted to attend Officer Training School at Lackland AFB, Texas in 1980. He received his Master of Science Degree in Aeronautical Science from Embry Riddle Aeronautical University in 1989. Lt Col Russell has served as an Aircraft Maintenance Supervisor, Chief of Logistics, Director of Maintenance, served on the staff at Headquarters, Strategic Air Command, Wing Executive Officer, Squadron Commander, and as Aircraft Maintenance Inspector at the Air Force Inspection Agency prior to being assigned to the Pentagon.

EDUCATION:

1977 Bachelor of Science Degree - Health and Physical Education, East Carolina University
1985 Squadron Officer School
1989 Master of Science Degree - Aeronautical Science, Embry Riddle Aeronautical University
1995 Air Command and Staff College

ASSIGNMENTS:

1. December 1978 - January 1979, attended United States Air Force Basic Military Training, Lackland Air Force Base, Texas
2. January 1979 - March 1979, student, Jet Engine Mechanic Technical Training Course, Chanute Air Force Base, Illinois
3. March 1979 - May 1980, Jet Engine Mechanic, 62d Organizational Maintenance Squadron, McChord Air Force Base, Washington
4. May 1980 - October 1980, student, Officer Training School, Lackland Air Force Base, Texas
5. October 1980 - March 1981, student, Aircraft Maintenance Officer Course, Chanute Air Force Base, Illinois
6. March 1981 - August 1982, OIC Tanker Branch, 93rd Organizational Maintenance Squadron, Castle Air Force Base, California
7. August 1982 - January 1984, Maintenance Supervisor, 93rd Avionics Maintenance Squadron, Castle Air Force Base, California
8. January 1984-August 1986, Director of Maintenance, Strategic Systems Combined Test Force, Edwards Air Force Base, California
9. September 1986-September 1987, Chief of Logistics, Detachment 2, 9th Strategic Reconnaissance Wing, Osan Air Base, Republic of Korea

10. October 1987 - October 1988, Policies and Procedures Officer, Logistics Management Division; Headquarters, Strategic Air Command, Offutt Air Force Base, Nebraska
11. October 1988 - October 1989, OIC Aircraft Maintenance Officer Utilization, Logistics Management Division; Headquarters, Strategic Air Command, Offutt Air Force Base, Nebraska
12. November 1989 - December 1990, Chief of Manpower Utilization and Training Branch, Logistics Management Division; Headquarters Strategic Air Command, Offutt Air Force Base, Nebraska
13. December 1990 - May 1991, Acting Squadron Commander, 416th Organizational Maintenance Squadron, Griffiss Air Force Base, New York
14. May 1991 - June 1993, Chief of Logistics, 416th Intermediate Level Maintenance Squadron, Griffiss Air Force Base, New York
15. July 1993 - October 1993, Maintenance Supervisor, 416th Maintenance Squadron, Griffiss Air Force Base, New York
16. October 1993 May 1994, Wing Executive Officer, 416th Bomb Wing, Griffiss Air Force Base, New York
17. June 1994 - August 1994, Director of Maintenance, 416th Organizational Maintenance Squadron, Griffiss Air Force Base, New York
18. August 1994 - July 1995, Director of Maintenance, 42nd Airborne Command and Control Squadron, Davis-Monthan Air Force Base, Arizona
19. July 1995 - July 1997, Commander, 355th Equipment Maintenance Squadron, Davis-Monthan Air Force Base, Arizona
20. August 1997 - August 1998, Chief Inspector, Logistics Division; Air Force Inspection Agency, Kirtland Air Force Base, New Mexico
21. September 1998 - June 1999, Chief, Planning and Programming, Inquiries Directorate; Secretary of the Air Force Office of the Inspector General, Pentagon, Washington D C.
22. July 1999 - present, Chief, Operations Division, Inquiries Directorate; Secretary of the Air Force Office of the Inspector General, Pentagon, Washington D.C.

MAJOR AWARDS AND DECORATIONS:

Meritorious Service Medal with three oak leaf clusters
 Air Force Commendation Medal with one oak leaf cluster
 Air Force Outstanding Unit Award with three oak leaf clusters
 Air Force Organizational Excellence Award with one oak leaf cluster
 Air Force Good Conduct Medal
 National Defense Service Medal
 Southwest Asia Campaign Medal with one oak leaf cluster
 Air Force Achievement Medal

EFFECTIVE DATES OF PROMOTION:

Second Lieutenant	1 October 1980
First Lieutenant	1 October 1982
Captain	1 October 1984
Major	1 November 1992
Lieutenant Colonel	1 October 1998



BIOGRAPHY

UNITED STATES AIR FORCE

SAF/MIQ

Washington, D.C. 20330-1260

LIEUTENANT COLONEL M. KELLI BALLENGEE

Lt Col M. Kelli Ballengee is Deputy for Occupational Health and Operations in the Deputy Assistant Secretary of the Air Force for Environment, Safety, and Occupational Health.

She entered the Air Force in 1979 with a direct commission after receiving a Bachelor of Science degree in Biomedical Engineering from Marquette University. She was the distinguished graduate from Bioenvironmental Engineering School at Brooks Air Force Base, Texas in December 1979. She received her Masters in Environmental Health Engineering from the University of Texas-Austin in May 1990. She is a Certified Industrial Hygienist. Lt Col Ballengee has served in research and development positions; HQ staff; Chief, Bioenvironmental Engineering; and Deputy Director, Bioenvironmental Engineering at clinic and medical group Air Force medical treatment facilities; and the Air Force Inspection Agency before being assigned to the Pentagon.

EDUCATION:

- 1979 Bachelor of Science Degree in Biomedical Engineering, Marquette University
- 1979 Bioenvironmental Engineering School, School of Aerospace Medicine
- 1984 Squadron Officer School
- 1987 Air Command and Staff College
- 1990 Master of Science Degree in Environmental Health Engineering, University of Texas-Austin

ASSIGNMENTS:

1. July 1979-August 1979, student, Military Indoctrination for Medical Services Officers, Sheppard Air Force Base, Texas
2. August 1979-December 1979, student, Bioenvironmental Engineering Course, Brooks Air Force Base, Texas
3. December 1979-April 1982, Program Manager of Chemical Defense Systems, Life Support SPO, Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio
4. April 1982-May 1986, Manager Chemical Defense and Air Base Survivability Systems, HQ Air Force Systems Command, Andrews Air Force Base, Maryland
5. May 1984-July 1984, student, Squadron Officers School, Maxwell Air Force Base, Alabama
6. May 1986-May 1990, Chief of Bioenvironmental Engineering Services, USAF Clinic Randolph, Randolph Air Force Base, Texas
7. January 1990-May 1990, student, Masters in Environmental Health Engineering, University of Texas-Austin, Austin, Texas
8. May 1990-June 1991, Technical Manager of Hazardous Materials Management Task Force, Human Systems Division, Brooks Air Force Base, Texas
9. June 1991-June 1992, Executive Manager of Occupational and Environmental Health Systems, Armstrong Laboratory, Brooks Air Force Base, Texas
10. June 1992-February 1995, Deputy Director of Bioenvironmental Engineering Services, 74th Medical Group, Wright-Patterson Air Force Base, Ohio
11. February 1995-December 1996, Medical inspector, Medical Inspection Directorate, Air Force Inspection Agency, Kirtland Air Force Base, New Mexico
12. January 1997-June 1997, Chief of Inspection Management Division, Medical Inspection Directorate, Air Force Inspection Agency, Kirtland Air Force Base, New Mexico
13. July 1997-present, Deputy for Occupational Health, Deputy Assistant Secretary of the Air Force for Environment, Safety, and Occupational Health, Pentagon, Washington DC

MAJOR AWARDS AND DECORATIONS:

Meritorious Service Medal with three oak leaf clusters
Air Force Commendation Medal with one oak leaf cluster
National Defense Service Medal

OTHER ACHIEVEMENTS:

1993 Field Grade Bioenvironmental Engineer of the Year, Air Force Materiel Command
1995 Field Grade Office of the Year, Air Force Inspection Agency Medical Directorate

EFFECTIVE DATES OF PROMOTION:

Second Lieutenant	23 July 1979
First Lieutenant	23 July 1981
Captain	23 July 1983
Major	1 November 1990
Lieutenant Colonel	1 January 1997

REPORT DOCUMENTATION PAGE

Form Approved
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Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE December 1992	3. REPORT TYPE AND DATES COVERED Final January 1991 - October 1991	
4. TITLE AND SUBTITLE Industrial Hygiene Evaluation of F-111 Fuel Tank Sealant Process			5. FUNDING NUMBERS	
6. AUTHOR(S) Robert Walton				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Armstrong Laboratory Occupational and Environmental Health Directorate 2402 E Drive Brooks Air Force Base, TX 78235-5114			8. PERFORMING ORGANIZATION REPORT NUMBER AL-TR-1992-0139	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) This report presents an informative, inclusive and concise evaluation of a new tank sealant process. Recommendations are made based on air sampling results and current industrial hygiene practices. This report will aid those bases implementing this new process in selecting the proper protective equipment for workers and in determining where and what to sample for when documenting worker exposure.				
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INDUSTRIAL HYGIENE EVALUATION OF F-111 FUEL TANK SEALANT PROCESS

INTRODUCTION

Purpose and Scope

In response to a 12 Oct 90 letter of request from the McClellan Air Force Base (AFB) Bioenvironmental Engineering Section (BES), we conducted an initial industrial hygiene evaluation of this new sealant process. Three separate surveys (22-26 January 1991, 12-16 August 1991, and 29-31 October 1991) were performed at McClellan AFB during actual spray sealant operations. Additional air sample results included in this report were done by Lt Devine of BES during September and October 1991. The purpose of the surveys was to conduct a thorough industrial hygiene evaluation of this new fuel tank sealant process. The ultimate goal was to determine how the process could be safely implemented and to provide that documentation to other Air Force Materiel Command (AFMC) bases.

Background

The F-111 fuel tank sealant process is new to the Air Force but has been used successfully by civilian industry for some time. The F-111 has had a history of fuel tank leak problems and therefore was a good candidate for testing the new sealant process.

Description of Operation

The process consists of a number of different operations which must be performed in a certain order. It begins with fuel tank de-sealing where all the old sealant is removed by waterpicking. The old sealant surface is prepped using a wire brush and wiped down with Turco 6628. The sealant surface is then primed with a Desoto epoxy primer which takes 30 to 60 minutes, depending on tank size, when using a spray gun (air pressure @ 30 ± 5 psi and fluid pressure @ 4 ± 1 psi). The primer coat requires a 30-minute to 45-minute drying time prior to sealant application. The sealant application requires two coats to ensure proper coverage. By applying white and black coats separately, sealant coverage for each coat can be easily determined by visual inspection. The sealant is also applied with an air-assisted airless spray gun (fluid pressure is 500 psi @ pump but decreases to 30 psi @ gun tip); each application requires between 1.5 to 3 hours per coat depending on tank size. The current procedure requires a 3-hour drying time between sealant coat applications. During spray application, the tank is

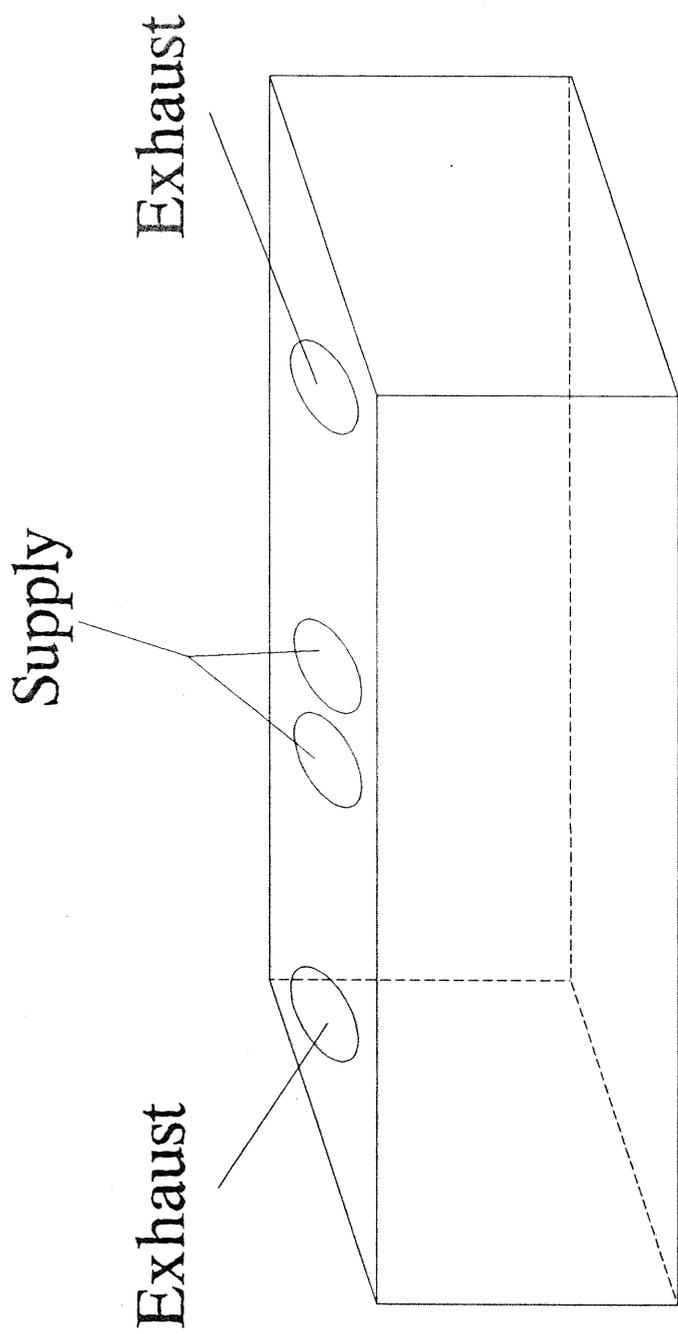


Figure 1. Fuel Tank

The sealant is mixed just prior to application using a hand-held pneumatic mixer with a one-to-one ratio between parts A and B. Again, mixing changes the constituent concentrations from what is indicated in the MSDS to 50% PM Acetate, 40% HMDI polythioether pre-polymer (according to John Zook, PRC chemist, only 2.5% of the 40% is unreacted HMDI terminal groups), 2.5% HMDI monomer, 2.5% DETDA, and 5% pigment. The explosive hazard during sealant spraying is significantly reduced compared to the primer because PM Acetate is much less volatile. As with the primer application, most worker exposure to these materials will occur during spraying and only within the confined spaces of the tank. This proximal effect is due to the non-volatile nature of the contaminants which generate a particulate aerosol hazard only. Refer to Appendix A for a diagram of the vulcanization mechanism.

Personal Protective Equipment (PPE)

PPE, worn by workers to protect them from a hazardous work environment, is used while engineering controls are being developed or when appropriate engineering controls are still unable to adequately eliminate the hazard. It is NEVER used in place of engineering controls. In this particular case, PPE is used to supplement existing engineering controls to reduce the workers' risk. There are really three different exposure groups within Hangar 251: the sealant mixing operator, the sealant spray applicators and workers not associated with the sealant operation. All require different levels of protection. The last group has no exposure to the material and, therefore, does not require any PPE. Current procedures require the mixer to wear a full-face dual cartridge organic-vapor respirator, cotton coveralls with a polyethylene-coated Tyvek suit including boots and drawstring hood on top, and Ansell/Edmont nitrile gloves. All openings in this ensemble must be taped to prevent any skin exposures. A portable ventilation booth is being procured for mixing operations. Current procedures require the sealant applicators to wear full-face, positive-pressure, air-supplied respirators, cotton coveralls with a Sarnex 23P suit including boots and drawstring hood on top, and Ansell/Edmont nitrile gloves. Again, all openings must be taped to prevent skin exposures. Heat stress became a problem for the personnel inside the tank; consequently, a whole-body cooling suit system was procured and seems to work very well. The method of operation is very simple. A small pumping unit circulates ice water within narrow plastic tubing woven throughout a cotton suit.

Confined Space Entry

According to the proposed Occupational Safety and Health Administration (OSHA) standard, Title 29 of the Code of Federal

9. Protection from External Hazards
10. Duty to Other Employees

Waste Stream Discharge

All of the material exhausted by the ventilation system is vented through the roof directly outside. Due to the composition of the material being sprayed, even without a filter, only the solvents would actually be discharged to the outside air. The Environmental Management Division at McClellan AFB has stated that, at the current usage levels, the mass of volatile organic chemicals (VOC) does not violate current California State Regulations. Again, we highly recommend use of an in-line particulate filter.

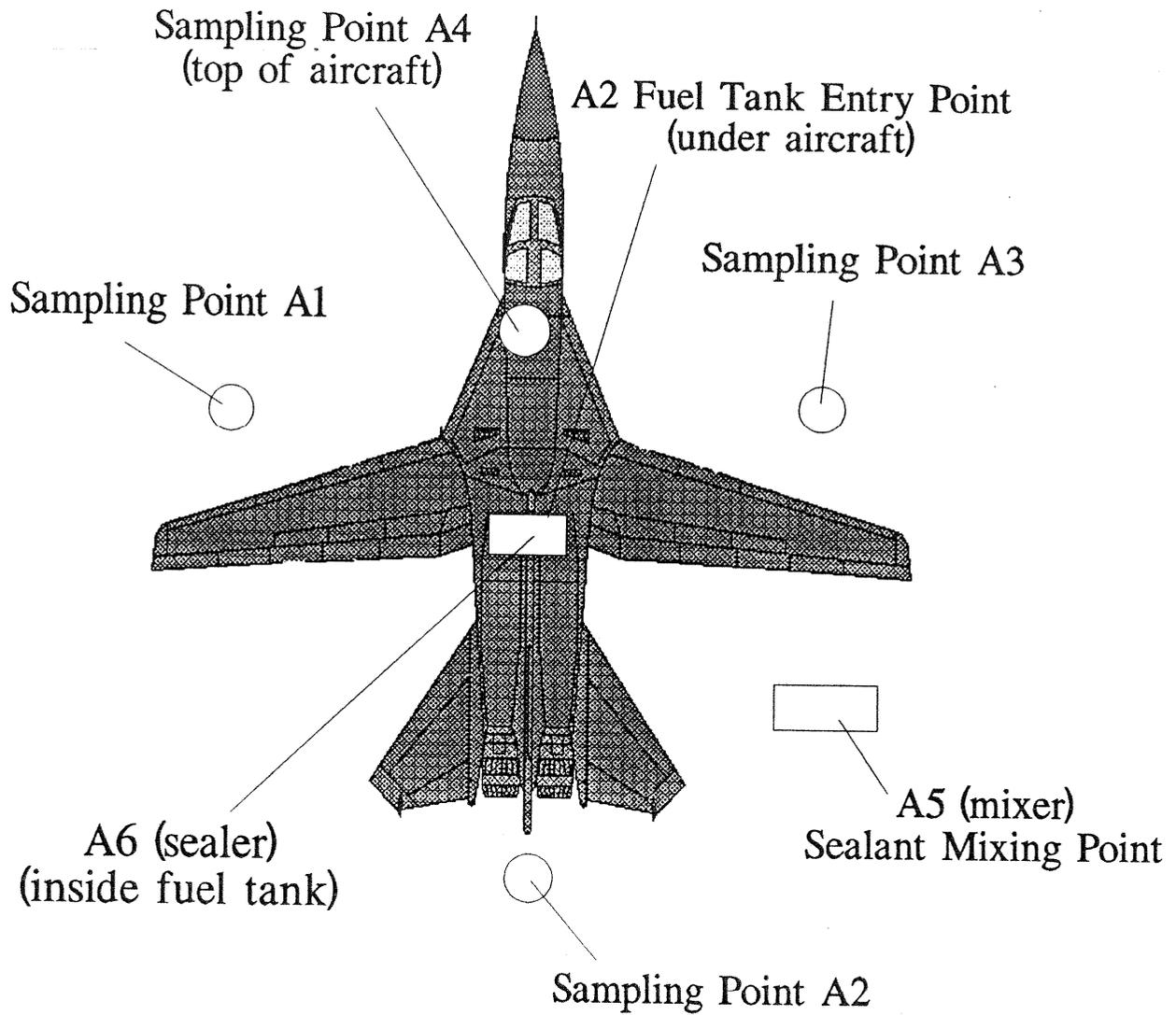
POTENTIAL HAZARDS

The solvents in the material combined with the confined space of the fuel tank produce an explosive hazard during spray application.

The strontium chromate contains hexavalent (Cr+6) chromium which is listed as a human carcinogen by the International Agency for Research on Cancer and the National Toxicology Program and as a potential human carcinogen by the American Conference of Governmental Industrial Hygienists (ACGIH). The Cr+6 form is treated differently than the trivalent (Cr+3) form because Cr+6 is readily absorbed by the body while Cr+3 is not. An ironic point to note is the damage to the body is caused by the reduction of Cr+6 to Cr+3.

Between the primer and sealant material, three different forms of isocyanates are used: Toluene diisocyanates (TDI), HMDI, and HMDI polythioether pre-polymer. The hazard stems from the extreme reactivity of the isocyanate functional group ($N=C=O$). Isocyanates are doubly dangerous because they will readily react with the moisture in the skin as well as any of the mucous membranes. They are potent sensitizers and once sensitized, exposure to levels far below the threshold limit value (TLV) will still elicit a reaction. Again, it is important to note that, because of the extremely low volatility of the isocyanates, they present an airborne particulate hazard to only those personnel exposed to the spray mist.

The sealant contains a secondary amine DETDA which activates the isocyanate and begins the vulcanization mechanism. The manufacturer, Ethyl Corporation, has performed a two-year study



NOTE: All sampling points
app. 17 ft from
entry point

Figure 2. Sampling Points of F-111 Aircraft (not to scale)

22 Jan 91

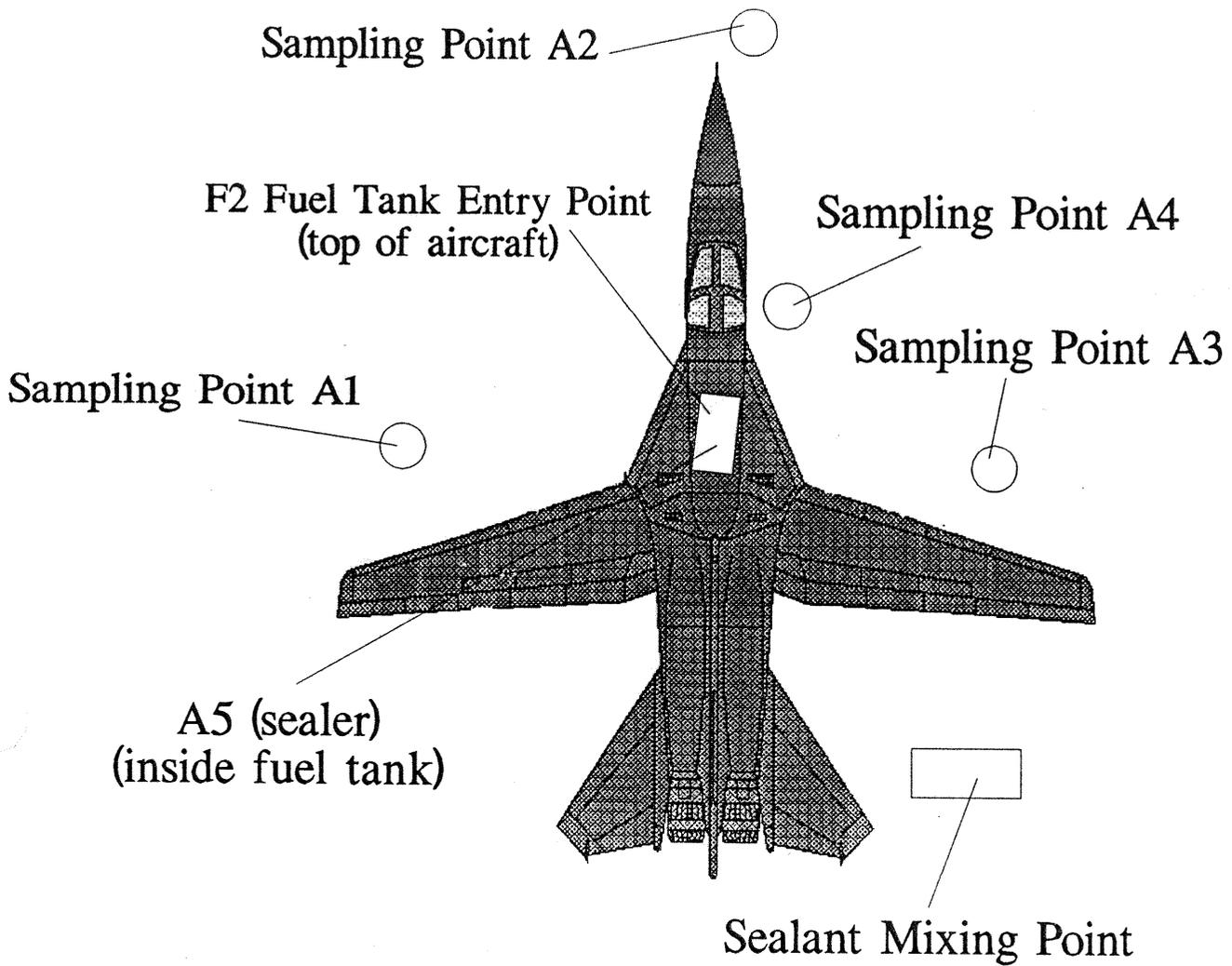
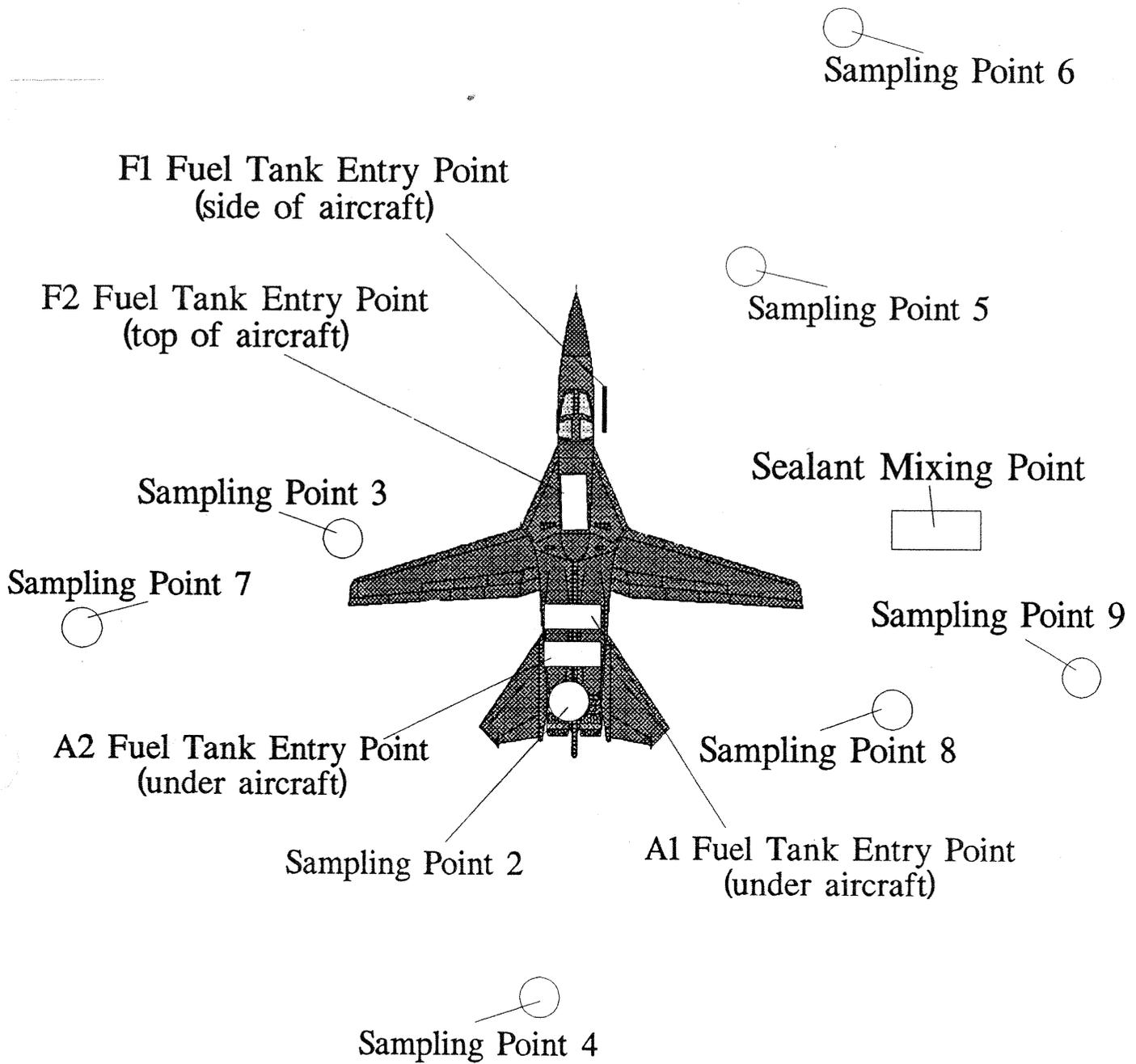


Figure 4. Sampling Points of F-111 Aircraft (not to scale)

24 Jan 91



NOTE: Sample Point 1
(sealer inside different
fuel tank each day)

Figure 6. Sampling Points of F-111 Aircraft (not to scale)
12 - 16 Aug 91

Strontium chromate 8-hr TWA values exceeded the TLV by as much as 360 times during the January 1991 sampling and 680 times during the August 1991 sampling. It is important to note that the TLV for strontium chromate has changed since the survey was done. The TLV at the time of the sampling was 0.05 mg/m³; the new TLV is 0.0005 mg/m³. Consequently, not enough air volume was collected during the sampling and the detection limit of the analysis of these samples is above the TLV.

The August 1991 survey sample results indicate a worst case HMDI exposure that exceeded the TLV by 10.3 times. The DETDA and 1M2PA sample results are well below the manufacturer's recommended exposure limits. Although some of the above results seem very high, they originate within a confined space and personnel are wearing a positive pressure supplied respirator which provides a protection factor of 1000.

Sample Results From Mixing

Samples were collected on the mixer only during the Jan 91 survey and all results were below recommended exposure guidelines. However, due to the extreme sensitization characteristics of isocyanates and the close proximity to the ongoing operation, all mixing personnel should continue to wear the PPE previously described in the PPE section.

Sample Results Within Hangar

Sample collection points ranged from 13 to 120 feet from the aircraft being sprayed. During the January 1991 survey, several strontium chromate samples were above exposure limits. On 24 January, levels exceeding the TLV by 18 times were detected in location A4 (see Figure 4). On 25 January, levels exceeding 100 times the TLV were measured on the helper (see Figure 5). During the August 1991 survey, all general area samples were below detection limits. However, as noted above, due to the low sample volume collected, the TLV is below the analysis detection limit. These results indicate that, with the exception of strontium chromate at location A4, no airborne hazard exists outside the fuel tanks. The levels of air samples collected by Lt Devine for DETDA and 1M2PA were below the manufacturer's recommended exposure limits.

APPENDIX A

VULCANIZATION MECHANISM

APPENDIX B

AIR SAMPLE RESULTS

23 January 1991
Priming Operation

Sample #	Location (**)	Contaminant Analysis	Result (mg/m3)	8-hr TWA (mg/m3)	TLV (mg/m3)@	15 min TWA (mg/m3)	STEL (mg/m3)
SX910028	A1	TDI (TD)	1.6	0.0024	0.036	0.094	0.14
SX910029	A1	Str Chr	<0.07	<0.0018	0.0005		
SX910030	A1	Iso Alc	<1.2	<0.03	983	<1.25	1230
SX910032	A2	TDI (TD)	0.45	0.001	0.036	0.040	0.14
SX910033	A2	Str Chr	<0.07	<0.0018	0.0005		
SX910034	A2	Iso Alc	<1.2	<0.03	983	<1.2	1230
SX910036	A3	TDI (TD)	0.28	0.0006	0.036	0.025	0.14
SX910037	A3	Str Chr	<0.07	<0.0018	0.0005		
SX910038	A3	Iso Alc	<1.2	<0.03	983	<1.2	1230
SZ910040	A4 (mixer)	TDI (TD)	<0.01	0.00007	0.036	<0.001	0.14
SZ910042	A4 (mixer)	Iso Alc	26.8	2.0	983	26.8	1230
SZ910045	A5 (sealer)	Str Chr	4.3	0.18	0.0005		
SZ910046	A5 (sealer)	But Acetate	620	25.8	713	620	950
SZ910046	A5 (sealer)	Iso Alc	2980	124.2	983	2980	1230
SZ910046	A5 (sealer)	Toluene	695	29	188		

1st Adhesive Coat

Sample #	Location	Contaminant	Result	8-hr TWA	TLV	15 min TWA	STEL
SX910048	A1	HMDI (TD)	<0.01	<0.0003	0.054	<1.0	2700
SX910049	A1	1M2PA	<1.0	<0.26	540		
SX910050	A2	HMDI (TD)	<0.01	<0.0003	0.054	<1.0	2700
SX910051	A2	1M2PA	<1.0	<0.26	540		
SX910052	A3	HMDI (TD)	<0.01	<0.0003	0.054	<1.0	2700
SX910053	A3	1M2PA	<1.0	<0.26	540		
SZ910054	A4 (mixer)	HMDI (TD)	<0.01	<0.0003	0.054	<1.1	2700
SZ910056	A4 (mixer)	1M2PA	<1.1	<0.27	540		
SZ910058	A5 (sealer)	HMDI (TD)	<0.01	<0.0003	0.054	<1.1	2700
SZ910059	A5 (sealer)	1M2PA	1658	432	540	1658	2700

25 January 1991
Priming Operation

Sample # (*)	Location (**)	Contaminant Analysis	Result (mg/m3)	8-hr TWA (mg/m3)	TLV (mg/m3)ⓐ	15 min TWA (mg/m3)	STEL (mg/m3)
SX910085	A1	TDI (TD)	<0.01	<0.0001	0.036	<0.001	0.14
SX910086	A1	ISO Alc	<1.2	<0.165	983	<1.2	1230
SX910087	A2	TDI (TD)	<0.01	<0.0001	0.036	<0.001	0.14
SX910088	A2	ISO Alc	<1.2	<0.165	983	<1.2	1230
SX910089	A3	TDI (TD)	<0.01	<0.0001	0.036	<0.001	0.14
SX910090	A3	ISO Alc	<1.2	<0.165	983	<1.2	1230
SZ910091	A4 (helper)	Str Chr	0.70	0.05	0.0005		
SZ910092	A4 (helper)	But Acetate	114	9.98	713	114	950
SZ910092	A4 (helper)	ISO Alc	548	48	983	548	1230
SZ910092	A4 (helper)	Toluene	128	11.2	188		
SZ910093	A5 (mixer)	TDI (TD)	<0.01	<0.0001	0.036	<0.001	0.14
SZ910095	A5 (mixer)	Toluene	8.7	0.40	188		
SZ910096	A6 (sealer)	Str Chr	1.1	0.08	0.0005		
SZ910098	A6 (sealer)	But Acetate	182	15.9	713	182	950
SZ910098	A6 (sealer)	ISO Alc	817	71.5	983	817	1230
SZ910098	A6 (sealer)	Toluene	316	27.7	188		

1st Coat Adhesive

Sample #	Location	Contaminant	Result	8-hr TWA	TLV	15 min TWA	STEL
SX910099	A1	HMDI (TD)	<0.01	<0.0004	0.054	<0.61	2700
SX910100	A1	1M2PA	<0.61	<0.26	540		
SX910101	A2	HMDI (TD)	<0.01	<0.0004	0.054	<0.62	2700
SX910102	A2	1M2PA	<0.62	<0.26	540		
SX910103	A3	HMDI (TD)	<0.01	<0.0004	0.054	<0.61	2700
SX910104	A3	1M2PA	<0.61	<0.26	540	127	2700
SZ910106	A4 (helper)	1M2PA	127	45.8	540		
SZ910107	A5 (mixer)	HMDI (TD)	<0.01	<0.0004	0.054	13.2	2700
SZ910109	A5 (mixer)	1M2PA	13.2	6.2	540		
SZ910110	A6 (sealer)	HMDI (TD)	0.63	0.022	0.054	1035	2700
SZ910112	A6 (sealer)	1M2PA	1035	390	540		
SZ910114	A6 (sealer)	HMDI (TD)	0.8	0.03	0.054		

SX911383	8	HMDI (MI)	<0.0088	<0.0026	0.054	<0.38	2700
SX911384	8	1M2PA	<0.38	<0.11	540		
SX911385	9	HMDI (MI)	<0.0088	<0.00264	0.054	<0.28	2700
SX911386	9	1M2PA	<0.28	<0.084	540		
SZ911387	1 (sealer)	HMDI (TD)	0.76	0.01	0.054		

13 August 1991
Sealing Operation

SZ911415	1 (sealer)	HMDI (TD)	18.75	0.32	0.054	1219	2700
SZ911416	1 (sealer)	1M2PA	1219	216	540		
SX911417	2	HMDI (MI)	<0.0127	<0.0025	0.054	<0.42	2700
SX911418	2	1M2PA	<0.42	<0.08	540		
SX911419	3	HMDI (MI)	<0.0127	<0.0025	0.054	<0.42	2700
SX911420	3	1M2PA	<0.42	<0.08	540		
SX911421	4	HMDI (MI)	<0.0127	<0.0025	0.054	<0.42	2700
SX911422	4	1M2PA	<0.42	<0.08	540		
SX911423	5	HMDI (MI)	<0.0127	<0.0025	0.054	<0.43	2700
SX911424	5	1M2PA	<0.43	<0.08	540		
SX911425	6	HMDI (MI)	<0.0127	<0.0025	0.054	<0.37	2700
SX911426	6	1M2PA	<0.37	<0.08	540		
SX911427	7	HMDI (MI)	<0.0127	<0.0025	0.054	<0.44	2700
SX911428	7	1M2PA	<0.44	<0.08	540		
SX911429	8	HMDI (MI)	<0.0127	<0.0025	0.054	<0.4	2700
SX911430	8	1M2PA	<0.4	<0.08	540		
SX911431	9	HMDI (MI)	<0.0127	<0.0025	0.054	<0.43	2700
SX911432	9	1M2PA	<0.43	<0.08	540		

16 August 1991
Priming Operation

Sample # (*)	Location (**)	Contaminant Analysis	Result (mg/m3)	8-hr TWA (mg/m3)	TLV (mg/m3)@	15 min TWA (mg/m3)	STEL (mg/m3)
SX911493	F1	TDI (MI)	<0.0023	<0.0006	0.036	<0.0023	0.14
SX911494	Hangar Roof	TDI (MI)	<0.0025	<0.0006	0.036	<0.0025	0.14
SX911495	Hangar Roof	Str Chr	<0.004	<0.001	0.0005		
SX911496	2	TDI (MI)	<0.0023	<0.0006	0.036	<0.0023	0.14
SX911497	2	Str Chr	<0.004	<0.001	0.0005		
SX911498	4	TDI (MI)	<0.0023	<0.0006	0.036	<0.0023	0.14
SX911499	4	Str Chr	<0.004	<0.001	0.0005		
SX911500	5	TDI (MI)	<0.0023	<0.0006	0.036	<0.0023	0.14
SX911501	5	Str Chr	<0.004	<0.001	0.0005		
SX911502	8	TDI (MI)	<0.0023	<0.0006	0.036	<0.0023	0.14
SX911503	8	Str Chr	<0.004	<0.001	0.0005		
SX911504	9	Str Chr	<0.004	<0.001	0.0005		

10 September 1991
Sealing Operation

SX911775	25 ft	1M2PA	<0.19	<0.08	540	<0.19	2700
SX911776	50 ft	1M2PA	<0.19	<0.08	540	<0.19	2700
SX911777	75 ft	1M2PA	<0.19	<0.08	540	<0.19	2700
SX911778	A1	1M2PA	28.2	12.6	540	28.2	2700
SX911779	A2	1M2PA	608	272	540	608	2700

11 September 1991
Sealing Operation

SX911775	25 ft	1M2PA	<0.18	<0.09	540	<0.18	2700
SX911776	50 ft	1M2PA	<0.18	<0.09	540	<0.18	2700
SX911777	75 ft	1M2PA	<0.18	<0.09	540	<0.18	2700
SX911778	A1	1M2PA	32.5	15.6	540	32.5	2700
SX911779	A2	1M2PA	487	238	540	487	2700

30 October 1991
Sealing Operation

Sample # (*)	Location (**)	Contaminant Analysis	Result (mg/m3)	8-hr TWA (mg/m3)	TLV (mg/m3)@	15 min TWA (mg/m3)	STEL (mg/m3)
EX912064	A	1M2PA	<0.37	<0.18	540	<0.37	2700
EX912066	A	DETDA	<0.32	<0.15	30000 ppb	<0.32	150000 ppb
EX912067	B	1M2PA	<0.41	<0.20	540	<0.41	2700
EX912069	B	DETDA	<0.37	<0.18	30000 ppb	<0.37	150000 ppb
EX912070	C	1M2PA	<0.42	<0.20	540	<0.42	2700
EX912072	C	DETDA	<0.32	<0.15	30000 ppb	<0.32	150000 ppb
EX912073	D	1M2PA	<0.43	<0.20	540	<0.43	2700
EX912075	D	DETDA	<0.38	<0.18	30000 ppb	<0.38	150000 ppb
EZ912076	E	1M2PA	174	83	540	174	2700
EZ912078	E	DETDA	<0.45	<0.22	30000 ppb	<0.45	150000 ppb

* All sample numbers with X as the second number are area samples and with Z as the second number are personal samples.

** See attached maps of sampling points.

@ The ACGIH TLV is used for all chemicals with the following exceptions:
The manufacturer's recommended exposure limits are used for 1M2PA and DETDA

TD - Total Dust
MI - Midget Impinger