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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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B-163375

DECEMBER 12, 1979

The Honorable Jamie Whitten, Chairman
Committee on Appropriations
House of Representatives

Subject: Workplace Safety and Health Hazards at ~~Department of Defense~~ DOD Installations (HRD-80-20)

Dear Mr. Chairman:

Pursuant to your Committee's October 3, 1978, request, we reviewed the efforts made to identify and correct workplace safety and health hazards at Department of Defense (DOD) installations.

Generally, safety and health hazards are being identified at these installations. Many of the hazards are corrected promptly. However, many serious hazards, some of which have existed for years, remain uncorrected--especially those that would be costly to correct.

During the February 28, 1979, hearings of your Subcommittee on Military Construction, a DOD official said that correcting the current backlog of safety and health hazards at all DOD installations would cost about $500 million. Our review indicates that this amount is significantly understated. DOD agreed that the $500 million does not represent the complete cost to correct hazards at DOD installations. DOD said that certain costs, such as the costs of correcting hazards as part of construction projects or the costs of small abatement projects that are funded with local installation operating funds are not included.

We are recommending that DOD: (1) improve its efforts to better assure that identified hazards are corrected and (2) annually advise the Congress in its budget justification of the cost to correct safety and health hazards at all DOD installations and its progress in correcting hazards.

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BACKGROUND

The Occupational Safety and Health Act of 1970 (29 U.S.C. 651) is designed to assure, so far as possible, that every worker in the Nation has safe and healthful working conditions. The Department of Labor's Occupational Safety and Health Administration (OSHA) is responsible for administering the act as it relates to private businesses. OSHA establishes and enforces occupational safety and health standards for the private sector; however, it has no authority over Federal agencies.

Under section 19 of the act each Federal agency is responsible for establishing and maintaining an occupational safety and health program that will provide safe and healthful working conditions for its employees.

Section 2 of Executive Order 11807 provides guidance to Federal agencies to ensure that their occupational safety and health programs are consistent with OSHA standards. DOD Instruction 6055.1, dated January 30, 1978, provides guidance to DOD activities on administering a comprehensive occupational safety and health program. The instruction provides that these activities shall establish

--programs, under the cognizance of a designated safety and health official, to implement the instruction;

--occupational safety and health standards that should consist of OSHA standards or alternate standards authorized for component use;

--comprehensive programs to identify hazards at all workplaces and evaluate the effectiveness of such programs at all levels;

--hazard reporting programs; and

--systematic prioritized programs to correct unsafe or unhealthful conditions.

SCOPE OF REVIEW

We made our review at eight installations:

--Red River Army Depot, Texarkana, Texas.

--Corpus Christi Army Depot, Corpus Christi, Texas.

--Brooke Army Medical Center, San Antonio, Texas.

--Tinker Air Force Base, Oklahoma City, Oklahoma.

--Kelly Air Force Base, San Antonio, Texas.

--Norfolk Naval Shipyard, Portsmouth, Virginia.

--Naval Air Rework Facility, Norfolk, Virginia.

--Radford Army Ammunition Plant, Radford, Virginia.

OSHA safety compliance officers and industrial hygienists, acting as consultants to us, made inspections at the installations. We examined reports on safety and health inspections by DOD personnel, discussed hazards with installation officials, and obtained estimates of costs to correct hazards reported by the installations or OSHA consultants.

We spent about 1 month at each of the eight installations. Our OSHA consultants were unable to fully inspect the installations because of time constraints. However, in keeping with their normal inspection procedures, they concentrated on what they believed to be the more hazardous operations.

Because of the large number of DOD inspections made during the period covered by our review--January 1977 through December 1978--we did not review all inspection reports at some of the installations.

Enclosures I through VIII contain detailed information on each installation we visited.

SERIOUS HAZARDS AT DEFENSE WORKPLACES

The eight installations we reviewed made about 6,500 safety and health inspections during 1977 and 1978. We reviewed over 1,700 inspection reports which identified about 15,700 hazards. In addition, we reviewed 30 inspection reports of other DOD components which identified about 8,800 hazards. However, some hazards may have been reported in more than one report.

The information in the inspection reports was not consistent at all installations. Most reports we examined did not show what specific standards were violated, what the existing or potential dangers to the employees' safety or health were, how long the hazards had existed, how many employees were exposed, and how and when the hazards would be corrected.

The OSHA consultants identified 1,011 safety and 177 health hazards. Many of these hazards had already been identified during inspections by DOD personnel. The following table shows the number of hazards at each installation, categorized by the severity of the hazards.

	Severity of hazard		
Installation	Willful (note a)	Serious (note b)	Other
Red River Army Depot	4	214	39
Corpus Christi Army Depot	1	136	17
Brooke Army Medical Center		22	62
Tinker Air Force Base		136	10
Kelly Air Force Base		70	65
Norfolk Naval Shipyard	1	186	31
Naval Air Rework Facility		114	10
Radford Army Ammunition Plant	_	20	50
Total	6	898	284

a/A willful violation involves an intentional violation of standards or a lack of reasonable effort to eliminate a known hazardous condition.

b/A serious violation involves a situation in which there is a substantial probability that serious physical harm or death could result.

Some examples of hazards that they considered to be serious or willful violations are discussed below:

--Lead is toxic and can cause blood disorders and permanent damage to the nervous, urinary, and reproductive systems. Red River had a practice of rotating employees out of a spray paint area when their urine lead count reached 80 micrograms per milliliter. They were rotated back when the count fell. The installation has been following this practice for over 2

years. OSHA's standard for a normal urine lead count is 80 or less. In one case, an employee's urine lead count rose to 345 before he was rotated out in 1976. When his count dropped to 57, he was moved back to the spray area. In October 1978, his urine lead count had climbed to 118, but he was still working in the spray area. The OSHA industrial hygienist considered this as a willful violation.

--Coal tar pitch volatiles contain many constituents which are classified as carcinogens. Tests at Red River's rubber denuding facility showed that six employees working in this area were exposed to coal tar pitch volatiles at levels 21 times higher than the OSHA standard. Although air-supplied respirators were required, the compressor supplying air to the respirators was a paint compressor without a filter to remove oil and moisture and was inoperative during our review. We were told a new compressor had been on order for over a year. The OSHA industrial hygienist said that he considered the failure to provide appropriate respiratory protection a willful violation.

--An unguarded portable grinder with an abrasive wheel was mounted in a vise at Red River. The wheel was level with the operator's groin area. The OSHA consultant said a protective guard should be installed to protect the operator. Two days after a guard was installed, the abrasive wheel exploded, but because of the guard, the operator was not injured.

--Employees in the vane and shroud rework areas at Tinker were exposed to concentrations of nickel and chromium that exceeded OSHA's standards by five times and two times, respectively. Both of these metals are suspected carcinogens. The 15 workers exposed to these hazards were not wearing respirators.

--In one work area at Tinker, the methylene chloride concentration was about two times higher than the standard. Overexposure to methylene chloride could cause respiratory and internal damage. Six employees who had worked in this area for more than 1 year were not wearing respirators.

--At Corpus Christi, employees in various locations were exposed to chromates from 1 to 17 times higher than the OSHA standard. Overexposure was primarily due to ineffective ventilation systems. Chromates are suspected carcinogens and can cause skin irritations and ulcerations, as well as respiratory problems.

--At Corpus Christi, OSHA found a willful violation in areas where full-face air-supplied respirators were required. The employees were exposed to polyurethane paint. The instructions on the paint can label required using a full-face air respirator. However, the employees, at the direction of their supervisor and with the knowledge of the safety office, were wearing half-face masks modified to fit the shop air supply. This air supply was not filtered to remove odor, rust particles, or moisture and was not checked for carbon monoxide.

--At Brooke, the fire alarm system in a troop housing facility did not work.

--At Kelly, a metalizing spray-booth operator was exposed to about 3 times the standard for zinc, about 8 times the standard for copper, and 74 times the standard for silver. Overexposure to these contaminants could seriously impair certain body functions and cause kidney and nervous disorders. This area was not designated as being hazardous. Although the operator used a respirator at the start of the operation, he removed it before completing the operation.

--At the Shipyard, electrical lines were lying on the floor in about 1 inch of water.

--Also at the Shipyard, there were no controls in confined spaces on vessels to assure that hot work (welding, burning, grinding, etc.) and cold work (using flammable liquids) were not done simultaneously. If these operations are performed simultaneously, an explosive atmosphere may be created.

--At the Rework Facility, a plating-shop machine operator, who did not use personal protective equipment, was exposed to about 4 times the standard for cadmium.

Overexposure to cadmium could cause respiratory and internal damage, irritation of the respiratory system, and metal fume fever.

--OSHA consultants took "swipe" samples at Red River, Corpus Christi, and Kelly. Swipe samples are used to determine whether toxic substances are present. Samples taken in eating areas, inside respirators, on lunch boxes and lunch tables, and from drinking fountains showed lead and chromium contamination. Because of time constraints the OSHA consultants did not take air samples to determine the lead and chrome concentrations in all these areas.

--At Radford, employees were exposed to excessive levels of ethyl ether in the atmosphere. Overexposure can result in irritation of eyes, nose, and throat, or narcosis (deep unconsciousness). Employees' exposure to ethyl ether ranged from 1.3 to 1.8 times the OSHA standard. Although employees were required to wear personal protective equipment, there was a need to reduce operator exposure to an acceptable level.

Some of these hazards could be corrected by increased management attention to (1) inform workers of potential hazards, (2) require use of protective equipment in hazardous workplaces, and (3) assure safe work conditions and practices. However, others require substantial funding to correct.

COST TO CORRECT HAZARDS

On February 28, 1979, in hearings before the Subcommittee on Military Construction of the House Appropriations Committee, a DOD official said that about $500 million would correct the current backlog of serious safety and health hazards at all DOD installations over a 5-year period.

The $500 million represents the funds that the military services plan to request rather than the funds they need. For example, the $500 million includes $208.8 million that the Army plans to request. However, an August 1978 Army survey report showed that, with the survey approaching completion, the estimated cost to correct existing OSHA deficiencies was about $331 million. In addition, an Army budget

official told us that the Army alone would need the entire $500 million to correct existing hazards.

Further, on August 4, 1976, we issued a report to the Congress, "Hazardous Working Conditions in Seven Federal Agencies" (HRD-76-144). As part of that review, we sent questionnaires to selected Air Force, Army, and Navy installations with 1,000 or more civilian employees, requesting cost estimates to correct existing safety and health hazards. Only 48 of the 158 military installations that received questionnaires responded with cost estimates. The estimates for these 48 installations totaled $459 million.

The estimated cost to correct existing hazards identified at the eight installations we visited is shown below.

Installation	Cost (millions)
Red River Army Depot	$ 8.2
Corpus Christi Army Depot	8.2
Brooke Army Medical Center	28.5
Tinker Air Force Base	12.3
Kelly Air Force Base	46.5
Norfolk Naval Shipyard	81.0
Naval Air Rework Facility	15.6
Radford Army Ammunition Plant	73.5
Total	$273.8

The costs for Radford, the Rework Facility, and the Shipyard represent the amount needed to bring these installations into substantial compliance with safety and health standards. The costs to correct hazards at Corpus Christi and Tinker are based on our review of a sample of inspection reports, safety and health abatement projects established by the bases, and the hazards noted by OSHA. For Red River and Kelly, 1/ the amounts represent the cost of correcting hazards found by OSHA and by installation inspections made

1/Most of the costs for Kelly represent the estimated cost to reduce noise through engineering controls. Air Force officials told us they consider such controls to be economically unfeasible. (See enc. V.)

since January 1, 1977, and amounts included in base abatement projects. The cost for Brooke will modernize the facility and, in the process, correct safety and health hazards.

For Red River, Corpus Christi, and Tinker, some cost duplication exists in our estimates because time limitations prevented us from attempting to determine whether each deficiency our OSHA consultants identified had previously been identified in DOD inspections. However, the amounts needed to correct hazards could be understated because OSHA's inspections were limited, we did not review every inspection report for each base, and some hazards may not have been detected during DOD inspections.

CONCLUSIONS

DOD has identified and corrected many workplace hazards as part of its safety and health programs. However, many serious hazards have remained uncorrected for long periods of time.

The primary reason why hazards remain uncorrected is a lack of funds. Many hazards--especially those that require engineering controls, such as isolation of work areas or ventilating systems--would be costly to correct.

DOD's estimate that it would cost $500 million to correct all serious safety and health hazards in DOD workplaces is significantly understated.

Many hazards could be corrected at little cost. In such cases, greater management attention is needed to assure compliance with existing safety and health standards. For example, in many instances personal protective equipment was required. However, either the equipment was (1) not available, (2) not the proper type, (3) not worn, or (4) not worn correctly. Furthermore, safety and health training programs at some installations were not adequate, and employees were not properly informed of the injuries that could result by neglecting to use protective equipment.

OSHA cannot require DOD installations to correct safety and health hazards. Therefore, DOD must enforce standards at its workplaces. DOD Instruction 6055.1 provides that each installation identify its safety and health deficiencies and classify them based on the degree of risk. For

hazards that meet or exceed a specified degree of risk, each installation is to develop a deficiency correction plan showing

--the location and description of the hazard;

--the degree of risk;

--how, when, and at what cost the hazard will be corrected; and

--how workers are being protected until the hazard is corrected.

The Navy, Air Force, and Army issued instructions to implement Instruction 6055.1 on October 11, 1978, December 13, 1978, and February 1, 1979, respectively. Our work at the eight installations was completed before these instructions were fully implemented.

In our opinion, an effective program to correct existing safety and health hazards requires a realistic estimate of how many hazards exist in the workplace and how much it would cost to correct them. Although DOD Instruction 6055.1 provides for such estimates for each installation, it does not require the consolidation of these estimates into a DOD-wide estimate.

RECOMMENDATIONS

We recommend that the Secretary of Defense annually advise the House and Senate Appropriations Committees in its budget justification of the funds needed to eliminate workplace hazards and what DOD has done to eliminate workplace hazards.

For those hazards which can be corrected or minimized at a relatively small cost, we also recommend that the Secretary of Defense require that installations

--correct such identified hazards with available funds;

--provide appropriate personal protective equipment until engineering controls can be implemented, or for work situations where engineering controls are not feasible; and

--provide additional training as needed to workers and supervisors regarding the importance and proper use of personal protective equipment.

AGENCY COMMENTS AND OUR EVALUATION

In comments dated October 6, 1979 (see enc. IX), DOD said its $500 million estimate did not include: (1) costs for correcting safety and health deficiencies which are included in all construction or major renovation projects, (2) small projects funded with local installation operating funds, and (3) costs of correction by engineering controls when such controls are not considered economically feasible.

In addition to the three reasons cited by DOD, we believe the $500 million is understated because it represents the funds DOD plans to request for fiscal years 1980-85, rather than the total funds needed to correct workplace hazards.

In our draft report, we proposed that a one-time report be prepared and used to advise the Congress of the cost to correct serious safety and health hazards in DOD workplaces. DOD disagreed, stating that the cost of a one-time resurvey would far exceed any anticipated benefits for several reasons (see p. 50). DOD said that the hazard abatement procedures described in Department of Defense Instruction 6055.1 are adequate to correct hazards on a priority basis. When the instruction is fully implemented, each installation commander and major command will know hazard locations, associated risk assessments, and abatement costs.

We agree that a one-time survey would be costly. However, such a survey would not be necessary to develop the estimated cost of correcting hazards at DOD installations. As DOD stated, Instruction 6055.1 calls for data on what it would cost to correct hazards at each installation. We believe the data could be consolidated, with little effort, to provide an overall estimate.

We still believe the Congress should know DOD's total funding needs for workplace hazard abatement. We further believe that DOD should make the Congress aware of its progress in abating hazards. Therefore, we are now recommending that DOD annually advise the Appropriations Committees of the funds needed to eliminate workplace hazards and what it has done to eliminate them.

DOD agreed with our recommendations relating to hazards which can be corrected or minimized at relatively small costs and stated that it will implement a special respiratory protection emphasis program this fiscal year. DOD also pointed out the actions it was taking regarding the four willful violations specifically described in our report. (See p. 47.) (Although our report does not describe every hazard identified by our OSHA consultants, their complete findings were provided to officials at each installation.)

DOD stated that the deficiencies at the Radford Army Ammunition Plant are a separate issue, not directly related to DOD's program, because the contractor is responsible to OSHA for compliance with OSHA standards. We agree that the contractor has prime responsibility at Radford. However, the funds needed to correct identified hazards must be provided by DOD.

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As arranged with your office, we are sending copies of this report to the Director, Office of Management and Budget; the Secretary of Defense; the Secretary of Labor; and interested congressional committees and Members of Congress. Copies will also be made available to other interested parties who request them.

Sincerely yours,

Comptroller General
of the United States

Enclosures - 9

ENCLOSURE I

RED RIVER ARMY DEPOT

Red River Army Depot, located near Texarkana, Texas, had 5,103 civilian employees and 76 military personnel. Its mission is to supply, repair, and maintain Army material, with special emphasis on the repair and overhaul of the M-113 armored personnel carrier.

SAFETY AND HEALTH PROGRAMS

The Depot's safety office, which had eight full-time safety specialists, managed the safety program.

The industrial hygiene (health) office, which managed the occupational health program, was attached to the U.S. Army Health Clinic at the Depot. An industrial hygienist was the only person assigned to this office.

PRIOR INSPECTIONS

From January 1, 1977, through October 31, 1978, the Depot's safety and health staffs performed 155 inspections--143 safety and 12 health. We reviewed all inspection reports. The inspections identified 950 deficiencies--926 in safety and 24 in health. About 40 percent of the safety deficiencies involved (1) failure to meet electrical standards, (2) fire hazards, and (3) unsafe equipment. Most of the health deficiencies involved excessive fumes in work areas due to improper ventilation.

During the period covered by our review, six safety and/or health surveys were performed by noninstallation personnel, most by the U.S. Army Environmental Hygiene Agency. About 150 deficiencies were noted in these six surveys. Inadequate ventilation was a major problem identified.

INSPECTIONS BY GAO'S OSHA CONSULTANTS

The OSHA safety compliance officer and the industrial hygienist were unable to inspect the entire installation because of its size and the limited time available. Therefore, they concentrated on the most hazardous areas. The safety compliance officer identified 200 violations of OSHA standards. Of the violations, 177 were classified as serious hazards, such as

--inadequate machine guarding,

--improperly grounded electrical outlets,

--flexible cord used for permanent electrical wiring, and

--improperly sealed sandblasting machines.

Depot officials estimated the cost to correct the deficiencies identified by the compliance officer at $1,880,500. We asked these officials to provide estimates only for deficiencies that would cost $1,000 or more to correct.

The OSHA industrial hygienist identified 57 violations of OSHA standards--including 4 willful and 37 serious violations. Some of the hazards were

--missing seals on blast cabinet doors allowing silica dust to escape,

--inadequate ventilation in spray booths, and

--high noise levels.

Depot officials estimated the cost to correct these deficiencies at $1,649,000. This amount covers only deficiencies that would cost $1,000 or more to correct.

We did not attempt to relate each OSHA safety and health deficiency to deficiencies noted by Depot personnel because of time constraints; therefore, some of these costs may be duplicated in the $4.3 million discussed on page 4 of this enclosure.

Examples of some of the violations OSHA found are listed below:

--Three employees (one for each 8-hour shift) used a portable angle grinder which was held in a vise. The abrasive wheel was unguarded and grinding operations were performed near the employee's groin area. After this deficiency was cited by the OSHA safety inspector, Depot personnel placed a guard on the grinder. Two days after the guard was installed, the abrasive wheel exploded, but because of the guard, the operator was not injured.

--A broken hoist-control switch case exposed live wires. The case had been broken for at least 1 month and was being used by three employees at least once a day.

--Coal tar pitch volatiles contain many constituents which are classified as carcinogens. Tests at the rubber denuding facility showed that six employees working in this area were exposed to coal tar pitch volatiles at levels 21 times higher than the OSHA standard. Although air-supplied respirators were required, the compressor supplying air to the respirators was a paint compressor without a filter to remove oil and moisture and was inoperative during our review. We were told a new compressor had been on order for over a year. The OSHA industrial hygienist said that he considered the failure to provide appropriate respiratory protection a willful violation.

--In the paint preparation department, employees were using air pressure exceeding 90 pounds per square inch (OSHA standard is 30 pounds per square inch) to blow paint dust off vehicles before painting. Employees in the painting area have shown elevated urine lead counts over the past 2 years and have been rotated in and out of the area. Lead is a toxic material and can cause blood disorders and permanent damage to the the central nervous system. Although the Depot's policy was to rotate employees whose urine count exceeded 80 micrograms per milliliter, one employee was not taken out of the area until his lead count reached 345. Eleven months later, when his urine lead count was 57, he was rotated back into the area. A year later, his lead count had climbed to 118, but he was still working in the area. The OSHA industrial hygienist stated that the above practice is a willful violation of OSHA standards and in private industry would carry a $10,000 fine.

--Employees who were not provided approved respirators were spray painting items in a paint booth which had marginal ventilation, and they were also observed spraying outside the booth area. Tests showed that these employees were exposed to lead levels 18 times the OSHA standard and to chromate levels 4.8 times the OSHA standard. Chromates are suspected carcinogens.

--In the battery repair operation, tests showed lead levels 3.75 times the OSHA standard. One employee was exposed to excessive levels of lead because, even though he was wearing a proper respirator, he was wearing it upside down.

ENCLOSURE I

--"Swipe" samples taken from lunch tables, beverage machines, water cans, and coffee pots, in various locations at the Depot, and another taken from the inside of a respirator face piece revealed lead and chromium contamination.

--Because of the poor design and ventilation of a paint booth and improper respirator use, an employee was overexposed to lead and chromium. This employee was not fastening the bottom strap of his respirator. Tests showed that lead and chromium levels in this booth were 30 and 3 times higher than the OSHA standard, respectively.

COSTS TO CORRECT DEFICIENCIES

The Depot has an occupational safety and health hazard abatement program. Four of the thirteen projects in the abatement program have been completed. The estimated cost to complete the other nine projects is $379,200.

In reviewing the safety and health surveys performed by Depot personnel, we noted several deficiencies that had not been corrected as of November 1978. The primary reason these deficiencies had not been corrected was a lack of funds. Depot personnel estimated it would cost $4,258,500 to correct these deficiencies. While there may be some duplication for the reason discussed on page 2, the total estimated cost to correct the hazards identified at Red River is shown below.

Cost to Correct Hazards at Red River

Identified in Depot inspection reports	$4,258,500
Included in base abatement program	379,200
Identified by OSHA safety compliance officer	1,880,500
Identified by OSHA industrial hygienist	1,649,000
Total	$8,167,200

ENCLOSURE II

CORPUS CHRISTI ARMY DEPOT

Corpus Christi Army Depot, located near Corpus Christi, Texas, had 3,203 civilian employees and 38 military personnel. Its primary mission is to repair and maintain rotary wing aircraft. The Depot also performs training, supply, storage, and distribution functions in support of its maintenance program.

SAFETY AND HEALTH PROGRAMS

The Depot's safety office was authorized nine safety specialists; however, two positions were vacant. According to safety reports, the safety office made periodic and spot-check inspections of the facility. Followup responses from the inspected activity were required. The safety office appeared to maintain an adequate program to evaluate unsafe working conditions.

The health program was administered by the Naval Regional Medical Center at Corpus Christi. The industrial hygiene office had one hygienist and one technician. The hygienist spent about 40 percent of his time at the Depot and his other time working with the Navy. The technician was assigned full time to the Depot.

Even with its small staff, the industrial hygiene office seemed to do an adequate job of inspecting the facility.

PRIOR INSPECTIONS

Since January 1, 1977, the Depot's safety and health staffs performed 2,088 inspections--1,989 safety and 99 health. We reviewed 130 inspection reports--99 in safety and 31 in health. These reports identified 571 deficiencies--483 in safety and 88 in health. About 40 percent of the safety and health deficiencies consisted of fire and equipment hazards. The reports indicated that most deficiencies were corrected within 30 days.

From September 1976 to November 1978, nine safety and/or health inspections were performed by noninstallation personnel. About 74 deficiencies were noted in the nine inspections. Examples of deficiencies noted were

--personnel not using safety glasses in designated eye hazard areas,

--punch presses without guards on foot controls, and

--inadequate ventilation in flammable storage and processing room.

We noted some deficiencies that had not been corrected; base engineers estimated that it would cost $305,200 to correct these deficiencies.

Although the Depot had an active hazard abatement program, 57 deficiencies were still uncorrected as of January 4, 1979. The abatement program was supervised by a committee composed of safety staff, union representatives, and supervisory representatives. Most deficiencies in the abatement program involved inadequate ventilation and lack of machine guarding. The base engineers estimated it would cost about $5.1 million to complete the abatement program.

Minor deficiencies which were not costly to correct were usually corrected promptly. Correction of more costly deficiencies has been held up primarily due to a lack of funds. The Depot had not requested funds to be used exclusively for correcting safety and health deficiencies since fiscal year 1975. In 1975, the U.S. Army Materiel Development and Readiness Command requested the Depot to report the amount of funds necessary to bring it into OSHA compliance. The Depot submitted the information but did not receive any feedback or funds. Each directorate is responsible for obtaining funds to correct deficiencies in its area. Each project is assigned a priority and is accomplished as funds permit.

INSPECTIONS BY GAO'S OSHA CONSULTANTS

The OSHA safety compliance officer identified 111 serious and 16 nonserious deficiencies. The two largest categories of deficiencies were electrical hazards and machine guarding. Base engineers estimated it would cost $2.5 million to correct these deficiencies.

The OSHA industrial hygienist identified 27 deficiencies--1 willful, 25 serious, and 1 nonserious. Base engineers estimated the cost to correct these deficiencies would be $345,000.

The following are examples of violations noted by the OSHA consultants:

--The respirator training program was inadequate. Many employees were not fastening the bottom strap of their respirator. One employee had no cartridges in his respirator.

ENCLOSURE II

--In a paint shop, employees were wearing half-face masks even though the caution label and the specifications on the paint container called for full-face air-supplied respiratory protection. These employees were also modifying the air-line hose coupler of their respirators so they would fit the shop air supply. This air supply was not filtered to remove odor, rust, and moisture and was not checked for carbon monoxide. These modifications were made at the direction of the supervisor in charge. The safety office was also aware of the above modifications. The OSHA industrial hygienist stated that he considered this a willful disregard of the standards.

--A painter in the general paint department was exposed to chromate levels 1.9 times the allowable standard due to an ineffective paint booth exhaust system. Also, "swipe" samples showed 56 micrograms of lead contamination on a lunch table in the area. Chromates are suspected carcinogens, and lead is a toxic material which can cause blood disorders and permanent damage to the central nervous system.

--Another painter in the general paint department was exposed to chromate levels 3.3 times the allowable standard due to ineffective ventilation in a paint booth.

--A "swipe" sample from a lunch table in the rotor blade shop showed 690 micrograms of lead contamination.

--A spray operator was exposed to copper fumes 19 times the allowable standard because he wore his respirator without a bottom strap. Copper fumes can cause skin discoloration, nervous disorders, irritation of the respiratory system, metal fume fever, and may affect the kidneys.

--A welder, who used no respirator, in the container repair department was exposed to chromate levels 1.3 times the standard.

--A painter in the jointer paint shop was exposed to lead and chromate levels nine times the OSHA standard due to ineffective ventilation in a paint booth. "Swipe" samples from a lunch table in the area showed 130 micrograms of lead, and a sample from the water fountain showed 160 micrograms of lead contamination.

--An employee who did grinding in the container repair department was exposed to chromate levels 1.1 times the standard. The employee did not wear a respirator. "Swipe" samples from a lunch table showed lead contamination of 240 micrograms.

--Two painters in the transmission paint shop were exposed to excessive levels of chromates due to an ineffective exhaust system. One painter was exposed to 1.8 times the standard and the other to 8 times the standard.

--In the engine cleaning shop and at hanger 45, employees were exposed to noise levels in excess of DOD and OSHA standards. Installation officials estimated that they could correct the problem for about $210,000.

--Painters in building 1808 were exposed to levels of chromates which were from 15 to 17 times the standard. These employees were painting with paint booth doors open.

--In the stencil area, "swipe" samples showed 120 micrograms and 190 micrograms of lead contamination on nearby lunch tables.

Many of the violations noted by the OSHA inspectors had already been identified by the safety and health offices. The primary reason why they had not been corrected was lack of funds.

COST TO CORRECT DEFICIENCIES

The cost to correct hazards are as follows:

Identified in Depot inspection reports	$ 305,200
Included in base abatement program	5,084,148
Identified by OSHA safety compliance officer	2,503,300
Identified by OSHA industrial hygienist	345,000
Total	$8,237,648

We did not attempt to relate each deficiency to previously identified deficiencies because of time constraints. Many of the deficiencies pointed out by the OSHA consultants are included in the Depot's OSHA abatement program. Thus, there is some duplication of costs.

ENCLOSURE III

BROOKE ARMY MEDICAL CENTER

Brooke Army Medical Center is located within the compound of Fort Sam Houston in San Antonio, Texas. The Center consists of two large hospitals, one smaller psychiatric hospital, a main laboratory, and several support units. According to Army officials, most buildings were constructed from 1937 to 1942, and their design concepts are now technologically obsolete and no longer considered acceptable for life safety. The Center had 1,141 civilian employees and 1,517 military personnel.

SAFETY AND HEALTH PROGRAMS

The Center's fire marshal/safety office managed the safety and accident prevention program. During our review, two individuals, a fire marshal/safety manager and an assistant, were assigned to the fire marshal/safety office; however, both of these positions were unauthorized. These two individuals devoted their time equally to fire and safety activities at the Center.

Recently, one position was authorized for a safety specialist at the Center, but it had not been filled at the end of our site work. The safety specialist, when hired, will be primarily responsible for developing and managing the Center's safety program.

Inspection reports prepared by the fire marshal/safety office showed that emphasis was primarily placed on identifying fire safety and electrical deficiencies. The adequacy of the Center's safety program is questionable because (1) it involves only two persons, who spend about half of their time on safety activities, and (2) little was done to assure that identified deficiencies were corrected.

The environmental health section of the Center's preventive medicine activity was responsible for the health program. Six persons--the chief and five environmental health specialists--were assigned full time to the section. They were responsible for various activities designed to identify, prevent, and eliminate environmental health hazards at Brooke and for large portions of Fort Sam Houston. Generally, these activities included making health inspections or surveys, collecting samples, and preparing written reports of findings and recommendations for corrective actions.

ENCLOSURE III

Our review of the inspection reports prepared by the section showed that the overall adequacy of their inspection effort was questionable. For example, inspections by outside personnel identified many deficiencies, while section inspection reports identified relatively few. In addition, the chief stated that more personnel and equipment are needed to accomplish the section's mission.

PRIOR INSPECTIONS

We reviewed all safety and health inspection reports involving the work area at the Center for January 1977 to December 1978. Forty-three inspection reports (31 safety and 12 health) identifying 792 deficiencies were prepared in-house, and three inspection reports identifying 973 deficiencies were prepared by noninstallation personnel. In-house safety inspection reports were available only for 1978 because these reports are normally disposed of at the end of each calendar year.

The 31 in-house safety reports which identified 756 deficiencies were prepared by safety staffs from three divisions/offices as follows:

--The Fort Sam Houston fire prevention and protection division prepared three reports identifying 38 deficiencies.

--The Center's logistics division prepared five reports identifying 570 electrical deficiencies.

--The Center's fire marshal/safety office, which is primarily responsible for the Center's safety program, prepared 23 reports identifying 148 deficiencies.

Of the safety deficiencies identified, over 80 percent were electrical, and a significant number of the others involved fire safety problems and a lack of machine guards. According to the Center's fire marshal/safety manager, his office performed an additional 54 safety inspections during 1978. However, reports were not prepared since no deficiencies were identified.

From January 1977 to December 1978, the Center's environmental health section prepared 12 health inspection reports identifying 36 deficiencies. Over 40 percent of the deficiencies were fumes/ventilation problems. The other deficiencies were of various types, with no one category containing a significant number.

ENCLOSURE III

The three inspection reports by noninstallation personnel were all prepared by the U.S. Army Environmental Hygiene Agency. Of the 973 deficiencies identified in these reports, 122 were in the environmental health area and 851 were in the safety area. Most of the safety deficiencies were electrical and fire safety problems, and most of the health deficiencies were fumes/ventilation, sanitation, and lack of personal protective equipment.

INSPECTIONS BY GAO'S OSHA CONSULTANTS

The OSHA safety compliance officer identified 84 safety violations during his walk-around inspections. Of these violations, 22 were classified as serious. Some of the serious violations cited were

--exposed live electrical terminals,

--ungrounded equipment,

--inoperative fire alarm system in a troop housing facility, and

--inadequate machine guards.

Center officials considered all but 1 of the 84 violations as minor in terms of estimated cost to correct. We had asked them to consider any violation that would cost less than $1,000 to correct as minor. The one violation not labeled as minor was the inoperative fire alarm system in a troop housing facility, which would cost an estimated $56,800 to correct. According to a Center official, this violation had been identified before the OSHA inspections, and a project had been funded to correct it.

The OSHA industrial hygienist did not identify any health violations during his walk-around inspections; however, he said that the old and converted facilities were conducive to poor environmental conditions. He explained that exposure of employees to potential health hazards was very limited due to relatively little work activity in laboratories during his inspection, which took place during the Christmas holidays. The industrial hygienist took air samples of contaminants (xylene, ethanol, bis-chloromethyl ether, and asbestos), but OSHA laboratory analysis showed that all exposures were within permissible levels.

ENCLOSURE III

COST TO CORRECT DEFICIENCIES

According to an Army official, upgrading/improvement projects amounting to about $28 million are ongoing or planned at the Center through fiscal year 1981. These projects include

--$9 million, funded in fiscal year 1978, for upgrading the two large hospitals and one smaller psychiatric hospital;

--$12.5 million, planned for fiscal year 1981, to complete hospital upgrade/improvement;

--$1.6 million, funded in fiscal year 1979, for a new dental clinic;

--$2.9 million, planned for fiscal year 1981, for a new centralized troop medical clinic; and

--$2 million, planned for fiscal year 1980, for various maintenance projects in the support units.

Center officials said that, although these projects are intended to improve hospital conditions in general and are not solely for correcting OSHA-type deficiencies, many of the uncorrected OSHA deficiencies already identified would be corrected by these projects. Accordingly, we used the estimated costs of $28 million for these projects as estimated costs to correct existing deficiencies. Additionally, about $500,000 is needed to correct OSHA-type deficiencies identified at the Center, but not specifically provided for in its upgrade/improvement projects. Thus, the total estimated cost is $28.5 million. At our request, only deficiencies that would cost $1,000 or more to correct were considered in arriving at this estimate.

Center officials included corrective costs for existing deficiencies identified in the inspection reports we reviewed with one notable exception. This exception is the Occupational Safety and Health Act/Joint Commission on Accreditation of Hospitals survey report for the Center prepared by the U.S. Army Environmental Hygiene Agency. This report identified 946 safety and health deficiencies, of which 46 percent had been corrected at the time of our site visit. After our visit, Center officials told us that 110 of these were environmental health deficiencies, of which 77 percent had been corrected. Since this report was based on the most thorough inspection made during our review, we asked Center

officials to estimate the cost to correct the remaining deficiencies. The officials were reluctant to estimate costs because (1) this would be a massive, time-consuming task and (2) many of these deficiencies will be corrected as part of the ongoing and planned projects. Because of time limitations, we made no attempt to separate the occupational safety and health deficiencies from the Joint Commission on Accreditation of Hospitals-type deficiencies.

Most of the funds needed to correct deficiencies identified in inspection reports, and not included in the above projects, must be obtained from operation and maintenance funds; however, Center officials said only a few of these deficiencies can be corrected from funds currently available.

Although the Center has its own operation and maintenance fund for mission-related activities, it does not have such a fund for base operations (housekeeping functions) because it is a tenant at Fort Sam Houston. Fort Sam Houston manages the fund for all base operations. Because of this host-tenant relationship, Center priority requirements must be integrated into the overall Fort Sam Houston plan. Therefore, without a close relationship, the Center's priority requirements could become secondary in the Fort Sam Houston consolidated plan.

ENCLOSURE IV

TINKER AIR FORCE BASE

Tinker Air Force Base, located in Oklahoma City, Oklahoma, had a work force of 15,333 civilian and 1,086 military employees. Tinker's principal mission is the repair and maintenance of Air Force engines and components and the logistics and distribution management of those components.

SAFETY AND HEALTH PROGRAMS

Tinker had a separate safety office and bioenvironmental engineering department. Personnel at these offices were assigned full time to the maintenance of a hazard-free facility. The safety office had a director, a deputy director, and 11 safety specialists.

The bioenvironmental engineering division had 16 authorized positions--12 were filled.

The safety office inspects all areas annually, and also performs spot checks. Followup responses from the inspected departments are required.

PRIOR INSPECTIONS

From January 1, 1977, through November 30, 1978, the safety and health offices made 1,181 inspections. We reviewed 131 safety inspections which identified 2,446 deficiencies and 68 health inspections which identified 108 deficiencies.

Minor deficiencies which did not require significant funds were usually corrected promptly, while correction of deficiencies that cost more had been held up primarily due to lack of funds.

Tinker has not been requesting funds to be used exclusively for OSHA deficiencies. Each directorate is responsible for including in its budget any funds needed to correct deficiencies.

Each project is assigned a priority and is completed if funds are available. The deputy director of safety identified which military funding projects would correct some of the known OSHA deficiencies. The cost for the projects was $4.6 million. During our review of safety and health inspection reports, we identified additional items not included

in funding projects. At our request, base officials estimated the cost to correct these deficiencies at $1.6 million.

INSPECTIONS BY GAO'S
OSHA CONSULTANTS

The OSHA inspection was limited to high-hazard areas. The OSHA safety compliance officer identified 108 serious violations and 9 nonserious violations. The largest single category was machine guarding with 43 serious violations. The next category was electrical hazards with 29 serious violations. Base engineers estimated the cost to correct these deficiencies would be about $3.3 million.

The OSHA industrial hygienist identified 28 serious violations and 1 nonserious violation. The base engineers estimated the cost to correct these deficiencies would be $2.8 million.

Many of the violations noted by the OSHA inspectors had already been identified by the safety and health offices. The primary reason why they had not been corrected was lack of funds.

Some of the deficiencies noted by the OSHA consultants, and previously identified by Tinker safety and health personnel, are listed below:

--In the plating shop, acid and cyanide tanks were located close together without a dike or catch tanks around the cyanide tanks to enclose any spill. If acid and cyanide tanks were to spill at the same time, the resulting mix would produce deadly hydrogen cyanide gas. Five or six employees were exposed daily to this potential hazard.

--Employees in the vane and shroud rework area were subjected to excessive concentrations of both nickel and chromium. Nickel was five times the standard and chromium was two times the standard. Both of these metals are suspected carcinogens. The 15 workers exposed to these hazards daily did not wear respiratory protection.

--Pistol training instructors were exposed to two to three times the lead standard. Five instructors had been exposed to this level for over 2 years. Overexposure to lead can cause internal organ, blood, and bone damage.

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--Methylene chloride was about two times the standard in a working area. Overexposure to methylene chloride causes respiratory and internal damage. Respirators were not used by the six employees who had worked in this area for more than 1 year.

--Nickel was four times the standard in another work area. Respirators were not worn by the 15 people who were exposed to this hazard daily.

--Cadmium exposure was 12 times the standard in the silver solder operation. Four welders were exposed to this hazard. Overexposure to cadmium causes respiratory and internal damage, irritation of the respiratory system, and metal fume fever.

--Forty-four sandblasting machines had taped openings which inadequately retained blasting sand within the machine. Inhaling sand can cause internal organ damage, including silicosis.

Excessive noise was the major problem at Tinker. Air Force data show that $539,938 in hearing loss claims was awarded between July 1, 1977, and June 30, 1978, at Tinker. Using the percentage of claims approved for this period and the average dollar amount of the awards, the projected cost for 621 pending claims filed as of June 1978 was $4.2 million.

COST TO CORRECT DEFICIENCIES

The estimated costs to correct deficiencies identified at Tinker are as follows:

Identified during our review of base safety and health surveys	$ 1,550,910
Included in base military funding projects	4,605,700
Identified by OSHA safety compliance officer	3,347,380
Identified by OSHA industrial hygienist	2,778,578
Total	$12,282,568

We did not attempt to relate each OSHA deficiency to previously identified deficiencies because of time constraints; therefore, some duplication exists.

ENCLOSURE IV

According to Tinker personnel, they are now taking corrective actions on all reported deficiencies. They also said an aggressive corrective program has been initiated to review all deficiencies monthly until they are corrected.

ENCLOSURE V

KELLY AIR FORCE BASE

Kelly Air Force Base is a 4,000-acre installation in San Antonio, Texas. Its mission is to provide (1) air commands with components to keep their aircraft, missiles, and equipment operating anywhere in the world, and (2) Air Force units worldwide with transportation, equipment testing, and repair services.

Kelly had a work force of 1,292 military and 14,928 civilian employees (not including tenant and contractor personnel) as of December 31, 1978.

SAFETY AND HEALTH PROGRAMS

The Kelly safety office manages the overall safety program. Eight of the nine positions authorized for the office's industrial operations section were filled. Six individuals (the safety engineer and five safety specialists--were assigned full time to industrial safety, while the top two safety officials (the safety office chief and supervisory safety engineer) oversaw all safety office functions.

Our review of safety inspection files showed that workplaces were being evaluated, safety hazards were being identified, and followup actions were being taken to assure that unsafe working conditions were corrected. However, according to Kelly safety officials, management should emphasize training employees in proper use and care of personal protective equipment and ensuring that they wear this equipment in hazardous areas.

The bioenvironmental engineering service managed the health program at Kelly. It was authorized 14 positions, and during our review, 10 were filled. The chief bioenvironmental engineer, one bioenvironmental engineer, one industrial hygienist, and seven environmental health specialists/technicians worked full time in the health program.

Our review of health inspection files showed the service was making inspections and surveys of work environments, identifying health hazards, and recommending corrective actions. However, there was little feedback from work areas concerning action taken on health hazards.

PRIOR INSPECTIONS

From January 1, 1977, to November 1978, Kelly safety and health staffs prepared 370 inspection reports identifying

1,270 deficiencies. Safety personnel made 93 reports citing 911 deficiencies, and health personnel made 277 reports citing 359 deficiencies. Our review of these reports showed that nearly 50 percent of the deficiencies cited in safety inspection reports were in the following categories: (1) electrical, (2) fire safety, and (3) equipment. About 72 percent of the deficiencies cited in health inspection reports were in the noise and fumes/ventilation categories. Kelly safety and health files did not contain any inspection reports prepared by outside personnel for this period.

INSPECTIONS BY GAO'S OSHA CONSULTANTS

The OSHA safety compliance officer identified 119 violations. Of these violations, 65 were classified as serious. Some of the serious hazards were

--unguarded shears, drill press points, and radial arm saws;

--inadequately guarded power press points;

--exposed live electrical terminals; and

--improperly stored toxic gases.

Unguarded and inadequately guarded machines represent about 45 percent of the serious hazards. However, it should be noted that Kelly officials acted immediately to correct the machine guard problems during the OSHA inspections. Other serious hazards were distributed among several categories.

According to Kelly officials, the estimated cost to correct each identified safety violation, except one which is estimated to cost $1,500, is less than $1,000.

The OSHA industrial hygienist also made inspections of selected areas at Kelly. During these inspections, he observed ongoing operations, interviewed employees, took readings of noise levels in five work areas, and took 33 environmental air and "swipe" samples. Specifically, he identified

--noise violations in five different work areas;

--the need for a respiratory program to stress the wearing of, caring for, and storing of respirators;

ENCLOSURE V

--four fumes violations at two locations, based on results from air samples submitted to the OSHA laboratory in Salt Lake City, Utah; and

--lead contamination based on "swipe" samples taken from a lunch room.

The industrial hygienist attributed the noise violations to lack of engineering/administrative controls throughout most of the high-hazard noise areas surveyed. Regarding the need for a respiratory program, the industrial hygienist reported that no written procedures existed for selecting and using respirators at five locations surveyed. Through observation and discussion with employees at four of these locations, the industrial hygienist noted that

--employees had not received respirator training,

--respirators were not cleaned and disinfected,

--employees were wearing respirators with only one of the two straps fastened, and

--one employee was wearing an unapproved respirator.

Three of the four fumes violations identified by the industrial hygienist involved a metalizing spray booth operation. Within this small booth, rotating metal parts are sprayed (metalized) with an aerosol composition consisting of three toxic contaminants--copper, zinc, and silver. As the parts are sprayed, "back spray" fumes are created around the booth. Sample results showed that these fumes were about 3 times the standard for zinc, about 8 times the standard for copper, and 74 times the standard for silver. Overexposure to these three contaminants together could seriously impair certain body functions. Separately, either silver or copper can cause skin discoloration, and copper may also cause kidney and nervous disorders.

The spray booth is not designated as a hazardous area. Therefore, respirators are not mandatory. According to the OSHA inspector, the "back spray" fumes were not visible, and the operator wore a respirator to start but not through the completion of the operation.

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Another fumes violation was identified by the industrial hygienist at a paint shop. An employee spray painting various aircraft parts was exposed to almost two times the chromate standard. Chromates are suspected carcinogens and may cause serious physical impairment. Although the employee used a respirator, he did not clean and disinfect the respirator after using it.

According to the industrial hygienist, four lead "swipe" samples revealed lead dust on surfaces of eating and drinking areas in a lunch room. Six employees were seen eating food and drinking beverages in the lunch room. Ingesting and inhaling lead could result in damage to the nervous, urinary, and reproductive systems and could inhibit the flow of oxygen in the body.

According to Kelly officials, a respiratory protection program was established after our review. The program includes briefings on proper selection, use, and care of respirators as well as fit testing for respirators.

Regarding the violation for lead dust in a lunch room, the Kelly safety officer stated that lunch facilities would be moved to a nonhazardous location. This solution involves little, if any, costs to implement.

COSTS TO CORRECT DEFICIENCIES

According to Kelly officials, about $46.5 million would be needed to correct safety and health deficiencies identified through in-house inspections at Kelly. This amount includes the following estimates

--$4.1 million for 127 ongoing and planned abatement projects to correct deficiencies during fiscal year 1979,

--over $42.3 million (rough estimates--not detailed engineering computations) to correct deficiencies cited in health inspections, and

--$36,600 to correct deficiencies cited in safety inspections.

For hazardous noise areas where the solution has been to wear hearing protection, we asked Air Force officials to base their estimates on engineering controls that would

involve isolating the noise sources in separate buildings or soundproofing each noise source. The Kelly response was that, of the estimated costs mentioned above, $41.8 million would be needed to correct noise deficiencies in addition to the $1.4 million for ongoing noise abatement projects. However, Kelly officials emphasized that where the cost of abating noise sources is very high, the project probably would not be funded and the practice of wearing hearing protection would continue. They also said that isolating some noise sources would seriously disrupt production lines and would significantly increase maintenance costs.

In addition, for hazardous noise areas where corrective action is not possible, we asked Air Force officials to briefly explain why. Kelly officials mentioned only one area where permanent corrective action of a hazardous noise problem is not possible. In this case, they explained that equipment with lower sound levels does not exist. Furthermore, Kelly officials said technology does not exist to decrease the noise level of many of the operations, such as riveting, or that quieting some items, such as ground support equipment, would require complete redesign of many pieces of equipment throughout the Air Force.

Kelly officials said that they will not request all the funds needed to correct deficiencies identified in inspections. Specifically, they maintained that, to a large extent, funds will not be requested for permanently correcting hazardous noise areas at Kelly since this would not be economically feasible.

HEARING LOSS CLAIMS--IS HEARING PROTECTION A VIABLE ALTERNATIVE?

Because of increasing costs for hearing loss claims at Kelly, the emphasis on wearing hearing protection, in lieu of implementing engineering controls, appears undesirable. Air Force figures show that $677,703 in hearing loss claims was awarded for the period July 1, 1977, to June 30, 1978, at Kelly. Using the percentage of claims awarded for this period and the average amount of the awards, the projected cost for 333 pending claims filed as of June 30, 1978, would be about $2.6 million. To add to the problem, correspondence from Kelly dated July 19, 1978, stated that more employees are filing second and third claims for additional hearing loss sustained.

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Air Force policy gives management the authority to take disciplinary actions against employees who fail to observe safety practices. Possible actions include oral admonishment, written reprimand, suspension, and removal. Kelly managers have administered limited disciplinary actions in the form of oral admonishments against employees who do not wear hearing protection where required. Kelly safety officials stated that stronger actions were not taken because they would not be upheld. They explained that, because of union support, employee appeals usually result in reversal of disciplinary actions--either immediately or after long periods of litigation.

In a 1977 briefing, the Kelly inspector general said that controlling noise by constructing new facilities is an aspect of the program that has been largely ignored. The engineering controls for hazardous noise sources addressed in this briefing were (1) elimination, (2) isolation, and (3) suppression. Some of the methods suggested for implementing these controls were to

--buy quieter equipment,

--redesign existing equipment, and

--design noise controls into new facility construction and building alterations.

According to Kelly officials, an aggressive program is underway to coordinate all new projects relating to the suggested methods.

The Kelly inspector general also told base staff

> "* * * unless aggressive actions are taken to control exposure to noise, significant cases of hearing loss will continue to occur, and the individuals will be permanently lost to the work force."

This assessment, along with the increase in hearing loss claims, supports the need for a greater effort to assure that hearing protection equipment is used, and for greater emphasis on engineering controls to reduce noise levels at Kelly.

ENCLOSURE VI

NORFOLK NAVAL SHIPYARD

The Norfolk Naval Shipyard, located in Portsmouth, Virginia, converts, overhauls, and repairs U.S. Navy ships and craft. The Shipyard employs about 11,000 civilian and 150 military personnel.

SAFETY AND HEALTH PROGRAMS

Eight offices were involved in safety and health programs. Except for radiological controls, the safety office had overall responsibility for maintaining and directing the safety program. Twelve people were employed in that office.

The director of safety said safety inspections are made on (1) request, (2) an informal basis, and (3) a scheduled basis. Inspections made on request consist of safety office personnel investigating hazards referred to them by Shipyard employees. Informal inspections are made when a safety specialist walks through the buildings or ships assigned to him, looking for hazards. He said these informal inspections are not documented because any corrective action required is taken immediately. Scheduled inspections are made every 2 weeks at a Shipyard workplace. The inspection results are documented and sent to the supervisor of each workplace. The director of safety had not taken action to ensure that safety deficiencies identified during 1978 would be corrected. However, he has now implemented plans to require shop supervisors to respond in writing as to when and how they plan to correct deficiencies. Also, the safety specialists will follow up on deficiencies to ensure they are corrected.

The industrial hygiene unit does not come under the control of the Shipyard commander. It is under the control of the Naval Regional Medical Center at Portsmouth, Virginia, and consists of three people--an industrial hygienist, a chemist, and a secretary.

The industrial hygienist said most of his time is spent as a consultant, investigating potential health problems referred to him by employees and recommending corrective actions. He said he has not made the biannual inspections required by the Bureau of Medicine and Surgery because he does not have enough staff. He said he planned to hire three additional people to enable him to make more routine inspections and surveys, but because of a hiring freeze, these positions were not filled.

The Shipyard commander hired three industrial hygienists in February 1979 to provide better coverage of industrial health hazards at the Shipyard.

The Shipyard safety office appeared to have the staffing to perform informal and periodic formal safety inspections. However, the overall adequacy of its effort was questionable since no file or system existed to record safety hazards that were identified but not corrected due to lack of funds or other problems. Some improvement was made at the end of our review through the implementation of a followup procedure for safety inspections and the hiring of additional hygienists to provide better health coverage.

PRIOR INSPECTIONS

About 187 safety inspection reports identifying 2,886 hazards at the Shipyard were prepared between January 1977 and October 1978. The safety specialists also made informal inspections; however, they did not prepare reports on these inspections. The following are examples of safety deficiencies listed in the reports:

--Hot water tank in restroom has loose insulation.

--Cans of cutting oil not stored in flammable storage area.

--End of insulation exposed on pipe to water cooler (possible asbestos).

--Point-of-operation not properly guarded.

Safety inspections of buildings and ships have also been made by other internal inspection groups.

The industrial hygienist has not made any routine or periodic formal health inspections at the Shipyard. However, he has investigated employee complaints and documented 37 of his suggestions for corrective action. He said he (1) is notified of potential health hazards, (2) visits potential unhealthy workplaces, and (3) takes samples to determine if health hazards exist. Sometimes he documents his recommended corrective action. Examples of employee complaints and the corrective action are listed on the following page.

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Employee complaints	Recommended corrective action
An employee was on a roof installing insulation. The waterproofing material made him dizzy.	Instructed the employee to use a respirator.
An employee washed parts in trichloroethane and developed a hand rash.	Instructed the employee to keep his hands out of the solvent.
An employee was holding galvanized steel for a welder and became nauseated, vomited, and felt chilled.	Explained the hazards of working with galvanized steel and suggested the employee use a respirator.
An employee was working near other employees who were using pneumatic chippers to remove cement-like flooring that contained asbestos. The employee felt short of wind as if something was stuck in his throat.	Instructed the employee to use a filter respirator and avoid dust exposure.

The industrial hygienist said no policy exists for insuring safety and health deficiencies are corrected or for abating health hazards within a certain time frame. Also, he said recommended corrective actions were not always followed up due to lack of staff.

INSPECTIONS BY GAO'S OSHA CONSULTANTS

The OSHA safety compliance officer identified 195 deficiencies at seven Shipyard workplaces. The table below shows the seriousness of the deficiencies.

Type of deficiencies	Number of deficiencies
Serious-willful	1
Serious	163
Other	31
Total	195

ENCLOSURE VI

The serious-willful violation resulted from employees overriding the dead-man control on an abrasive blasting nozzle by placing a rubber washer over the control. This control is needed to shut off the nozzle in case the employee should lose control, causing the hose to continue to shoot out abrasive shots that could cause injury. The blasting foreman was aware of the practice. Shipyard officials reported that disciplinary action had been taken against the employee and the supervisor for this deficiency.

Examples of serious violations include:

--Machinists were working in a confined space and there was no indication that a test had been made to insure sufficient oxygen in the space.

--Electrical lines were lying on the floor of the dry dock in about an inch of water.

--An employee removing hand rails on a 15-foot rolling stage was not wearing a safety belt.

--There were no controls in confined spaces on vessels to assure that hot work (welding, burning, grinding, etc.) and cold work (use of flammable liquids) were not done simultaneously, creating an explosive atmosphere.

--Power and drill presses were not equipped with point-of-operation guards.

--An employee working with an acid was not wearing proper eye protection.

The Shipyard commander estimated the costs to correct deficiencies (costing over $1,000) identified by the OSHA compliance officer to be about $1.4 million. Additionally, the commander stated that this figure does not reflect the total cost to correct all deficiencies that may exist at the Shipyard. For example, the OSHA compliance officer identified deficiencies pertaining to one crane; however, the Shipyard has 135 cranes with similar deficiencies.

The OSHA industrial hygienist took 66 air samples at the Shipyard; 19 exceeded the standards established by OSHA. The sample results showed workers were overexposed to such chemicals as silica, copper, zinc, and asbestos.

ENCLOSURE VI

The industrial hygienist identified 23 serious violations, which he grouped into the following four problem areas:

--The asbestos program is understaffed and needs to be under the control of one qualified individual.

--The respirator program is not comprehensive enough to provide workers with adequate respirator equipment.

--No routine sampling is performed due to understaffing in the industrial hygiene unit.

--The audiometric program appeared to be providing adequate screening and indoctrination services; however, these services were limited to the dispensary and did not include employee workplaces.

The Shipyard commander said the following action is being taken to correct the above deficiencies:

--Present industrial hygienist staff needs will be reviewed by a team appointed by the Naval Sea Systems Command.

--The Shipyard is currently drafting a procedure on respiratory equipment. After it is signed, it will take 9 to 12 months to implement.

--The audiometric program currently includes instructing employees on inserting ear plugs and the importance of protecting one's hearing. Additionally, the safety office has increased its surveillance of employees working in noise-hazardous areas.

The Shipyard commander estimated that at least $650,000 would be needed to build a safety and health building and to hire additional industrial hygienists to sample potentially hazardous areas. The commander also said it would cost $70,000 a year to implement and maintain a respiratory protective program and $80,000 a year to enforce the use of personal protective equipment.

COST TO CORRECT DEFICIENCIES

In July 1976, the Chief of Naval Operations directed Shipyard officials to make a list of OSHA deficiencies and provide cost estimates for correcting them. The estimated cost to correct OSHA deficiencies was $58 million as of

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September 1976. However, Shipyard officials said due to inflation the cost was estimated to be $81 million.

Shipyard officials said they did not have enough time to make a comprehensive survey/study of OSHA-type deficiencies. As a result, the cost estimates are best guesses and not necessarily the precise costs to correct the deficiencies.

Because of voluminous internal inspection reports on file and time constraints, we were unable to ascertain whether any specific safety or health deficiency identified by the OSHA consultants had been previously identified. However, based on other documents we reviewed, it appears that Shipyard officials were aware of most of the deficiencies at the Shipyard. Therefore, we believe that the cost to correct the deficiencies identified by the OSHA compliance officers is covered by the $81 million Shipyard estimate.

Shipyard officials said they have requested and received approval to spend $2.1 million to correct OSHA deficiencies--$1 million in fiscal year 1979 and $1.1 million in fiscal year 1980.

ENCLOSURE VII

NAVAL AIR REWORK FACILITY

The Naval Air Rework Facility in Norfolk, Virginia, overhauls the F-14 and A-6 aircraft and performs depot level rework operations on engines and a wide variety of accessories and components for aircraft, engines, and ground-support equipment. The facility (covering about 167 acres with 125 buildings) employs about 4,500 civilian and 30 military personnel.

SAFETY AND HEALTH PROGRAMS

The Rework Facility's occupational safety and health office, established in January 1978, made its first formal inspection in October 1978. Before 1978 the Norfolk Naval Air Station's general safety office made safety inspections at the Rework Facility.

The office had six employees--a director, a secretary, and four safety specialists. The office is responsible for both safety and health, but it depends on the Naval Regional Medical Center to make health inspections and evaluate any health hazards identified.

The Naval Regional Medical Center provides one full-time industrial hygienist, who is responsible for the industrial hygiene program for approximately 30,000 employees at about 60 commands and tenant activities. He spent about 80 percent of his time working at the Rework Facility because it is the only industrial activity in his area of responsibility.

The Medical Center's industrial hygienist said that he has no assistant, chemist, secretary, or laboratory and sends most samples to Ohio for analysis. Occasionally, his supervisor assists him by making surveys. He said three hygienists are needed to provide adequate surveillance at the Rework Facility and one additional hygienist is needed to cover other commands in the area.

The Rework Facility occupational safety and health office makes both periodic and informal inspections to identify safety and health hazards. Periodic inspections are made quarterly, semiannually, or annually, depending on the areas involved.

Reports are issued on the periodic inspections, but not on the informal inspections. We were told that when hazards are identified during the informal inspections, the safety specialists notify the shop supervisor, who either corrects

the situation immediately or forwards a work order request to correct the problem. We were advised that there are followups to ensure that all hazards are corrected, although such actions are not documented.

The Medical Center's industrial hygienist provides the occupational safety and health office technical expertise in evaluating health hazards, while the occupational safety and health office provides the safety specialists for the walk-through inspections. The safety specialists can identify potential health hazards but must contact the hygienist for analysis, conclusions, and recommendations. The hygienist's findings may be reported separately or included in a safety report.

The Medical Center's industrial hygienist does not have a planned program for surveying the Rework Facility. He said he periodically inspects for beryllium and mercury hazards and sometimes makes walk-around inspections.

The industrial hygienist said he has not been performing the biannual health surveys required by the Navy because his office is understaffed. However, he said he is confident that all the Rework Facility's health hazards have been identified by external inspections.

The industrial hygienist stated that he responds to employee complaints. However, he records only complaints he considers important in his log book. If possible, employee complaints are resolved immediately over the telephone. If a hazard exists, he investigates, recommends corrective action, and follows up to ensure that hazardous situations are corrected.

The lack of an effective program to identify industrial health hazards was listed as a major deficiency in a 1978 inspection. To improve the documentation of hazards, the Rework Facility's commanding officer requested that the results and recommendations of all industrial hygiene surveys, inspections, and audits of the installation be sent in writing to him with a copy to the occupational safety and health office.

PRIOR INSPECTIONS

Since January 1, 1977, over 120 reports had been issued dealing with occupational safety and health problems. Fourteen of these inspections, surveys, and studies were made by the installation's occupational safety and health office. The others were made by the following external organizations:

--Naval Air Station General Safety Office.

--National Loss Control Service Corporation.

--Naval Regional Medical Center.

--Naval Environmental Health Center.

--OCCUSAFE, Incorporated.

--Naval Aviation Logistics Center.

--Naval Nuclear Power Unit.

The above reports described numerous deficiencies; however, because of time constraints, we did not attempt to determine the total number of deficiencies identified in all these reports. We reviewed two external reports which identified 7,533 safety and health deficiencies at the Rework Facility.

The OCCUSAFE, Incorporated, Safety and Health Survey Report, dated March 3, 1978, identified 3,140 deficiencies in the following categories:

--Category I--may cause death or loss of a facility (1 item). Navy officials disagreed with the classification assigned to this deficiency.

--Category II--may cause severe injury, severe occupational illness, or major property damage (498 items).

--Category III--may cause minor injury, minor occupational illness, or minor property damage (1,433 items).

--Category IV--probably would not affect personnel health or safety, but is nevertheless in violation of specific criteria (1,208 items).

The latest safety and health inspection at the Rework Facility was made in October 1978 by a Naval Aviation Logistics Center compliance team. The report listed 4,393 deficiencies classified as follows

--4,318 safety hazards,

--66 health hazards, and

--9 radiation hazards.

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Examples of category I and II deficiencies noted in the report include

--electrical shock hazards,

--explosion/fire hazards,

--dangerous walking/working surfaces,

--inadequate beryllium control, and

--mercury hazard.

The team also identified the following deficiencies in the Rework Facility's safety and health program.

--Employees lack knowledge of their rights to report unsafe or unhealthful working conditions.

--The personal protective equipment programs need improvement. The respirator program is completely ineffective.

--Employees need training about hazardous materials.

--Ventilation deficiencies exist throughout the installation.

--Equipment lacks machine guarding.

--Industrial hygiene support is inadequate.

During our review, the Naval Air Logistics Center had requested the Rework Facility to estimate the amount of funds needed to correct the safety and health deficiencies identified by the inspection team. We were later advised that it would cost about $2.1 million to correct these deficiencies.

INSPECTIONS BY GAO'S OSHA CONSULTANTS

The OSHA safety compliance officer surveyed eight locations and identified 117 safety violations--107 serious and 10 nonserious. Examples of serious safety violations follow:

--Four shrinking and/or stretching machines were not equipped with point-of-operation guards.

--A full revolution punch press was not equipped with point-of-operation guard and other moving parts were not enclosed.

--An employee was wearing unapproved eye protection while operating a metal cutting machine.

--No shop requirement existed for foot or eye protection even though hazards warranted such protection.

--There was no emergency eye wash or shower located in building V-28 dip-tank area.

--A blow gun used in a nondestructive test area operated at 90 pounds per square inch instead of the required 30 pounds per square inch.

Rework Facility officials estimated it would cost about $119,000 to correct the deficiencies identified by the OSHA safety compliance officer.

The OSHA industrial hygienist made surveys of seven selected locations and identified the following hazards:

--No central list of specifications (chemical constituents, density, boil point, flash point, etc.) existed for all the materials used. He stated that, without knowledge of the constituents of a particular material, an industrial hygienist cannot sample for exposure, much less recognize or evaluate a hazard.

--Programs for respirators and for hearing conservation were not effective because employees were not properly instructed in the use, wear, and care of protective equipment.

--In one of the plating shops, the cadmium vacuum deposit machine operator, who did not use personal protective equipment, was exposed to about four times the allowable limit for cadmium. Overexposure to cadmium causes respiratory and internal problems. The industrial hygienist told Rework Facility officials about this overexposure, and the operation was shut down. Rework Facility officials told us that the machine was repaired for about $360 and overexposure no longer exists.

--At another area, a sample showed a chromium overexposure of two times the standard. Chromium is

a suspected carcinogen. The fumes from this area were exhausted into an alley which is frequented by employees during lunch or break periods.

Rework Facility officials estimated the cost to correct each of the uncorrected hazards identified by the OSHA industrial hygienist was less than $1,000.

COST TO CORRECT DEFICIENCIES

Rework Facility officials estimated that $15.6 million is needed to correct all deficiencies identified in the various studies made to date. The production engineering section monitors the status of safety and health deficiencies by lining out corrected deficiencies on the March 1978 OCCUSAFE, Incorporated, report, considered the most complete deficiency list available. This section has grouped deficiencies by similarity, determined what departments will correct deficiencies, and developed and submitted projects for funding. According to Rework Facility officials, category I and II deficiencies and deficiencies that can be eliminated with a minimal number of departments involved will be corrected first.

Deficiencies are to be corrected with funds from operating overhead, the Navy Occupational Safety and Health Deficiency Abatement Program, and the Military Construction Program. Officials said $100,000 has been budgeted from each of the fiscal year 1979 and 1980 Navy Industrial Fund overhead accounts to begin correcting the safety and health deficiencies in-house. Also, $13.1 million has been requested under the Navy Occupational Safety and Health Deficiency Abatement Program and Military Construction Program to correct category I and II deficiencies. For fiscal years 1979 and 1980, only $271,000 (1.7 percent) of the required amount has been approved.

Rework Facility officials estimated an additional $2.2 million is required to correct category III and IV deficiencies. They said they have not requested the money because the Chief of Naval Operations directed them to submit projects only for category I and II deficiencies.

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RADFORD ARMY AMMUNITION PLANT

Radford Army Ammunition Plant, located near Radford, Virginia, encompasses nearly 7,000 acres with over 1,700 buildings and structures. It is a Government-owned, contractor-operated facility that manufactures propellants, explosives, and chemical materials. Hercules Incorporated has served as initial design engineer and operating contractor since production operations began in 1941. As of October 1978, Radford employed 2 military, 75 Army civilian, and 2,654 contractor personnel.

SAFETY AND HEALTH PROGRAMS

The Radford commander and Hercules are jointly responsible for the safety and health programs at the installation. The Radford commander's staff oversees the contractor's performance. The Hercules safety department is responsible for directing and coordinating the occupational safety and health program for Radford. Both the Army safety office and the Hercules safety department develop operating procedures, make inspections, review operations, investigate accidents and incidents, assure corrective actions are taken, and have the authority to shut down unsafe operations.

The Army safety office staff consists of a safety manager and two safety specialists. The safety manager also serves as the fire marshall.

The safety office makes inspections of Radford facilities and monthly evaluations of the contractor's safety management activities. During 1977 and 1978, the safety office made 35 inspections identifying 131 deficiencies. The safety office submits deficiencies to Hercules, which in turn notifies the office of corrective actions taken or planned. Safety office personnel follow up to assure that the deficiencies are corrected.

The Army's Quality Assurance Division assists the safety office by making safety inspections and evaluations of operations.

The Quality Assurance Division chief estimated that the division's 31 inspectors devote about 2 staff-years to the safety effort. In 1977 and 1978, the inspectors prepared 35 reports identifying 42 deficiencies which were sent to Hercules for corrective action. The Hercules safety superintendent said the inspectors' reports are of low quality and attributes this to inexperience and a lack of formal safety training.

ENCLOSURE VIII

The Quality Assurance Division inspectors have been making safety inspections since 1965, providing coverage when the safety specialists are not available. Both the Army safety manager and Hercules safety superintendent stated the Quality Assurance inspectors are ineffective as safety inspectors.

Since 1965, the safety office generally has employed only two specialists. From November 1977 through March 1978, the safety manager was the only employee working in the office. As Radford operates 24 hours a day, 7 days a week, the safety office needs at least four full-time specialists to make safety inspections on all shifts.

The safety specialists told us that in the past year they had been unable to make safety inspections due to the time they were required to spend with special investigative groups, escorting personnel, and gathering data. Additionally, increased participation in preoperational inspections has also limited the time available to make safety inspections. Safety office records showed that no safety inspections were made by safety specialists during 4 months in 1977 and 6 months in 1978.

Safety office officials said that, as of May 1979, the U.S. Army Armament Material Readiness Command had approved two additional safety positions--a safety professional and a safety specialist. The safety manager was in the process of selecting the safety professional, and the safety specialist was on board and in training. He was expected to join the safety office staff by June 1, 1979.

The safety office's monitoring or evaluating of the industrial hygiene program at Radford was generally limited to receiving informational copies of air and water analysis reports from the Hercules safety department. The safety office did not employ an industrial hygienist, and therefore, left the evaluation of Hercules' industrial hygiene efforts to outside agencies, such as the U.S. Army Environmental Hygiene Agency.

Safety office officials requested the addition of an industrial hygienist to their staff; however, the Army Readiness Command did not approve the request. The safety manager informed us that the new safety professional would be trained to monitor the Hercules industrial hygiene program.

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The Hercules safety department is responsible for directing and coordinating the Radford safety program to assure plant compliance with all applicable policies and regulations governing occupational safety and health. During our visit, the safety department employed 14 people directly involved with safety and health, including a safety superintendent, a safety supervisor, 5 safety engineers, and 7 safety inspectors. The safety supervisor and engineers are each responsible for specific functional areas.

The seven safety inspectors inspected over 10,500 locations at Radford during 1977 and over 7,500 during the first 11 months of 1978. The following types of deficiencies were identified during these inspections.

	1977	1978 (Jan.-Nov.)
Facility and equipment	2,453	1,731
Procedure violations	640	472
Unsafe practices	96	60
Inadequate training	16	2
Housekeeping	364	355

The results of the safety inspections were reported in over 1,800 daily reports. The safety department forwards these reports to the operating departments. The supervisors in these departments, in turn, give the safety department written comments concerning the safety reports and specify the corrective actions taken.

The occupational health program at Radford is under the jurisdiction of the safety and medical departments. One of the safety engineers is also an industrial hygienist.

The industrial hygienist is primarily concerned with the control of toxic substances and unhealthful conditions in the workplace. He usually makes noise level surveys, heat stress studies, and illumination studies. Although he does not routinely take air samples, he developed an operating procedure whereby technicians take air samples for specific substances at specified locations and time intervals, and make an analysis. In addition, air samples are also taken at the request of any Hercules department, the safety committee, or the Radford commander's staff.

The industrial hygienist evaluates the air sample results. If they show an excessive level of toxic substance, he usually samples the operating area again to substantiate the first sample. If the first sample is substantiated, he makes recommendations to the appropriate Hercules department specifying protective equipment required for use by employees and requesting an engineering study.

Our review showed that, for the period January 1977 to November 1978, the industrial hygienist made 13 noise surveys of 28 operations and recommended protective hearing equipment be mandatory at 15 locations and engineering studies be made at 11 of the 15 locations. He also made four illumination studies in five buildings and recommended additional lighting for all areas surveyed.

During this period over 1,050 air samples of 44 different substances were taken. At least 232 samples showed excessive levels of various toxic substances. However, the industrial hygienist made only a few written recommendations regarding the samples. He explained that he sometimes made oral recommendations. In addition, many of the air samples showing excessive levels were taken in operating areas where corrective actions had already been initiated or were ongoing.

OSHA officials stated that one industrial hygienist was not adequate to provide the necessary health protection in a complex as large as Radford. Hercules hired an additional industrial hygienist in January 1979.

SAFETY AND HEALTH REPORTS ISSUED AND CORRECTIVE ACTION TAKEN AT RADFORD

From January 1977 to December 1978, personnel from the Department of Defense, the Army, and Hercules issued about 2,400 inspection reports. We reviewed 659 of these reports which identified 6,705 safety and health deficiencies at Radford. We also reviewed 10 reports prepared by non-installation personnel which identified 74 deficiencies. Some of the serious deficiencies include

--improperly stored equipment,

--incomplete preventive maintenance list of safety and operating equipment,

--inadequate fumes ventilation,

--leaks in acid pipelines, and

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--excessive nitroglycerin and ether vapors in working environments.

Some deficiencies require extensive funds, time, technology, and manpower to correct, while others require minor mechanical, engineering, or procedural changes and may require no additional cost. Hercules estimated the cost to correct known safety and health deficiencies to be over $73 million. This cost includes corrective action for the following:

Estimated Costs for Known Safety and Health Deficiencies

One-time OSHA-type survey	$39,959,100
Vapor, dust, and noise control	3,928,237
Barricade replacements	28,500,000
Other safety and related projects	1,081,500
Total	$73,468,837

Of this amount, Radford has requested $8,441,935 for fiscal years 1979-82.

A major barrier to correcting the deficiencies is funding. Radford has received about $5.5 million each year which could have been used to correct deficiencies. However, those funds were also needed for other purposes.

One-time OSHA-type survey

The Army Readiness Command directed Radford officials to make a one-time safety and health survey of active operating facilities using OSHA standards. The survey, completed in 1977, disclosed over 5,000 deficiencies in facilities and equipment. Hercules estimated the cost to correct the deficiencies at almost $40 million.

As a result of the survey, similar deficiencies were grouped into 20 projects for funding submissions to the Army Readiness Command. The first project appears in the fiscal year 1980 Plant Support and Equipment Replacement budget proposal. In addition, the 1981 and 1982 budget proposals each contained a single one-time survey project. The projects for fiscal years 1980, 1981, and 1982 are:

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Fiscal year	Facilities or equipment	Estimated cost
1980	Active hazardous material and equipment facilities	$ 271,500
1981	Ammonia storage and handling facilities	350,000
1982	Ventilation systems for abrasive blasting, grinding-polishing, spray-finishing, and open surface tank facilities	407,600
	Total	$1,029,100

Vapor, dust, and noise control

As of January 30, 1979, Hercules had initiated corrective action aimed at controlling vapor, dust, and noise problems in 56 Radford workplaces. Hercules and U.S. Army Environmental Hygiene Agency personnel identified excessive levels of toxic and volatile vapors, chemical dust, and noise in various workplaces. Hercules also initiated projects to investigate alternative chemical solvent systems for its propellant manufacturing processes and to replace deficient personal protective and air sampling equipment. The table below shows the estimated costs associated with these efforts.

Projects	Estimated cost
Toxic vapors and fumes	$1,999,460
Chemical dust	947,127
Noise	a/470,000
Alternative solvent systems	464,000
Personal protective and air sampling equipment	47,650
Total	$3,928,237

a/Estimated costs include $60,000 for consultant services to provide recommendations for solving noise problems in six operations.

Barricade replacement

Hercules has identified the need to replace 95 double revetted wooden barricades. These barricades are designed to contain or restrict any accidental explosion that may

occur in the buildings they surround and thereby reduce the danger of sympathetic detonation and further explosions in adjacent operating buildings. Radford plans to replace 4 barricades in fiscal year 1980 and 10 barricades per year in fiscal years 1981-89. The estimated cost to replace the four barricades in fiscal year 1980 is about $1.2 million. Based on this, the total estimated cost to replace all 95 barricades could be as much as $28.5 million.

Other safety-related projects

Other safety-related projects stem from hazard analysis recommendations, Hercules Corporate Headquarters safety audits, and projects identified by other Hercules personnel. The following table shows the estimated costs for the safety-related projects.

	Estimated cost
Hazard Analysis Projects	$ 339,300
Hercules Corporate Audit Project	100,000
Plant Support and Equipment Replacement Safety-Related Projects	642,200
Total	$1,081,500

INSPECTIONS BY GAO'S OSHA CONSULTANTS

At our request, OSHA compliance officers made safety and health inspections at Radford. The safety compliance inspections disclosed 52 violations (11 serious and 41 other) which Hercules corrected at a cost of $40,425.

The serious violations involved

--guarding live electrical parts on four generators and one elevator motor;

--guarding points of operation on an ironworker (punch and shear points), a press, and a sheetmetal roller; and

--guarding the exposed, unused portion of the blades on three band saws.

The OSHA safety compliance officer's report stated that Hercules has an effective safety and health program, as

evidenced by overall workplace conditions, formal safety program, and immediate abatement of apparent violations pointed out during the compliance inspection.

Nine OSHA industrial hygienists made health inspections at Radford from January 3 through February 14, 1979. They collected samples and made evaluations of all operations where the following toxic materials or physical agents were found: lead, asbestos, silica, ether, alcohol, di-nitrotoluene, nitroglycerin, coal tar pitch volatiles, nuisance dust, elba solvent, di-phenolamine, carbon disulfide, mercury, noise, and radiation.

The OSHA health inspections disclosed 18 violations of OSHA standards--9 serious--9 other.

The serious violations included:

--Employees were exposed to excessive levels of ethyl ether in four different operations. Overexposure can result in irritation of eyes, nose, and throat, and narcosis (deep unconsciousness).

--Employees' exposure to ethyl ether ranged from 1.3 to 1.8 times the OSHA standard. Although employees were required to wear personal protective equipment, Hercules acknowledged the need to reduce operator exposure to an acceptable level.

--Feasible administrative or engineering controls were not determined and implemented to reduce the employees' exposure to ethyl ether.

--Emergency respirators in the Ammonia Oxidation Plant area were stored with out-of-date or improperly preserved cannisters creating a possibility of serious exposure to ammonia gas, if needed in an emergency. Exposure to ammonia gas can result in respiratory arrest.

The problem areas involving ethyl ether and noise that OSHA health inspections disclosed were previously known to Hercules officials. Hercules had initiated engineering studies and projects for corrective action and required employees to wear personal protective equipment--respirators and hearing protection--in these areas. The estimated costs to reduce the levels of ether and the noise levels are $811,530. All of the $811,530 is included in the total estimated cost to correct OSHA deficiencies of $73,468,837.

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The OSHA industrial hygienists gave us an evaluation of certain aspects of the Hercules health program. They commented that:

--One qualified industrial hygienist assisted by four technicians provide industrial hygiene coverage. The technicians do not perform full-time air sampling, and there is a lack of air sampling procedures. Inadequate equipment was used for air sampling, but this discrepancy was corrected after the OSHA inspection started.

--The Medical Surveillance program appears to cover all areas in which personnel are potentially exposed to hazardous conditions.

--The respirator program, as designed, is generally adequate, but various OSHA compliance personnel observed some laxity in the program's implementation. In some plant areas, personnel wore the respirator improperly.

ENCLOSURE IX

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

MANPOWER,
RESERVE AFFAIRS
AND LOGISTICS

6 OCT 1979

Mr. Gregory J. Ahart
Director, Human Resources Division
U.S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Ahart:

This is in response to your letter of July 24, 1979, to the Secretary of Defense concerning the draft General Accounting Office (GAO) report entitled "Workplace Safety and Health Hazards at Department of Defense Installations" (OSD Case #5237).

The report represents a great deal of useful effort and thoughtful consideration. With the exception cited below, we concur generally with its findings, conclusions, and recommendations. We believe, however, that deficiencies at the Radford Army Ammunition Plant (RAAP) are a separate issue, not directly related to the Department of Defense (DoD) program. RAAP is a DoD-owned, contractor-operated facility, and the contractor is responsible to the Occupational Safety and Health Administration (OSHA) for compliance with OSHA standards.

To strengthen existing personal protective equipment and training programs at the installation level, the Office of the Secretary of Defense will implement a special respiratory protection emphasis program in fiscal year 1980.

With regard to expedited abatement of identified hazards, the DoD components are now in the process of implementing fully DoD Instruction 6055.1, "Department of Defense Occupational Safety and Health Program," which, in conjunction with annual program and budget guidance, will correct serious installation safety and health deficiencies on a systematic, prioritized basis. For this reason and the additional argument set forth in the enclosure, we do not concur with the recommendation to require each DoD installation to submit a one-time report that details all safety and health hazards and associated abatement costs.

ENCLOSURE IX

I have enclosed detailed DoD comments concerning the draft report's findings of willful violations, conclusions, and recommendations. Although there is reference to six willful violations in the body of the report, only four are described in the appendices.

We appreciate your thoughtful, continued interest in our safety and occupational health program.

Sincerely,

Robert B. Pirie, Jr.
Assistant Secretary of Defense
(Manpower,Reserve Affairs and Logistics)

Enclosure

ENCLOSURE IX

DoD Comments on
GAO Draft Proposed Report of
"Workplace Safety and Health Hazards at
Department of Defense Installations"
August 23, 1979

1. GAO Findings of Willful Violations

- Norfolk Naval Shipyard

GAO Comment

The serious-willful violation resulted from employees overriding the dead man control on an abrasive blasting nozzle by placing a rubber washer over the control. This control is needed to shut off the nozzle in case the employee should lose control causing the hose to continue to shoot out abrasive shots that could cause injury. The blasting foreman was aware of the practice. Shipyard officials reported that disciplinary action had been taken against the employee and the supervisor for this deficiency.

DoD Response

We agree that this is an extremely hazardous work practice which should never be permitted. This finding is indicative of a more basic, pervasive problem which is not DoD unique, i.e., the overriding of built-in safety devices. DoD, through employee training, continually strives to prevent this type of irresponsible action.

- Corpus Christi Army Depot

GAO Comment

In a paint shop, employees were wearing half-face masks even though the caution label and the specifications on the paint called for full-face air-supplied respiratory protection. These employees were also modifying the air line hose coupler of their respirators so they would fit the shop air supply. This air supply was not filtered to remove odor, rust, and moisture and was not checked for carbon monoxide. These modifications were made at the direction of the supervisor in charge. The safety office was also aware of the above modifications. The OSHA industrial hygienist stated that he considered this a willful disregard of the standards.

DoD Response

We agree that the half-face respirators were inappropriate since they did not provide adequate eye protection. Painters are now provided with approved eye and respiratory protection. In addition, a compressed air filtration system and air sampling program are now in operation.

- Red River Army Depot

GAO Comment

Employees in the painting area have shown elevated urine lead counts over the past two years and have been rotated in and out of the area. Lead is a toxic material and can cause blood disorders and permanent damage to the central nervous system. Although the Depot's policy was to rotate employees whose urine count exceeded 80, one employee was not taken out of the area until his lead count reached 345. Eleven months later, when his urine lead count was down to 57, he was rotated back into the area. A year later, his lead count had climbed to 118 but he was still working in the area. The OSHA industrial hygienist stated that the above practice is a willful violation of OSHA standards and in private industry would carry a $10,000 fine.

DoD Response

Prior to November, 1976, no uniform policy existed as to the quantity of lead that was permissable in an employee's blood or urine sample. It is now the Army's policy to remove employees from lead exposure when their blood samples exceed 80 micrograms/100 grams of whole blood. This is in agreement with the present OSHA standard. The Depot is investigating the reasons for all elevated blood lead samples to determine if engineering controls, personal protective equipment, and work practices are adequate. Corrective measures will be taken as indicated from the results of the investigation.

GAO Comment

Coal tar pitch volatiles are classified as carcinogens. Tests at the rubber denuding facility showed that six employees working in this area were exposed to coal tar pitch volatiles at levels 21 times higher than the OSHA standard. Although air-supplied respirators were required, the compressor supplying air to the respirators was a paint compressor without a filter to remove oil and moisture and was inoperative at the time of our review. We were told a new compressor had been on order for over a year.

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DoD Response

Airline respirators were not is use because oil vapors had been detected in the airline face masks. New filtering equipment has been installed to adequately filter oil vapors or mists, and approved airline respirators have been in use since the survey was completed. The coal tar pitch volatile standard evolved because of worker exposure to coke oven emissions. With coke oven emissions, the contaminant of interest is benzene soluble, and primarily aromatic in nature. The GAO report does not indicate whether the contaminant in question was primarily aliphatic or aromatic in nature. In general, aliphatic hydrocarbons are considerably less toxic than aromatic compounds. If the sampled material was primarily aliphatic, the coal tar pitch standard should not apply. Reportedly, two atmospheric samples were obtained, both from the same work area. One sample contained unreasonably high values of benz(a)pyrene, while the other contained none. The sampling results, therefore, are considered suspect. In any event, the Army Environmental Hygiene Agency completed an extensive study of the work sites in question during the week of July 16-20, 1979. Samples are undergoing analysis and appropriate corrective action will be taken.

2. GAO Conclusion

Our review indicates that Defense's estimate that it would cost $500 million to correct all serious safety and health hazards in Department of Defense workplaces is significantly understated.

DoD Response

The $500 million estimate, presented at the February 28, 1979, hearing before the House Subcommittee on Military Construction, did not include correction of safety and health deficiencies which are included in all new construction or major renovation projects. For example, approximately $28.0M of the $28.5M identified at Brooke Army Medical Center is to be used for upgrading medical facilities, in general, and not for the sole purpose of correcting safety and health hazards. In addition, $28.5M of the $74.0M identified at Radford AAP is for barricade replacement which is part of the plant's upgrade program and is not related to an OSHA-type deficiency. Neither did the estimate include small abatement projects that are funded with local installation operating funds and not separately reported. In addition, the Department of Defense believes that personal protective equipment and administrative controls must be utilized in lieu of engineering controls when engineering controls are not economically feasible. Accordingly, there could be wide disparity in overall

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cost estimates depending upon different interpretation of economic feasibility. For example, expenditure of the $41.8 million estimated as required to correct hazardous noise problems at Kelly AFB is not cost effective and would not be funded. Our aggressive hearing conservation program is an acceptable alternate to engineering controls for the major problem at Kelly AFB.

3. GAO Recommendations

• We recommend that the Secretary of Defense require that each installation submit to its major command a one-time report which identifies and describes existing safety and health hazards and the cost of corrective actions. This information should be used to advise the Congress of the magnitude of the cost to correct serious safety and health hazards in the workplace.

DoD Response

We believe that the costs involved with a comprehensive one-time re-survey of each DoD workplace and the preparation of reports would far exceed any anticipated benefits. In the first place, as described in the report, there are literally thousands of potential hazards. They range from conditions that can be corrected promptly with local operating funds to problems that require very extensive engineering changes involving detailed engineering studies, project development, and approval for centralized funding. Additionally, the correction of many such conditions are included as part of the normal cost of major renovation or replacement projects already underway or programmed. For these, it is virtually impossible to identify separately that proportion of costs attributable to safety or health considerations. Secondly, there is the matter of determining which hazards should be corrected by engineering changes and which would involve such extravagant expenditures that use of personal protective equipment and/or administrative controls represent the only feasible remedy. OSHA recognizes this fact in its compliance program for private industry. These judgments, subject to revision with changing conditions, would grossly impact any one-time estimate of costs. Finally, new health hazards are identified continually as science learns more about the long term health effects of chemicals and substances used in the workplace. Thus, the overall cost of abatement changes almost constantly. As previously stated, we believe that the hazard abatement procedures described in Department of Defense Instruction 6055.1, "Department of Defense Occupational Safety and Health Program", of January 30, 1978, are adequate to correct, on a systematic, priority basis, installation safety and health hazards. As this instruction is fully implemented at the base level, each installation commander and major claimant will know hazard locations, associated risk assessments, and abatement costs.

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• For those hazards which can be corrected or minimized with a relatively small expenditure of funds, we also recommend that the Secretary of Defense do more to ensure that installations:

- correct such identified hazards with available funds;

- provide appropriate personal protective equipment until engineering controls can be implemented, or for work situations where engineering controls are not feasible; and

- provide additional training as needed to workers and supervisors regarding the importance and proper use of personal protective equipment.

DoD Response

Concur. We are aware that many Department of Defense installations' personal protective equipment and training programs are in need of improvement. Respiratory protective equipment programs, as described in the findings of this report, are particularly weak. The DoD will place special emphasis on installation level respiratory protective equipment programs during fiscal year 1980 to insure that personnel are adequately protected and apprised of workplace hazards.