

NASA 1974

MISHAP AND

INJURY DATA

## FOREWORD

This report contains NASA mishap experience for calendar year 1974 in statistical and narrative form. It includes analyses and recommendations based on the material contained in this report.

The statistics presented are compilations of accident/mission failure/incident/illness experiences reported by NASA Installations in monthly and quarterly reports and in telephone reports and individual reports of investigation. With this report we have converted injury rates to the new OSHA base of 200,000 man-hours worked. The injury rates apply only to NASA civil servants. However, some mishaps encompass NASA contractor employees and the public and are so stated when applicable.

First, the good news. Compared to 1973, 1974 saw a lowered total cost of mishaps, reduced severity rate (fewer lost work days per injury) and fewer fires and aviation mishaps.

Next, the bad news. Compared to 1973, the total number of accidents increased. Although the cost was down, it still represents a tragic and unnecessary loss of our much needed resources. The cost of fires in NASA was up as well as the motor vehicle accident frequency rate. Of major concern is the steady, consistent increase in our NASA injury rate over the last 5 years. We met our goal of 1.0 lost time injuries per million man-hours worked in 1969. Since then we fall further from that goal each year. In 1974 we missed it by a factor of 2-1/2. This disabling injury rate is the trigger for OSHA attention. Our cost for compensation of injury is growing like the national debt. Every NASA manager and employee must help reverse the trend.

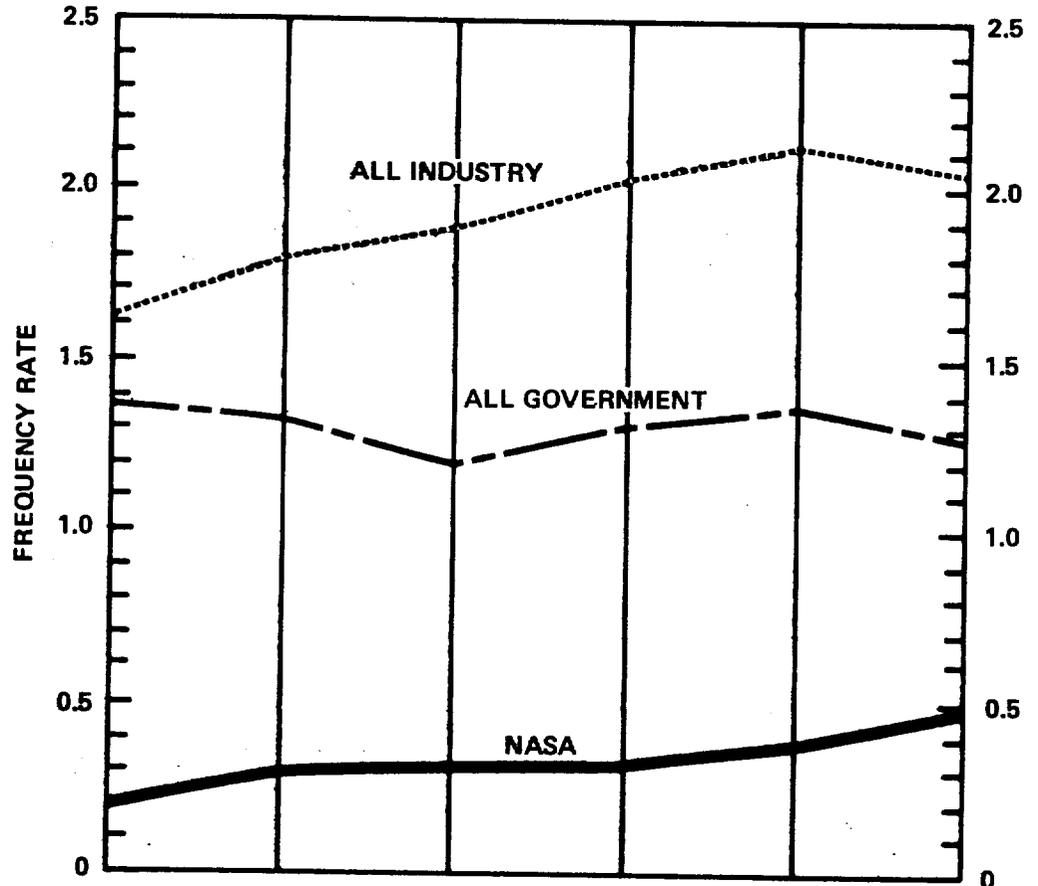
Each line manager/supervisor in NASA is responsible and accountable for safety. My desire is that all of you will use this report to reduce our needless loss of manpower, time, and resources. The charts, graphs, and narrative portions of this summary have been tailored to this goal and are considered self-explanatory. Should there be any questions about any part of the report, however, please direct them to my office.

Reuben P. Prichard  
Acting Director, Safety  
and Environmental Health

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## NASA INJURY EXPERIENCE - 1969 THROUGH 1974



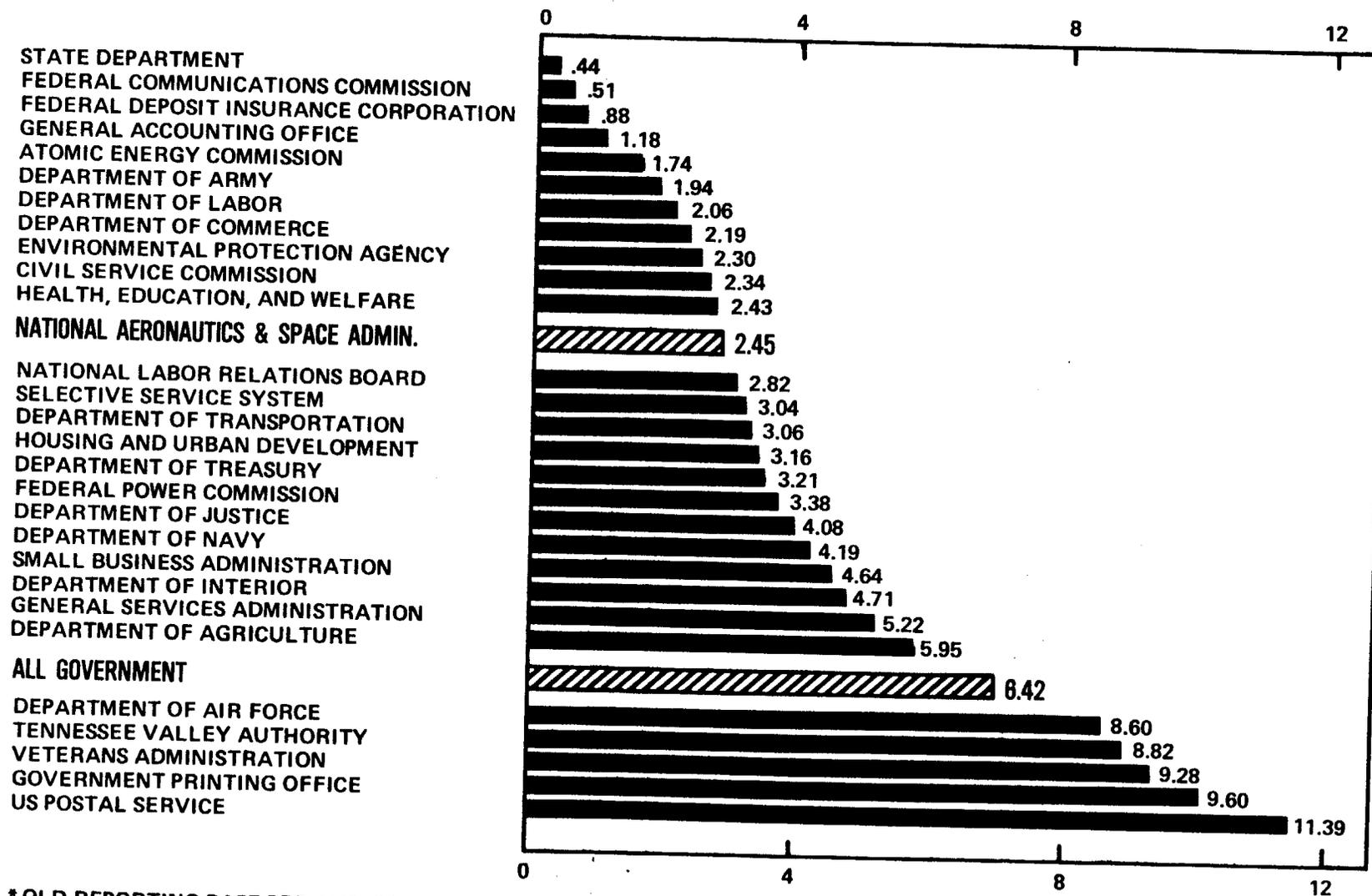
FREQUENCY RATE – NASA	69	70	71	72	73	74
	.20	.29	.30	.30	.37	.49
*FREQUENCY RATE – ALL GOVERNMENT	1.38	1.32	1.20	1.30	1.36	1.28
† FREQUENCY RATE – ALL INDUSTRY	1.62	1.77	1.87	2.03	2.11	2.04
AVERAGE NUMBER OF NASA EMPLOYEES	32,600	31,200	29,100	28,300	27,900	26,700
LOST TIME INJURIES – NASA	63	85	83	79	93	116

FREQUENCY RATE IS DEFINED BY OSHA AS THE NUMBER OF LOST TIME INJURIES PER 200,000 MAN-HOURS WORKED.

\* SOURCE: OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION, DEPT. OF LABOR

† SOURCE: NATIONAL SAFETY COUNCIL

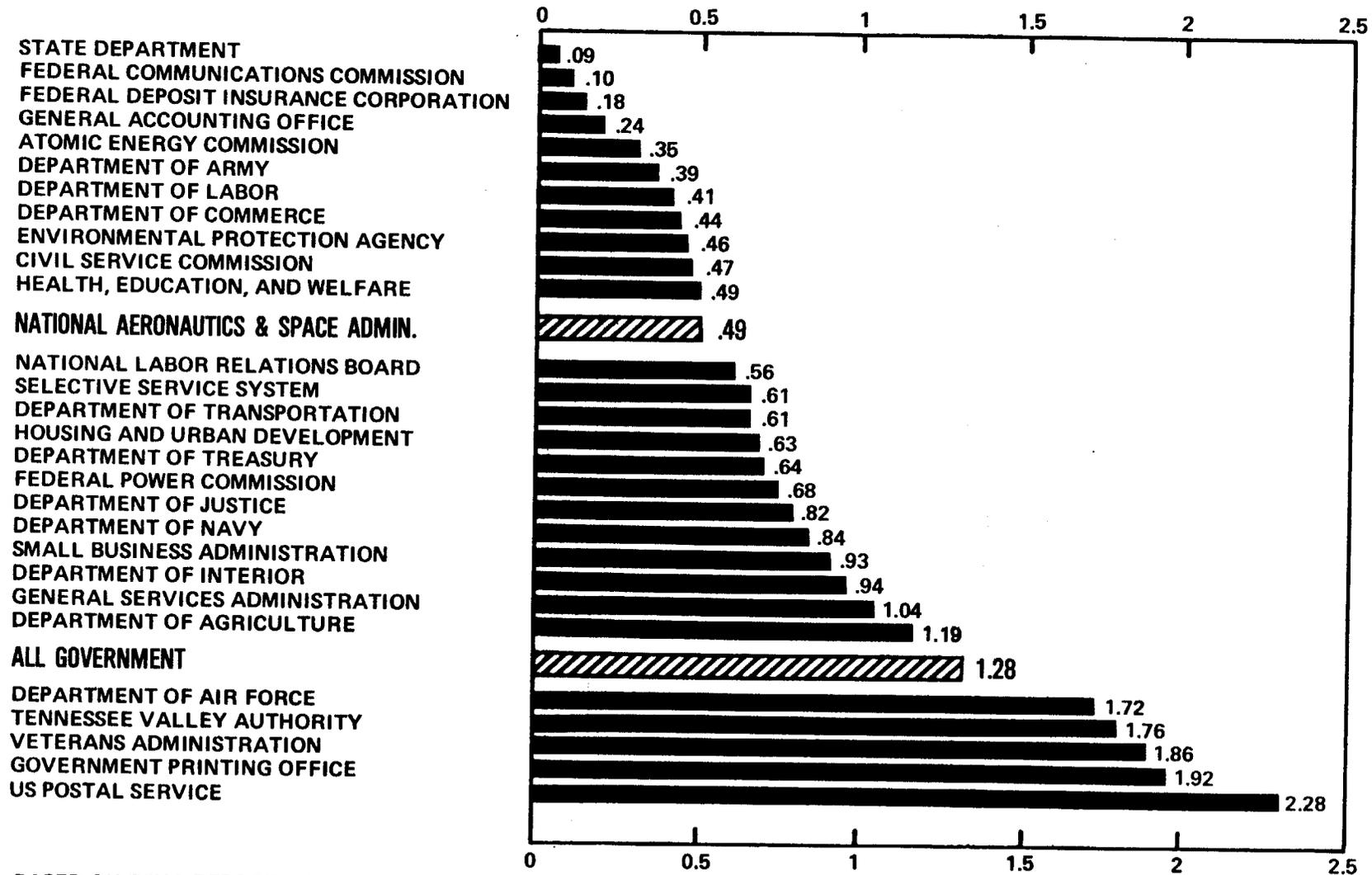
## LOST WORK DAY CASES IN FEDERAL AGENCIES OCCUPATIONAL INJURY RATES FOR CIVILIAN PERSONNEL PER MILLION MAN-HOURS\* - 1974



\* OLD REPORTING BASE PER ANSI Z16.1; WILL BE DISCONTINUED IN FUTURE REPORTS.

## LOST WORK DAY CASES IN FEDERAL AGENCIES

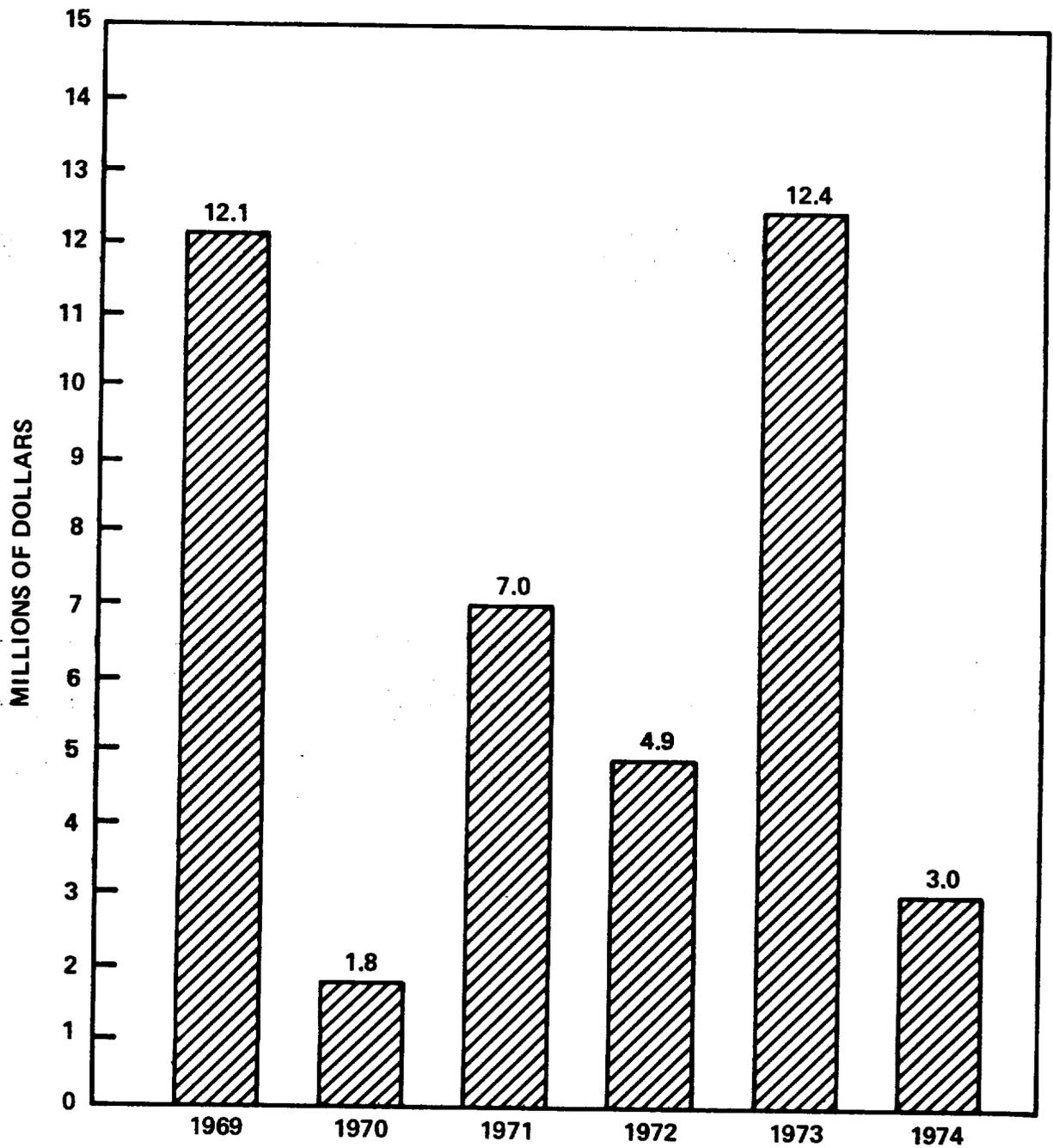
### OCCUPATIONAL INJURY RATES FOR CIVILIAN PERSONNEL PER 200,000 MAN-HOURS\* - 1974



BASED ON OSHA REPORTING REQUIREMENTS.  
 \*NEW REPORTING BASE; OSHA REGULATIONS.

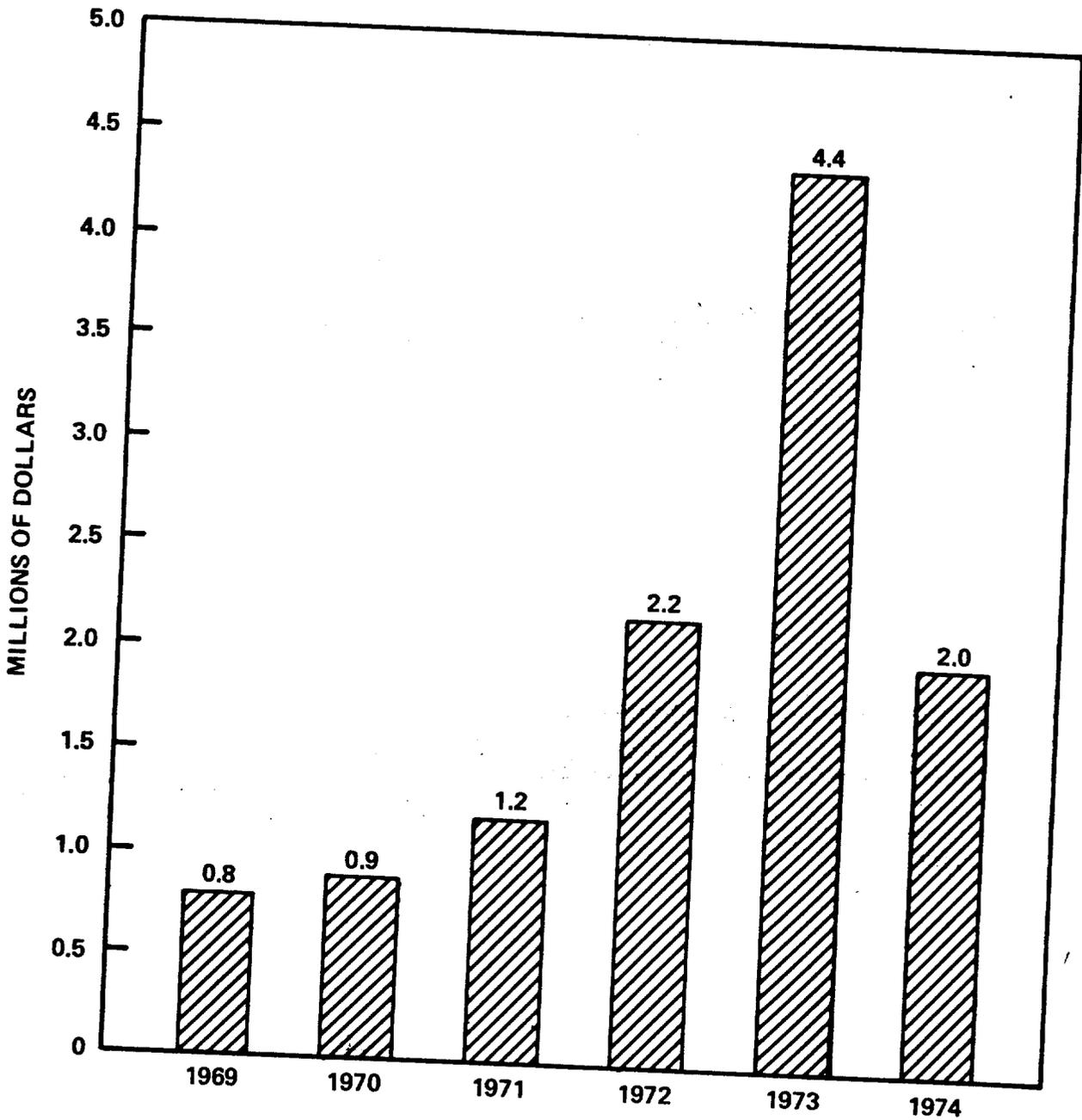


# TOTAL COSTS TO NASA DUE TO MISHAPS \*



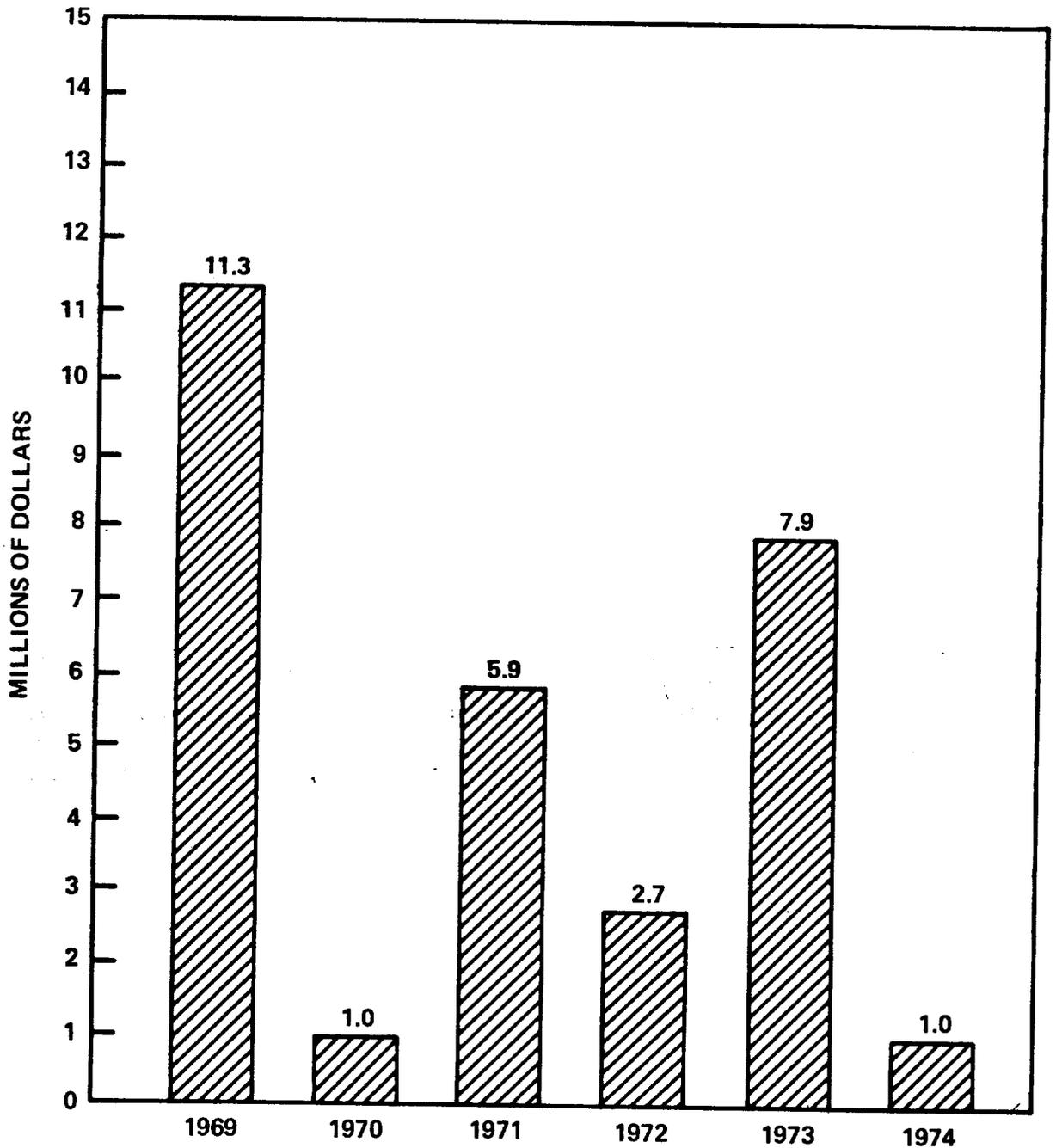
\* DOES NOT INCLUDE MISSION FAILURES.  
DOES NOT INCLUDE CONTRACTOR LOSSES.

# NASA MONEY LOSSES DUE TO MISHAPS\*



\* INCLUDES LOST WAGES AND CHARGE BACK BILLING TO THE FEDERAL EMPLOYEES COMPENSATION FUND, BUT DOES NOT INCLUDE CONTRACTOR LOSSES. TWO FATALITIES IN 1972 AND SEVEN IN 1973 DROVE COSTS UP FOR THOSE YEARS.

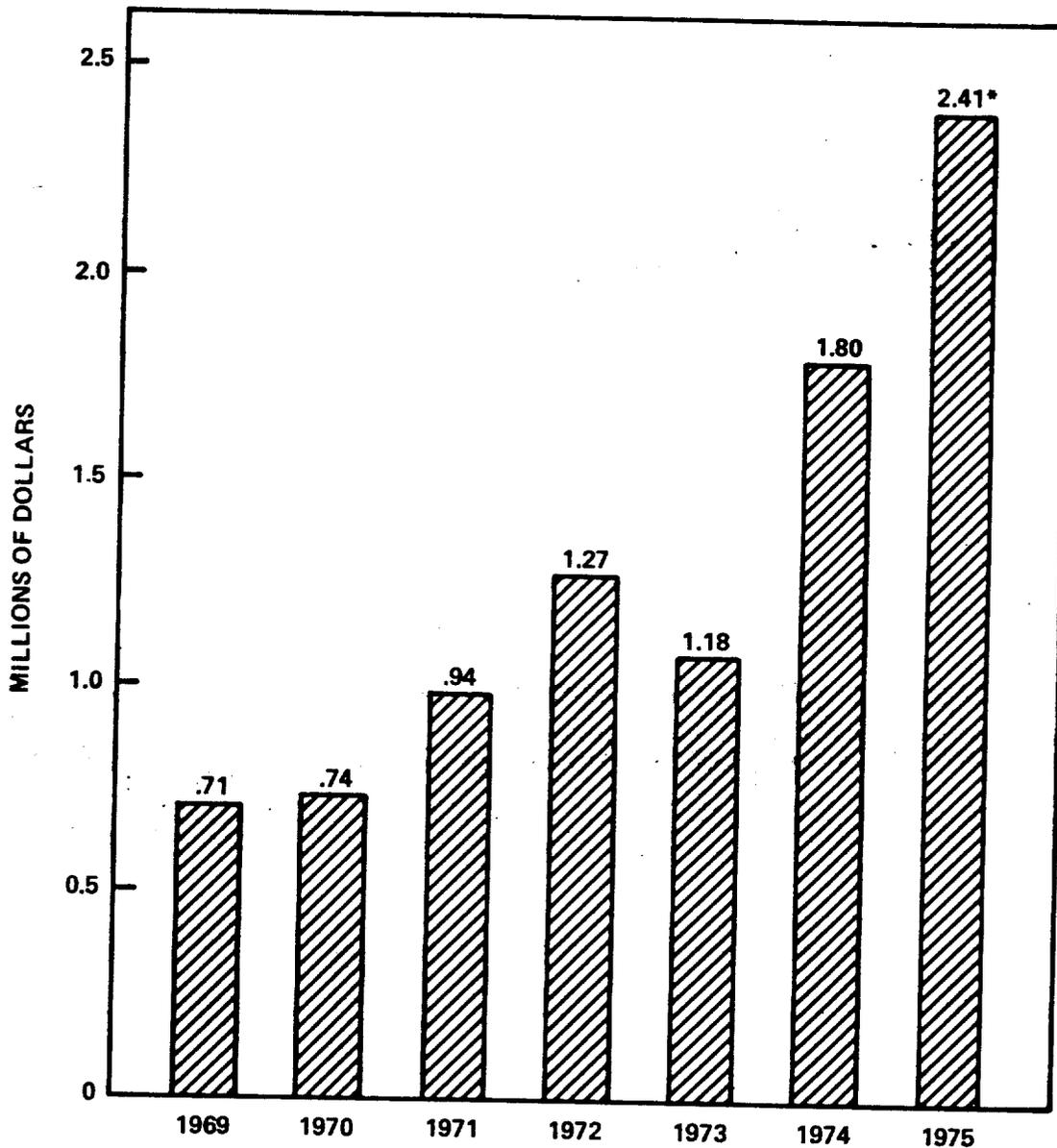
## NASA MATERIAL LOSSES DUE TO MISHAPS \*



\* INCLUDES AIRCRAFT, VEHICLE, AND FIRE MISHAPS AND LOSSES OF OTHER PROPERTY.  
DOES NOT INCLUDE MISSION FAILURE COSTS.  
DOES NOT INCLUDE CONTRACTOR LOSSES.

CONVAIR 990 LOSS IN 1973 DROVE COSTS UP THAT YEAR.

## COSTS NASA PAID TO FEDERAL EMPLOYEES COMPENSATION FUND (BY FISCAL YEARS)



\* NASA ESTIMATE FOR FY 75

1. THESE COSTS ARE CHARGED AGAINST NASA AS REIMBURSEMENT TO THE FEDERAL EMPLOYEES COMPENSATION FUND FOR PAYMENTS MADE ON ACCOUNT OF INJURY OR DEATH OF NASA EMPLOYEES OR PERSONS UNDER THE JURISDICTION OF NASA.
2. THE SLIGHT DECREASE FOR FY 73 MAY HAVE BEEN DUE TO A CHANGE OF STATUS OF BENEFICIARIES, I.E. WIDOWS REMARRYING, DEPENDENT CHILDREN COMING OF AGE, OR DEATH OF THE PRINCIPAL.

NASA ACCIDENT/INCIDENT EXPERIENCE IN 1974

**DEFINITIONS:**

1. Type A Accident - A mishap causing death, disabling injury to five or more persons, damage to equipment or property exceeding \$100,000, or destruction of an aircraft.

2. Type B Accident - A mishap causing disabling injury to four or fewer persons or damage to equipment or property exceeding \$10,000, but under that of a Type A accident.

3. Incident - A mishap of less than accident severity to persons or property, causing less than \$10,000 in damages, but exceeding \$250, or a non-serious injury.

4. Mission Failure - Any event which jeopardizes a mission, prevents accomplishment of major mission objectives, or causes premature mission termination.

5. Costs - Direct costs of repair, replacement or recovery, including man-hours, material and contract costs, but excluding indirect costs of clean-up, investigation, injury, and normal operational delay.

TOTAL NASA SIGNIFICANT MISHAPS

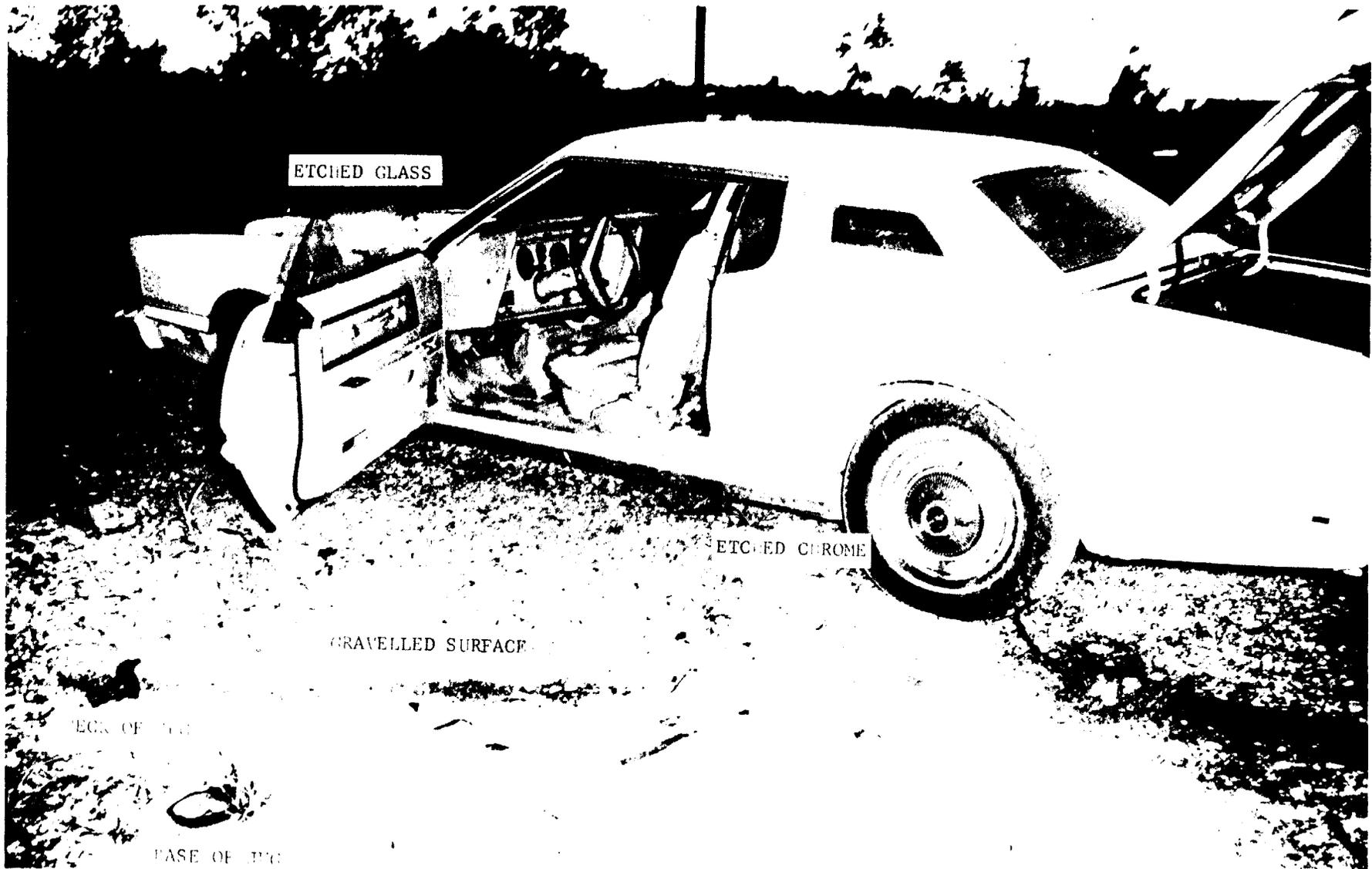
The significant mishaps shown on the following charts are only those reported by the NASA Field Installations and contractors as having significance beyond the minor dollar loss or injury incident categories.

	1969	1970	1971	1972	1973	1974
FATAL ACCIDENTS	4	2	2	3	2	2
TYPE A ACCIDENTS	11	6	13	11	4	6
TYPE B ACCIDENTS	7	12	11	7	6	11
INCIDENTS	12	20	24	9	22	13
MISSION FAILURES	1	1	3	0	3	2
ALL MISHAPS	30	38	44	29	32	30

FATAL ACCIDENT AND FATALITIES

	1969	1970	1971	1972	1973	1974
<u>Number of Fatal Accidents</u>	4	2	2	3	2	2
<u>Total No. of Fatalities</u>	4	2	5	4	17	3
<u>NASA Employees</u>	0	0	0	2	7	0
<u>Contractor Employees</u>	4	2	3	2	4	1
<u>Public</u>	0	0	2	0	1	2
<u>Military</u>	0	0	0	0	5	0

Two fatal accidents were reported in 1974. In one, two girls ran from behind a parked vehicle to cross a street. They were struck by a NASA-owned, University of Chile-operated carry-all on official business. Injuries resulted in the death of the two girls. In the other fatality, a third-tier NASA sub-contractor was moving hydrofluoric acid (HF) in glass containers from his car to where he would be cleaning NASA equipment. The HF etched through the glass and sprayed all over him. He subsequently died from the after-effects (pulmonary edema) of inhaling HF fumes.



Sub-Contractor Killed by Hydrofluoric Acid

TYPE A/B ACCIDENTS BY FIELD INSTALLATIONS

	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>
AMES	0/1	0/0	0/0	0/0	0/0	0/0	1/0	0/2
FLIGHT	2/1	0/0	0/1	1/0	1/0	0/0	0/0	0/0
GODDARD	0/0	0/0	4/0	0/3	2/3	0/1	0/0	0/1
JOHNSON	4/4	2/2	1/1	3/1	3/3	6/2	1/0	0/5
KENNEDY	2/1	4/0	2/1	2/1	1/0	1/0	0/1	2/1
LANGLEY	0/0	0/0	0/1	0/1	1/0	0/1	0/1	0/1
LEWIS	0/2	0/0	1/0	0/0	3/0	2/0	0/1	0/0
MARSHALL	4/5	0/2	3/2	1/4	3/3	6/2	1/0	1/0
NSTL	-	-	-	-	-	-	-	0/0
WALLOPS	1/0	1/0	1/0	0/1	0/2	0/0	0/0	1/1
TRACKING STATIONS	-	-	-	-	-	-	1/3	2/0
NASA TOTAL	13/14	7/4	12/6	7/11	14/11	15/6	4/6	6/11

Notes: Prior to 1974, MSFC included NSTL.  
WLOD is included in KSC.  
JPL has been excluded from the table.

ANALYSIS: The number of Type A and B accidents is once again on the rise, going up to 6 and 11, respectively, after a low last year of 4 and 6. With fewer hands-on projects, fewer overall personnel, bigger impact of OSHA, etc. it should be expected that NASA's safety posture would improve. But it hasn't. In addition, we have reporting problems wherein some installations fail to report any mishaps, report only "big" ones that may make the newspapers, or report some to Headquarters and others to OSHA. It's difficult to determine the true accident history, and this does little to mutually help other installations from having similar accidents occur. We have had many transformer and other electrical fires this past year which could be an alarming trend in our ageing facilities. Once again as in past years we have had several fires in buildings that were equipped with sprinklers but the sprinkler systems were not activated.

RECOMMENDATIONS: Supervisors should be getting out from behind their desks to supervise: hazardous operations, load testing, building inspections, fire safety drills, etc. Safety within NASA has always been line management's responsibility. Isn't management inattention ultimately responsible for the increase in numbers of accidents and incidents?

NASA TYPE "A" ACCIDENTS AND MISSION FAILURE - 1974

<u>LOCATION</u>	<u>DATE</u>	<u>DESCRIPTION</u>	<u>CAUSE</u>	<u>COST</u>	<u>RECOMMENDED CORRECTIVE ACTION</u>
KSC	1-18	Delta Launch vehicle tumbled after lift-off	Electrical short in a printed circuit board (PCB)	\$10,000K	Turn in leads on all PCB's and increase thickness of conformal coating
KSC	2-11	Centaur stage of a Titan-Centaur vehicle failed to ignite	Oxidizer pump froze	\$17,500K	Increase inspections. Flow dry gas thru pump. Spin pump up before lift-off
WFC	3-7	Bell UH-1B helicopter flipped over after hard landing due to power settling near ground	Poor mission planning, communication and pilot error	\$70K	Train management personnel & pilots in helo flying qualities and operating limitations. Conduct Flight Readiness Reviews and evaluate pilot currency requirements
Poker Flats, AK	3-9	Sounding rocket fell from launcher and hit technician	Bolts sheared	\$385K	Increase tensile strength of bolts. Increase safety supervision
MSFC	5-3	Third-tier sub-contractor killed by hydrofluoric acid	Acid ate through the glass containers and sprayed over contractor	-----	Use correct containers for corrosive fluids. Use buddy system. Increase supervision
Santiago, Chile	10-12	Two girls killed by NASA truck	Girls ran from between two parked cars	-----	Vehicle operators practice defensive driving and be especially alert for children in urban areas

NASA TYPE "B" ACCIDENTS - 1974

<u>LOCATION</u>	<u>DATE</u>	<u>DESCRIPTION</u>	<u>CAUSE</u>	<u>COST</u>	<u>RECOMMENDED CORRECTIVE ACTION</u>
ARC	1-2	Armature fell on stator	Bolts came loose	\$75K	Increase supervision and quality control inspections
Patrick, AFB	1-6	Four cameras ruined in fire	Unknown	\$32.6K	Install fire detection/prevention equipment
Palmdale, CA	1-8	Hangar fire	Welding sparks	\$15.02K	Use fire watch and welding permit system
Downey, CA	1-20 2-4	Substation fire	Deteriorated insulation	\$90K	Increase inspection frequency
Bergstrom, AFB (JSC)	2-6	T-38 aircraft, landed short on instrument approach, collapsed landing gear	Pilot error	\$65K	Re-train pilot in correct instrument landing techniques and procedures
ARC	5-9	Wind tunnel blades damaged	Vandalism or industrial sabotage	\$32.5K	Inspect before operation, increase supervision
JSC	7-1	Hydrazine explosion injured operator	Vapor decomposition	-----	Reduce dribble volume; increase training and supervision
WFC	9-5	Fire near oven	Spontaneous combustion	\$18K	Install oven per OSHA standards; correct operating procedures
LaRC	9-6	Drive carriage hit arresting gear	Failure in brake control system	\$22K	Inspect braking system before each operation
WSTF	9-20	Steam generator failed	Over-torqued bolts	\$60K	Use correct torque; inspect; increase supervision
GSFC	12-8	Electrical fire	Improper grounding	\$32K	Use proper grounding, fuzing or circuit breakers

SIGNIFICANT NASA INCIDENTS - 1974

<u>LOCATION</u>	<u>DATE</u>	<u>DESCRIPTION</u>	<u>CAUSE</u>	<u>COST</u>	<u>RECOMMENDED CORRECTIVE ACTION</u>
KSC	1-7	Chlorine in air conditioning vents	Corroded metal connection	----	Inspect more frequently
England, AFB (JSC)	3-6	T-38 aircraft, premature gear retraction	Pilot error	\$ 4,510	Retract gear only when safely airborne
FRC	5-15	F-111 aircraft, wing damage	Design error	\$ 1,500	Re-design tuck of wing
Downey, CA	5-27	Circuit breaker blew up	Mechanical interference	\$10,000	Inspect more frequently
NSTL	6-6	Crane hit stiff leg	Limit switches removed	\$10,000	Increase supervision of workers
FRC	6-14	Jetstar aircraft fuel tank buckled	Poor design	\$ 6,700	Re-design
JSC	7-16	Fire in building	Oily rags left near heater	\$ 986	Clean and inspect more often
JSC	8-6	Transformer fire	Oil leak and dust collecting	\$ 2,200	Clean and inspect more often
WFC	8-15	Fire in residence	Misuse of combustibles by children	\$ 500	Spank children; properly store combustible liquids
FRC	10-16	3/8 scale model F-15 hard ground impact on drogue chute	Main chute failure	Expendable test article	Re-design chute system
KSC	10-20	Windmill blades thrown	Corrosion fatigue of mounting	\$ 3,585	Inspect more frequently
ARC	11-5	Circuit breaker fire	Foreign material	\$ 8,000	Clean and inspect more often
FRC	11-26	Remote Piloted Vehicle (RVP) crashed	Unknown	\$ 1,500	No NASA recommendation

## SAFETY SURVEYS

1974

The NASA Headquarters Survey Program of the field installations was reinitiated during calendar year 1974. Five installations were visited.

Johnson Space Center	June 10-21, 1974
Wallops Space Center	July 15-19, 1974
Marshall Space Flight Center	August 19-23, 1974
Jet Propulsion Laboratory - NASA Pasadena Office	Sept. 9-13, 1974
Goddard Space Flight Center	Dec. 9-20, 1974

It was both reassuring and heartening to the Headquarters survey team that all the installations had the basic ingredients for a sound safety program:

- (1) There was sincere and visible energetic support of safety by top management.
- (2) The vital elements of a safety program to cope with each installation's operations were established and working effectively.
- (3) Housekeeping programs were in fairly good order but with some areas identified for potential improvement.
- (4) Safety concerns were being assigned a high priority and active follow up and corrective action was evident.
- (5) The general personnel morale and attitude reflected an active awareness and desire to improve working conditions and reduce the number of accidents.

## NASA PERSONNEL INJURIES FOR 1974

**ANALYSIS:** For the fifth year in a row NASA's lost work day rate has increased - with a quantum jump this past year alone. Our "Safety '76" goal of a frequency rate (lost time injuries per 200,000 man-hours worked) of 0.2 was last reached in 1969, the year of the lunar landing. This year's figure is 0.49 - 2-1/2 times worse than our stated goal.

Several field installations and establishments, notably WFC, FRC, NaPO, MAF, NSTL and Headquarters did meet the "Safety '76" goal. The remainder fell significantly short.

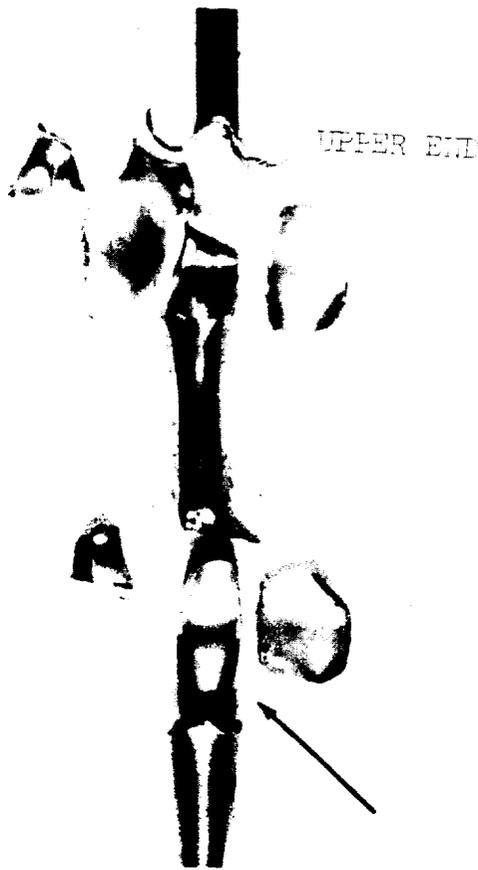
The advent of OSHA (Occupational Safety and Health Act) of 1970 has had little effect in decreasing NASA's injury rate. NASA management cannot be fined as is private industry for violations of safety standards. Perhaps this lack of a negative incentive contributes to disregard of good safety practices. Some installations which have aggressive OSHA compliance programs have significantly reduced their injury rates. The RIF's NASA has experienced each year since 1970 probably contribute to lackadaisical attitudes towards safety on the job.

There was a significant increase in lost time injuries this year - 116 - compared to 93 last year and 79 the year before.

NASA's workforce is undoubtedly getting older. Many apprentice programs have been eliminated entirely. Not many new hires are made. Since the young are the biggest contributors to accidents and injuries, one should expect our experienced workers to be less accident prone.

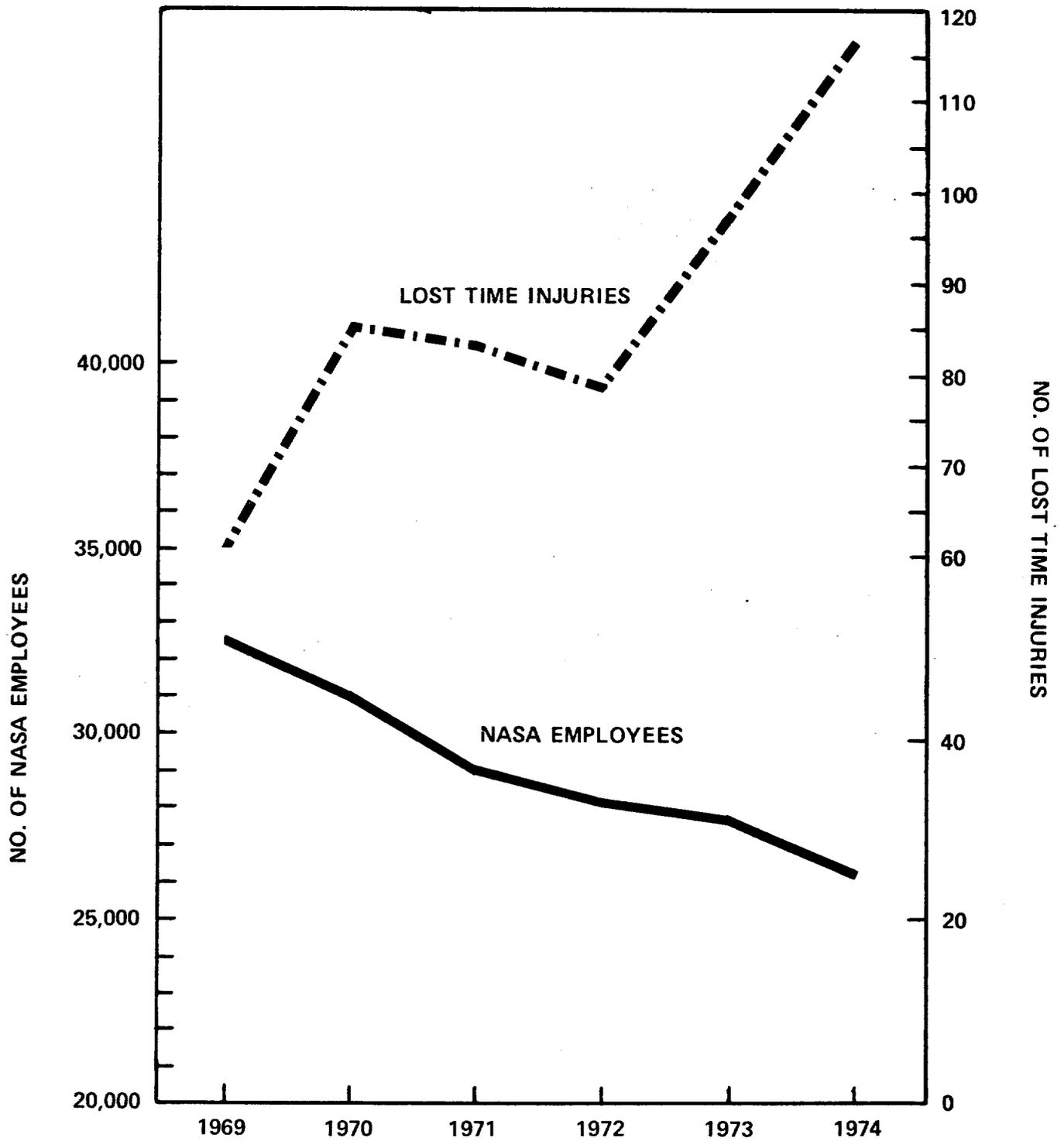
### RECOMMENDATIONS:

We in NASA sorely need to do more supervision of potentially hazardous operations. The line supervisors are the keystone to safety. Without their enthusiastic cooperation, NASA's bridge of safety will slowly tumble down, block by block.

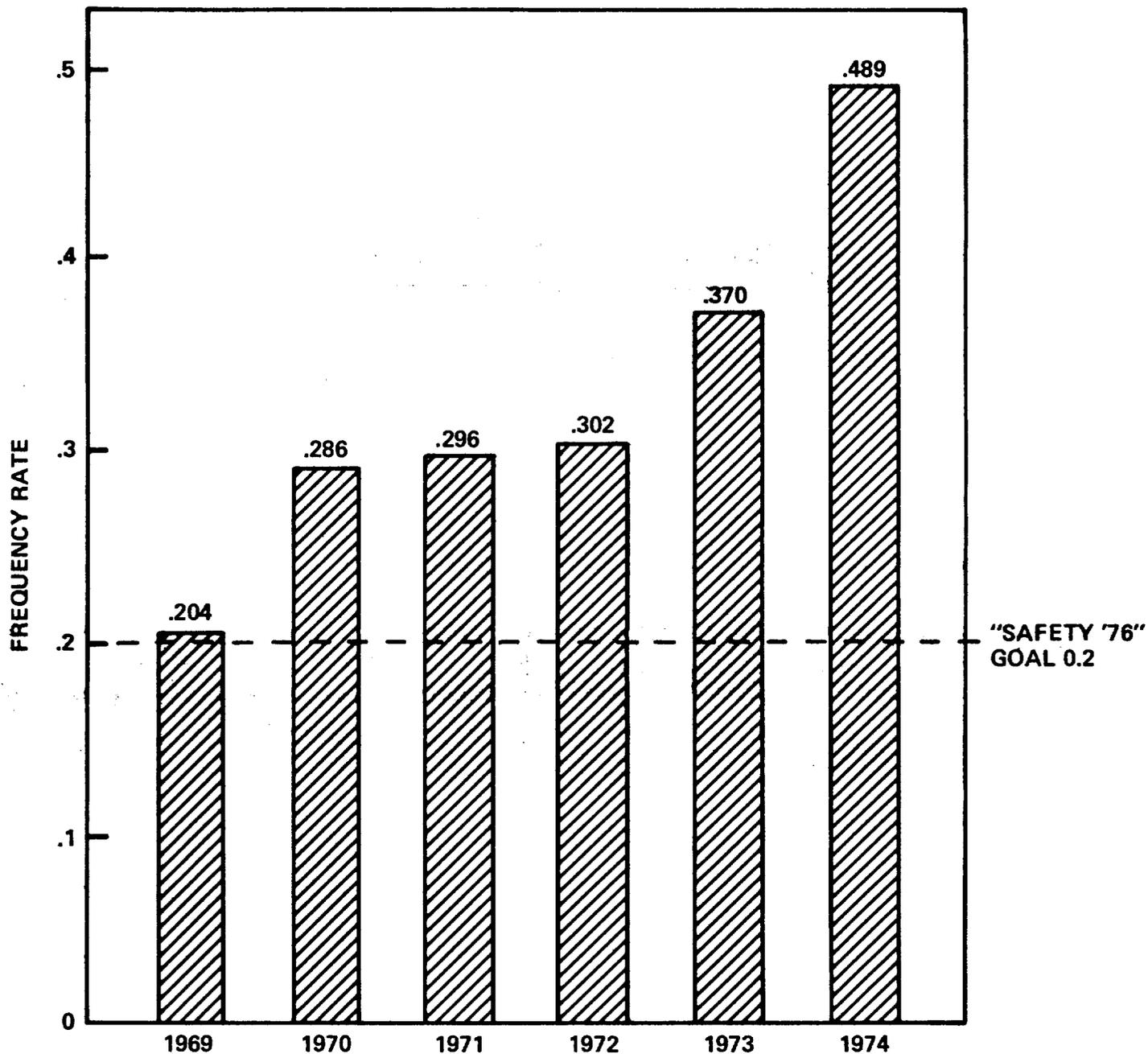


Tubing Explosion. Arrow Points to Fragment  
Removed from NASA Employee's Neck

# NUMBER OF NASA EMPLOYEES vs. NUMBER OF LOST TIME INJURIES



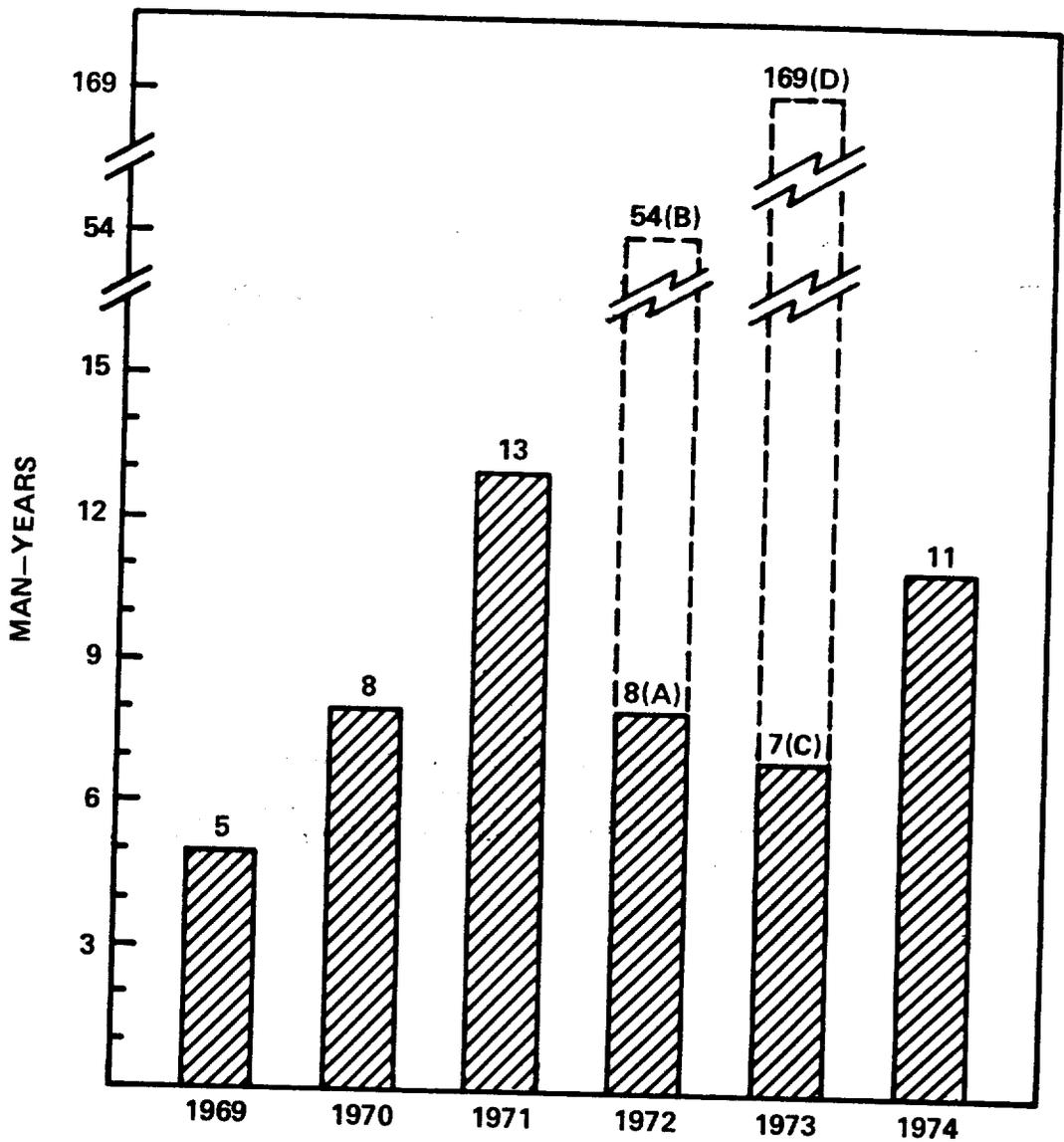
## NASA INJURY FREQUENCY RATE 1969-1974



FREQUENCY RATE IS THE NUMBER OF LOST TIME INJURIES PER 200,000 MAN-HOURS WORKED.

NASA'S PREVIOUS GOAL WAS 1.0 LOST TIME (DISABLING) INJURIES PER MILLION MAN-HOURS WORKED. THIS YEAR WE HAVE CONVERTED, PER OSHA, TO THE NUMBER OF LOST TIME INJURIES PER 200,000 MAN-HOURS WORKED.

# NASA MAN-YEARS LOST DUE TO ON-THE-JOB INJURIES \*



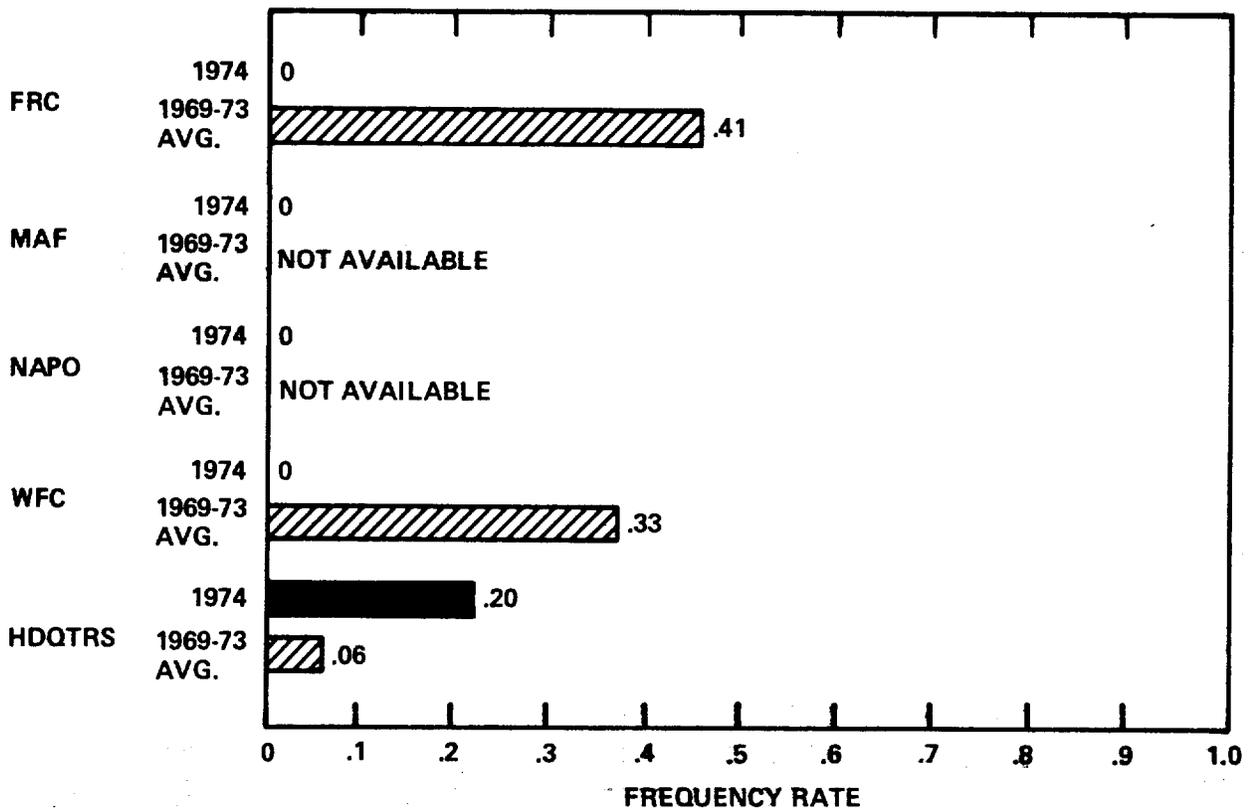
**NOTES:**

- (A) 1972 DATA EXCLUDING THE 2 FATALITIES
- (B) 1972 DATA INCLUDING THE 2 FATALITIES
- (C) 1973 DATA EXCLUDING THE 7 FATALITIES
- (D) 1973 DATA INCLUDING THE 7 FATALITIES

\* 260 WORK DAYS = 1 MAN-YEAR.  
EACH FATALITY CAUSES LOSS  
OF 6,000 WORK DAYS.

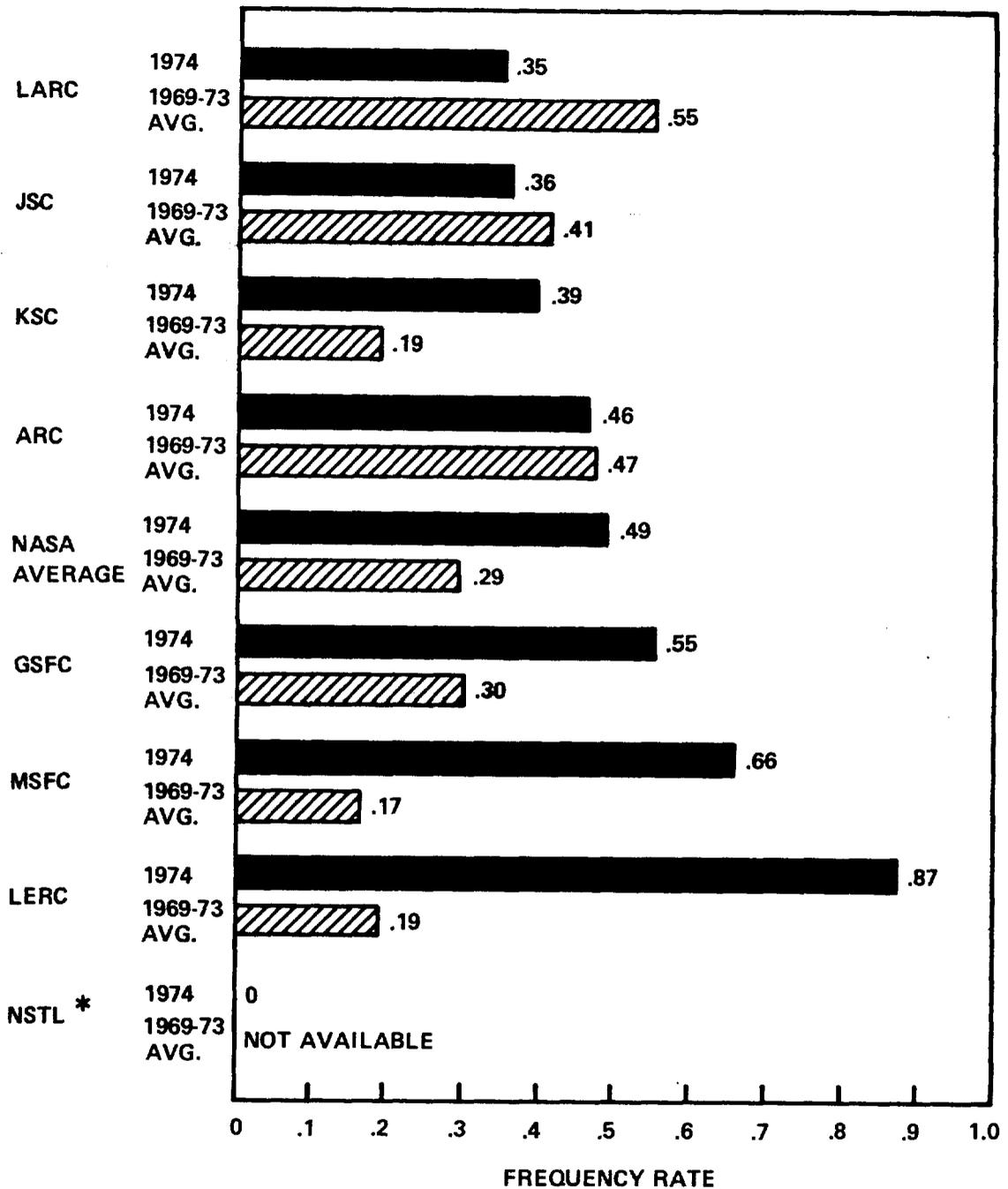
# NASA INJURY FREQUENCY RATES

INSTALLATIONS WHICH ACCOMPLISHED THE "SAFETY '76" GOAL OF 0.2



FREQUENCY RATE IS THE NUMBER OF LOST TIME INJURIES PER 200,000 MAN-HOURS WORKED.

**NASA INJURY FREQUENCY RATES**  
**INSTALLATIONS WHICH DID NOT ACCOMPLISH THE "SAFETY '76" GOAL OF 0.2**



\* RECEIVED DATA LATE AND BY PHONE; DATA NOT SUBMITTED TO OSHA, DEPARTMENT OF LABOR.

NASA INJURIES AND ILLNESSES BY INSTALLATIONS - 1974

	No. of Lost Time Injuries	Number of Lost Work Days	Number of Non-Lost Time Occ. Injuries	Number of Non-Lost Time Occ. Illnesses	Average Number of Employees	Freq. Rate Inj/Ill Per 100 Employees	Total Man- Hours Worked in Thousands	Freq. Rate- All Inj/Ill Per 200,000 Man-Hrs.	Severity Rate
AMES	8	96	232	1	1786	13.5	3449	14.0	27.8
FLIGHT	0	0	18	0	538	3.3	940	3.8	0.0
GODDARD	20	58	220	7	3942	6.3	7326	6.7	7.9
JOHNSON	12	107	9	0	4034	0.5	6592	0.6	16.2
KENNEDY	8	371	23	1	2386	1.3	4119	1.6	90.1
LANGLEY	11	609	119	4	3615	3.7	6365	4.2	95.7
LEWIS	26	787	95	1	3254	3.7	5982	4.1	131.6
MARSHALL	28	917	25	2	4846	1.1	8541	1.3	107.4
MICHOUD	0	0	0	0	34	0.0	60	0.0	0.0
NSTL*	0	0	0	0	69	0.0	134	0.0	0.0
NAPO	0	0	1	0	37	2.7	73	2.7	0.0
WALLOPS	0	0	8	0	442	1.8	811	2.0	0.0
HEADQUARTERS	3	6	0	0	1750	0.2	3067	0.2	2.0
NASA (TOTAL)	116	2951	750	16	26,733	3.3	47,459	3.7	62.2

Severity Rate =  $\frac{\text{Number of Man-Days Lost}}{\text{Total Man-Hours Worked}} \times 1,000,000$

Severity Rate is the number of man-days lost due to accidents per million man-hours worked.

\*Received data late and by phone; data not submitted to OSHA, Department of Labor

*File  
11/10/74*

PROBABILITIES OF BEING INJURED IN NASA ON-THE-JOB IN 1974

	<u>Total of Lost and Non-Lost Time Injuries</u>	<u>Average Number of Employees</u>	<u>Chances of Being Injured in 1974</u>	<u>Chances of Being Injured in 1973</u>
MICHOUD	0	34	0	0
NSTL*	0	69	0	NOT AVAILABLE
HEADQUARTERS	3	1750	1 IN 583.3	1 IN 46.1
JOHNSON	21	4034	1 IN 192.1	1 IN 16.7
MARSHALL	53	4846	1 IN 91.4	1 IN 15.2
KENNEDY	31	2386	1 IN 77.0	1 IN 23.4
WALLOPS	8	442	1 IN 55.2	1 IN 14.4
NASA PASADENA	1	37	1 IN 37.0	1 IN 37.0
FLIGHT	18	538	1 IN 29.9	1 IN 14.8
LANGLEY	130	3615	1 IN 27.8	1 IN 8.3
LEWIS	121	3254	1 IN 26.9	1 IN 6.8
GODDARD	240	3942	1 IN 16.4	1 IN 14.9
AMES	240	1786	1 IN 7.4	1 IN 7.5
NASA (TOTAL)	866	26,733	1 IN 30.9	1 IN 12.3

\*RECEIVED DATA LATE AND BY PHONE; DATA NOT  
SUBMITTED TO OSHA, DEPARTMENT OF LABOR

## NASA AVIATION ACCIDENT/INCIDENT EXPERIENCE IN 1974

### DEFINITIONS:

AVIATION FLIGHT MISHAP - An accident or incident involving a NASA-controlled aircraft or NASA flight crews, test personnel or passengers while on flight duty and which occurs after the engine(s) have been started with intent for flight. Type A and B accidents and incident classifications are applied as for other NASA accidents in terms of dollar loss or injuries/death except that Type A is also applied to any destroyed aircraft regardless of dollar loss. Where aircraft are involved in accidents with no intent for flight the term aviation non-flight mishap applies.

SUMMARY: 1974 marked a reversal of trend in NASA aviation mishap experience. Since the last aviation accident-free year of 1970, the number of accidents and accident rate had gone up each year. 1973 was one of NASA's worst years for aviation accidents. With one type A and one type B aircraft accident in 1974, we hopefully are on our way back to another accident-free year. One aviation flight incident in 1974 was only a thin line from being an accident. Those three mishaps all had a common causal factor--pilot error. Also in each case, the pilots should have known better. And in both accidents, NASA management was not aware that the pilots were operating in regimes beyond their capability, knowledge, or training.

1974 was brought an onset of accidents with Remote Piloted Vehicles (RPV) and model aircraft. These have not been recorded as aviation flight accidents because of the strict definition requiring on-board crew. Many of these vehicles are utilized for high-risk research where the loss of an RPV or model is considered more cost effective than the potential loss of an aircraft or crew. Often the high costs of the RPV's or models are written off with a short life expectancy.

### RECOMMENDATIONS:

Aviation managers must continuously be on the lookout for operations beyond the training, knowledge, or capability of their pilots. Pilots must be thoroughly familiar with and conform to their aircraft flight restrictions, operating limitations, instrument procedures, standard operation procedures, etc. Managers involved with RPV and model aircraft operations should be particularly alert to increased loss potential associated with these operations and conduct appropriate flight readiness reviews similar to those for aircraft.

AVIATION FLIGHT MISHAPS

	1969	1970	1971	1972	1973	1974
TYPE A	5	0	2	2	2	1
TYPE B	0	0	0	1	2	1
INCIDENTS	2	5	6	2	10	3
AIRCRAFT DESTROYED	4	0	2	2	2	1
PILOT/CREW FATALITIES	0	0	0	2	11	0

AVIATION FLIGHT ACCIDENTS RATES - NO. OF ACCIDENTS PER 100,000 HOURS

FLIGHT ACCIDENT RATE	20	0	4	11	14	9
FATAL ACCIDENT RATE	0	0	0	7	4	0
AIRCRAFT DESTROYED RATE	15	0	4	7	7	4

FLIGHT ACCIDENTS SUMMARY

CATEGORY OF AIRCRAFT

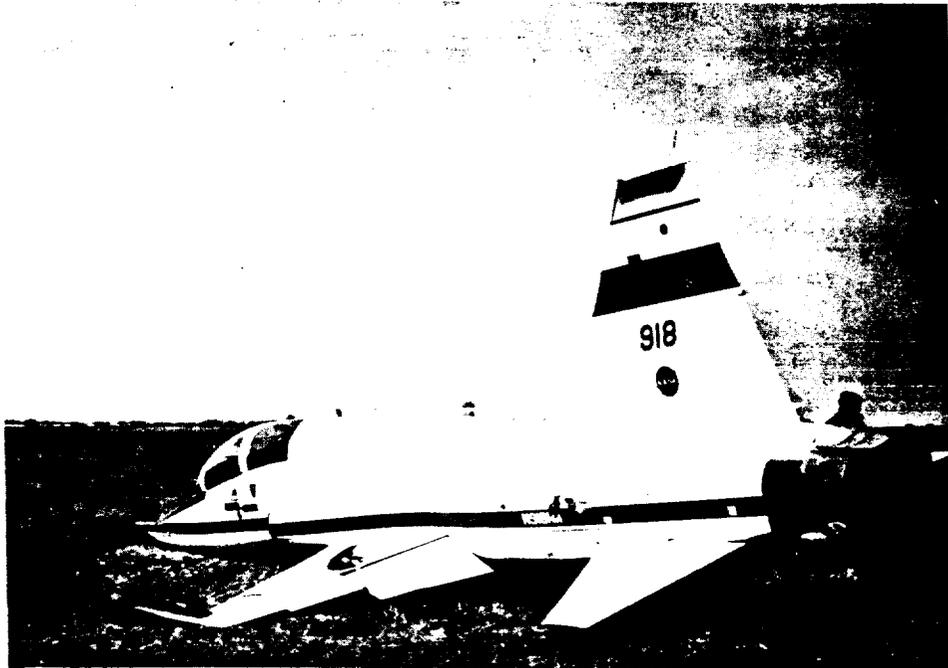
PROGRAM SUPPORT	1	0	0	0	0	1
ADMINISTRATIVE	1	0	0	0	0	0
SPACE FLIGHT READINESS & PROFICIENCY	2	0	2	2	1	1
R&D	1	0	0	1	3	0

TYPE OF AIRCRAFT

(H-13) BELL 47G	2	0	1	0	0	0
T-38	0	0	0	2	1	1
T-33	1	0	0	0	0	0
F-8	1	0	0	0	0	0
LLTV/RV	0	0	1	0	0	0
R&D (X-15, P-1127, M2 F2, C-8, F-106)	0	0	0	1	1	0
PROG. SUP. (CV-990, OV-1C, UH-1B)	0	0	0	0	2	1



NASA Helicopter Crash



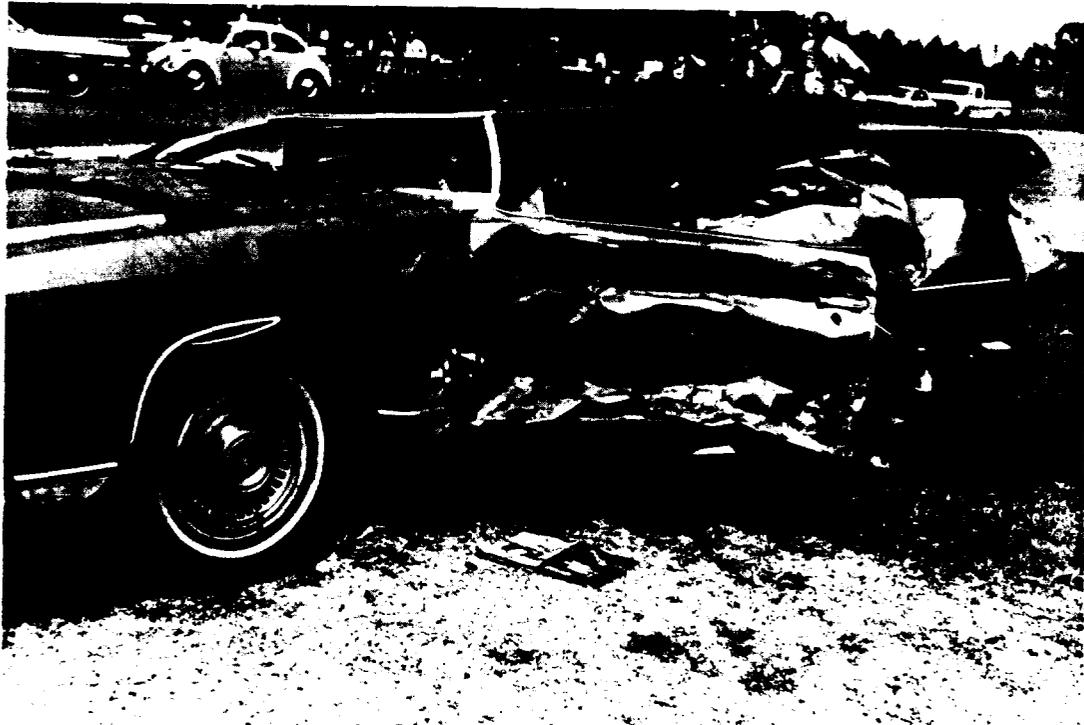
NASA T-38 After a Hard Landing and Veering Off the Duty Runway

# NASA MOTOR VEHICLE ACCIDENTS

1974

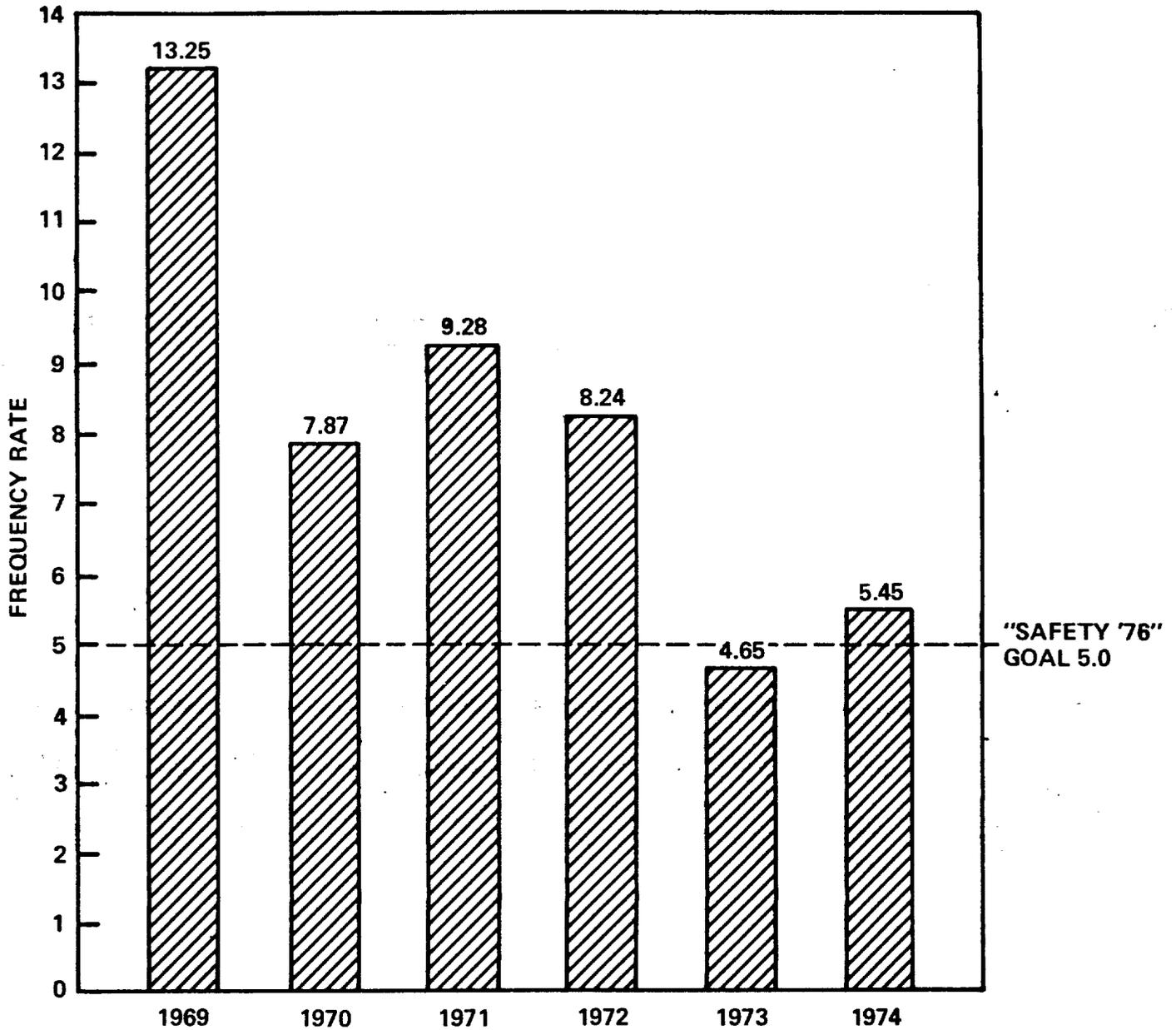
**ANALYSIS:** After having dramatically bettered our "Safety '76" goal of a frequency rate (number of motor vehicle accidents per million miles driven) of 5.0 last year, this year NASA is back up to 5.45. NASA drove more miles in spite of the fuel shortage, had more accidents, and not suprisingly, each accident cost more than in previous years. One installation (NSTL) failed to submit any data to OSHA and four (NSTL, LaRC, LeRC, and WFC) reported no private vehicular mileage. Privately operated vehicles used for official business such as travel or trips that are reimbursed to and from the airport should be statisticized at all installations as private mileage.

**RECOMMENDATIONS:** Encourage compliance with the NASA Safety Standard on seat belt usage. Emphasize defensive driving training. Drive carefully!



Results of a Collison at a NASA Facility

# NASA GOVERNMENT MOTOR VEHICLE ACCIDENTS



FREQUENCY RATE IS THE NUMBER OF MOTOR VEHICLE ACCIDENTS PER MILLION MILES DRIVEN.

NASA 1974 MOTOR VEHICLE ACCIDENTS

Field Installations	No. of Accidents		Total Miles Driven (in thousands)		Total Cost		Frequency Rate of Accidents	
	Govt.	Private	Govt.	Private	Govt.	Private	Govt.	Private
AMES	0	0	490	443	0	0	0	0
FLIGHT	0	0	256	188	0	0	0	0
GODDARD	20	4	3860	1122	\$ 7708	\$667	5.2	3.6
JOHNSON	0	0	201	1014	0	0	0	0
KENNEDY	3	0	998	564	\$ 357	0	3.0	0
LANGLEY	5	0	434	0	\$ 494	0	11.5	0
LEWIS	18	0	842	0	\$ 6102	0	21.4	0
MARSHALL	6	0	1908	817	\$ 1671	0	3.1	0
MICHOUD	0	0	3	12	0	0	0	0
NSTL	0	0	0	0	0	0	0	0
NAPO	0	0	3	17	0	0	0	0
WALLOPS	0	0	625	0	0	0	0	0
HEADQUARTERS	1	0	96	849	\$ 944	0	10.4	0
NASA (TOTAL)	53	4	9716	5026	\$17,276	\$667	5.45	0.80

FREQUENCY RATE IS THE NUMBER OF ACCIDENTS PER MILLION MILES DRIVEN.

## NASA FIRE EXPERIENCE

For the second straight year there was a decrease in reported fires. Though smaller and not nearly as dramatic as that between 1972-1973, it is nevertheless a decrease. In addition to the decrease the number of fires reported, there was an attendant slight decrease in monetary losses. Unfortunately we still have not returned to the low loss record of the late 1960's. Part of this may be the inflation factors which must be considered in repair or replacement of facilities, equipment, etc.

Major causes of facility and equipment losses continue to be of either an electrical nature or cutting, burning, welding or open flame torch use. Significant reductions in these causes can be achieved by adherence to hot work permit systems with continued training for appropriate personnel, strict adherence in use of the National Electrical Code requirements, and proper use and maintenance of all electric items.

Greater use of prevention programs, inspections, and training at all levels will continue the decreases in losses and provide for all a fire safety environment that will not jeopardize either employees, facilities or missions.



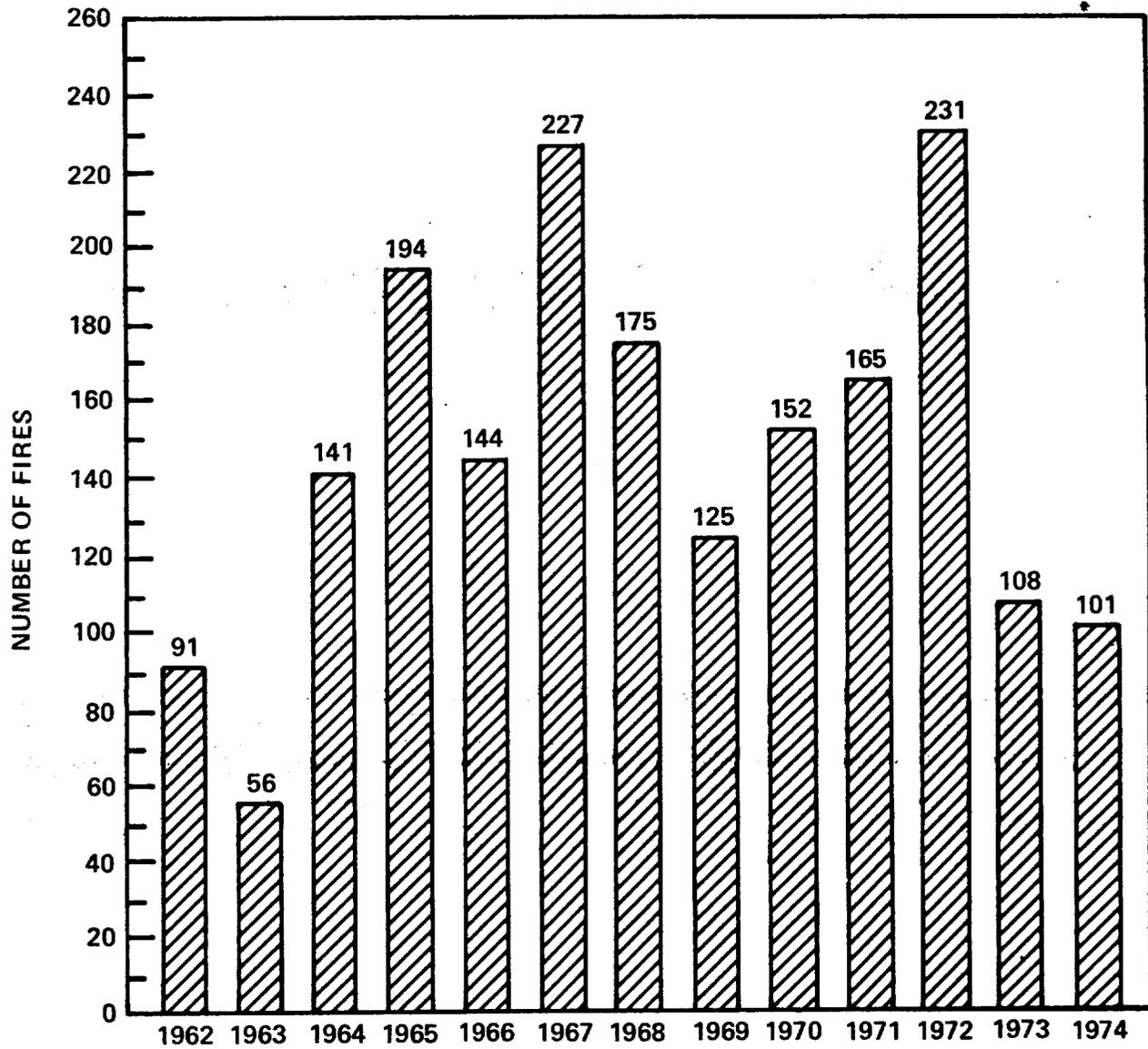


Results of an Untended Oven Fire  
Which Occurred After Working Hours

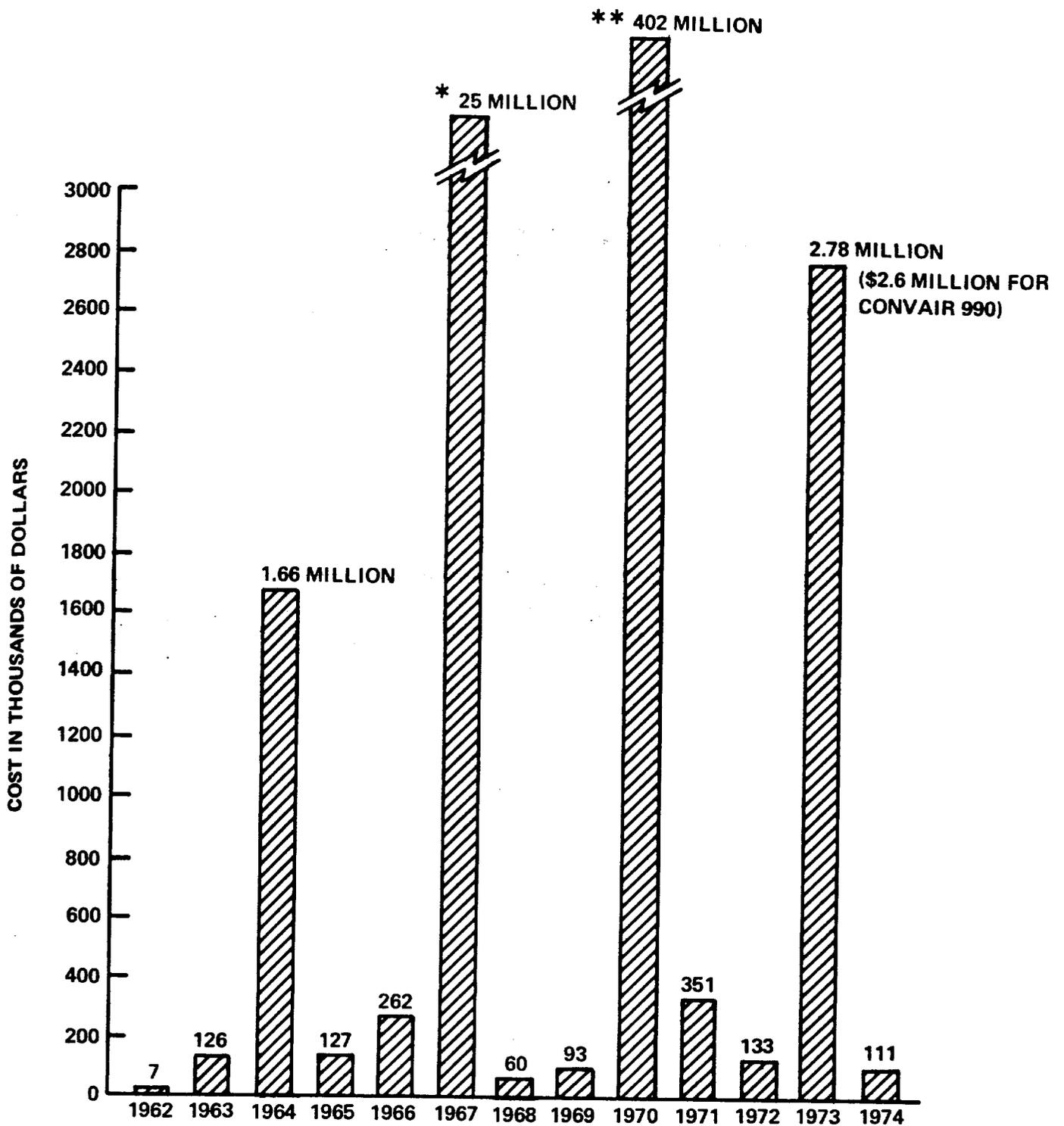


Children Playing with Matches  
Started This Fire at a Facility Residence

## NUMBER OF NASA FIRE MISHAPS BY FISCAL YEAR



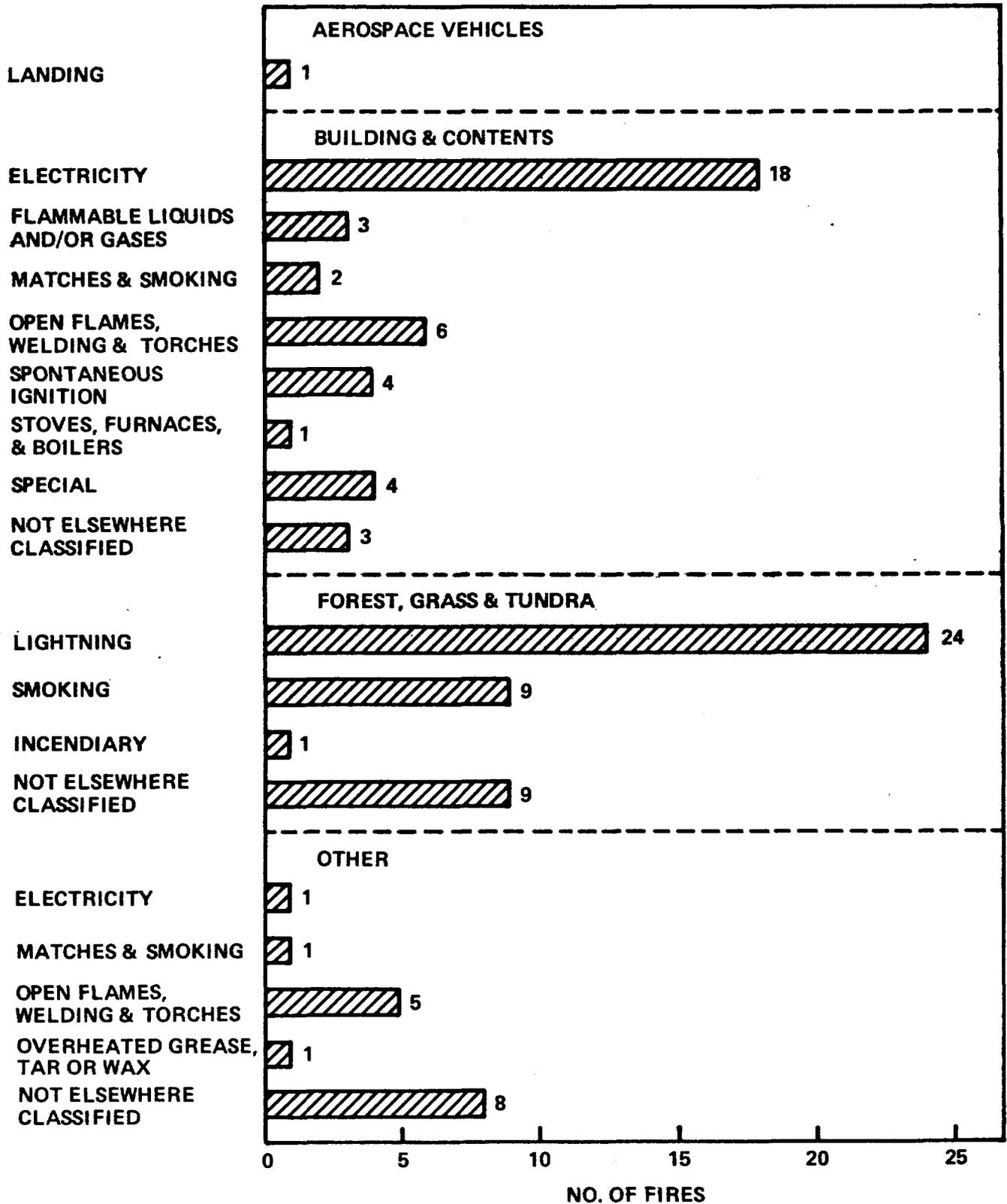
## COST TO NASA FOR FIRE MISHAPS BY FISCAL YEAR



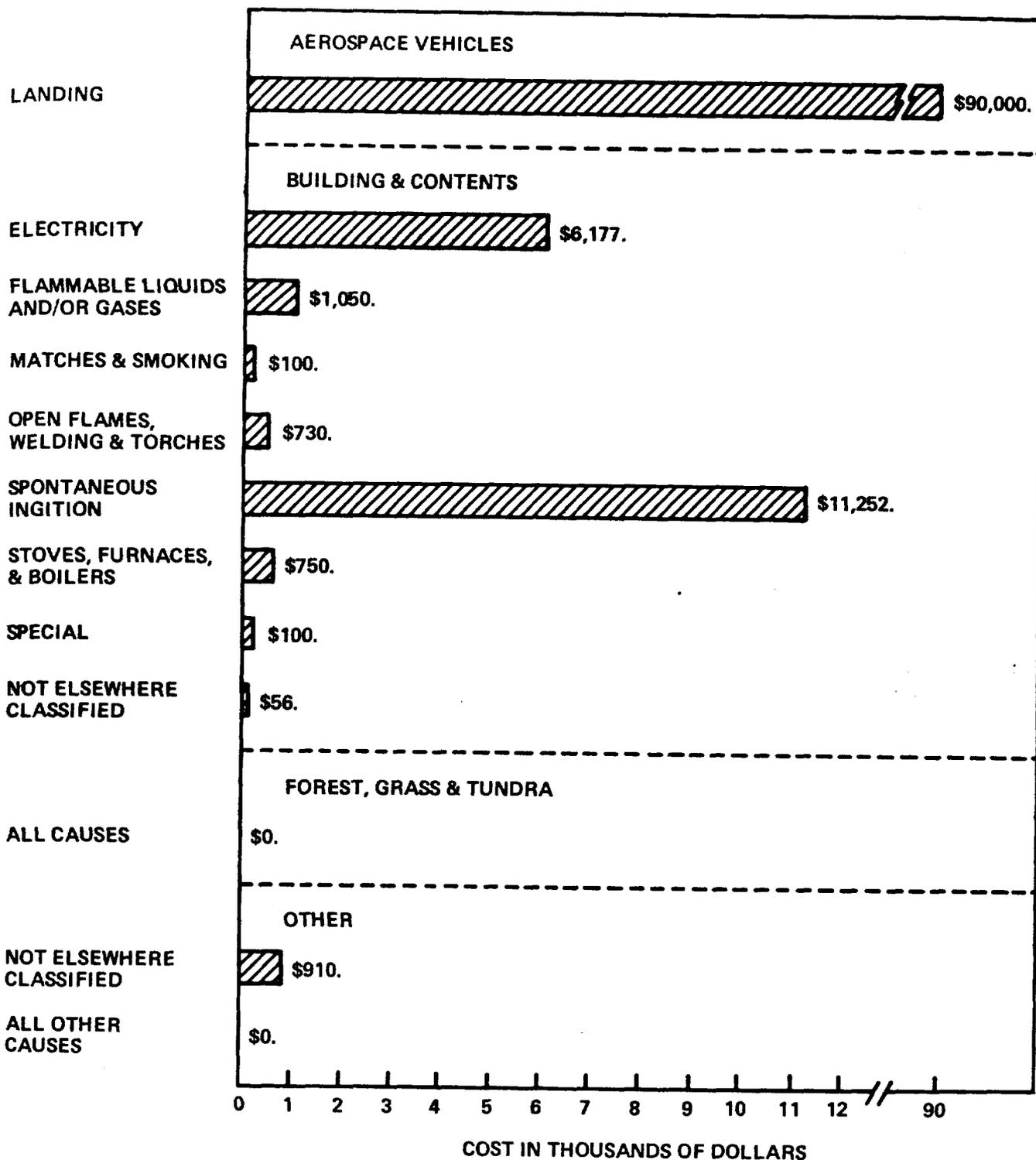
\* HIGH COSTS DUE TO APOLLO 204 FIRE WHICH KILLED THREE ASTRONAUTS.

\*\* EXCEEDINGLY HIGH COSTS WERE DUE TO APOLLO 13 LOX EXPLOSION ON THE WAY TO THE MOON.

# CAUSES OF FIRE MISHAPS - FY 1974



# COST TO NASA OF FIRE MISHAPS BY CAUSE - FY 74



# TYPES OF INJURIES

1974

Not all lost time injuries were summarized and submitted to Headquarters. Only 60 injury briefs with the number of days lost were received, but 116 lost time injuries were reported to OSHA.

	<u>Number Sustained</u>	<u>Number of Days Lost</u>
Striking Against	7	27
Struck By	8	28
Caught In, On, or Between	2	70
Fall on Same Level	6	383
Fall to Different Level	9	45
Slip (not Fall) or Over Exertion	26	923
Exposure to Temperature Extremes	1	4
Cause not Given	<u>1</u>	<u>31</u>
TOTAL	60	1511

LOST TIME INJURY BRIEFS  
1974

<u>STRIKING AGAINST:</u>	<u>DAYS LOST</u>
Employee was injured when she struck her foot against a piece of metal construction material which had been left lying on the floor by construction workers who were working in area. Injury diagnosed as a laceration and contusion of the right foot.	1
While working on a piece of metal, employee dropped his hand, lacerating it on the metal. Injury diagnosed as a laceration of the left hand.	2
Employee bent to pick up an object and upon straightening up, struck his back on the front of a chair. Injury diagnosed as a severe back strain.	2
Employee was walking in hallway when he struck his foot against a piece of pipe which was projecting into the doorway. The pipe was part of construction materials being use in modification of the facilities. Injury diagnosed as a 2 1/2" superficial laceration of the left foot.	2
Employee was driving his privately owned vehicle east when he struck the right front of a NASA-owned truck heading south. It was raining at the time of the accident. Employee was not wearing seat belt. Injury diagnosed as a contusion of the right knee and right elbow, also back discomfort.	4
Employee was standing on stacked spools of wire in a truck trailer when the stack on which he was standing toppled, throwing him against the side of the trailer and to the floor. Injury diagnosed as a contusion of the right shoulder and hip, lumbar sacral sprain/strain, and severe sprain of left wrist.	4

STRIKING AGAINST:

DAYS LOST

Employee, a doctor, was involved in a severe collision with a government vehicle. Injuries sustained included bruises of legs and forearms, sprained lower back, deep lacerations to face around mouth. 12

STRUCK BY:

Employee was leaving a ladies' room when another employee opened the door, striking the injured employee in the area of her left eye and breaking the injured employee's eyeglasses. Injury diagnosed as a contusion of left orbital area. 1

Employee struck on left shoulder by a stack of steel door frames which were overbalanced, toppling them which caused a small laceration to shoulder. 1

Employee was lifting a 5 gallon can of oil when the greasy handle slipped from his hand. The can fell on his left foot. Injury diagnosed as a fracture and laceration of large toe and left foot. 2

Employee dropped a piece of stainless steel sheet (4x8) and it slid and struck him on his right foot. Injury diagnosed as a fracture to the right first metatarsal. 3

Employee was pulling cables out of a cabinet when one caught and flipped into his left eye. Injury diagnosed as an abrasion to left cornea. 3

Employee was grinding a weld off a steel plate. The "C" clamp holding the plate slipped and the steel plate fell on his right foot. Injury diagnosed as a contusion to the right foot. 4

Employee was injured when a one-inch section of 1/4" diameter stainless steel tube hydrazine fuel line exploded. A small piece of tubing was surgically removed from his neck at the hospital. 4

STRUCK BY:

DAYS LOST

Employee was in the process of straightening out the hoist line on a crane. Lines had slipped out of the sheaves on the boom. When the block touched the pavement, after crane was boomed down, the block turned over on his foot. Injury diagnosed as bruised and ruptured blood vessels in left foot. 10

CAUGHT IN, ON, OR BETWEEN:

While disassembling a wire braiding machine for cleaning, employee's left first finger caught in the machine. Injury diagnosed as an amputation of the distal portion of left first finger. 1

Employee caught hand in a spinning lathe. Injury diagnosed as a traumatic amputation of tips of right index and fifth fingers. 69

FALL ON SAME LEVEL:

While walking, employee stepped upon a ramp, foot turned, causing him to twist his ankle and fall. 1

Employee stepped out of car, turned right foot, and fell to sidewalk. Injury diagnosed as a fracture of the neck of the metatarsal. 1

Employee is handicapped and has difficulty in walking. He was hurrying and got his feet tangled and fell, hitting head on concrete floor. Injury diagnosed as a laceration on the left side of scalp. Five sutures required. 3

Employee was walking in hall, when a lady came out of office door. While trying to avoid bumping into her, he spun and fell to floor against wall. Injury diagnosed as acute muscle strain of low back. 17

The chair in which an employee was sitting broke and he fell to the floor. 85

Employee stepped with his right heel on a plastic strip (used for tying cables together) on shop floor and his artificial leg bent backward. Then he fell backward. Injury diagnosed as a fractured right hip. 276

FALL TO DIFFERENT LEVEL:

DAYS LOST

Employee was walking in grass when he stepped in a hole, twisting his ankle. Injury diagnosed as a fracture of the left ankle. 1

Employee was walking up steps, caught left foot on next step. Fell down on steps. Injuries diagnosed as bruised left knee, elbow, and scalp. 1

Employee fell down stairs. Injury diagnosed as a contusion of the head. 1

Employee was getting up on a sand blasting machine when he slipped on the platform and fell. Injury diagnosed as a muscle strain, left calf. 2

Employee was removing an extension cord from a pit when he lost his balance and fell into the pit. Injury diagnosed as a twisted left knee. 3

Employee was riding a NASA bicycle; apparently the left handle bar failed at the stem fitting causing him to fall from bicycle. He struck his head on the concrete and ended up with the bicycle on top of him. Injuries diagnosed as a contusion of forehead, laceration of bridge of nose and mid upper lip (internal and external), contusion and abrasions on right side of face. 5

Employee was walking in grass in back of a NASA building, when he stepped in a hole causing him to turn his left ankle. Injury diagnosed as a severe sprain to left ankle. 6

Employee was walking up stairs and slipped on the second stair from the top; she fell backwards 6 or 7 steps. She turned as she fell and landed on her hip. Injury diagnosed as a contusion of the left hip. 7

Employee was positioning a pallet of material on a falt bed trailer. The material started slipping and he moved backwards and stepped into a chain-well hole, causing him to fall off the trailer. Injuries diagnosed as sprained ankle, severe bruises on back, knee, and wrist. 19

SLIP (NOT FALL) OR OVER EXERTION:DAYS LOST

Employee was attempting to move a desk with several boxes on it. He put his body and neck against a wall and attempted to push the desk with his feet when he suffered the injury. Injury diagnosed as a cervical neck sprain.	1
Employee was walking up a flight of stairs in a normal manner when he experienced an injury to his leg. Injury diagnosed as a left muscle strain.	1
Employee tripped over boxes stacked in passageway, so tried to move them and developed a crick in her neck.	1
Employee lifted box of film and felt pain in back and had difficulty in straightening up.	1
While going downstairs, employee moved aside to let another pass, letting go of handrail. She twisted her ankle as she was unable to reach handrail.	1
Employee picked up a block of wood weighing about 25 lbs. while in an awkward position. Injury diagnosed as a strain of the middle back.	1
Employee stepped off a 14" I-Beam and slipped. Injury diagnosed as a sprained ankle.	1
Employee was walking down steps, slipped and twisted left ankle. Injury diagnosed as a sprain of the left ankle.	2
Employee was drilling a hole through concrete. The drill stuck and the employee felt his shoulder "pop". Injury diagnosed as a possible tear of rotator cuff, right shoulder.	3
Employee was on ladder checking lamp positions; twisted back while stretching.	3
Employee was assembling a work bench in an awkward position. Injury diagnosed as acute back strain.	3
Employee squatted to examine means of removing test equipment from a pallet and experienced sharp pains when he rose and was unable to stand upright.	4

<u>SLIP (NOT FALL) OR OVER EXERTION:</u>	<u>DAYS LOST</u>
Employee was leaning over a table to write when stricken. Injury diagnosed as acute back strain.	4
Employee experienced low back syndrome-exacerbation when he lifted a heavy item.	10
While lifting a heavy microscope, employee pulled the right side of his back. Injury diagnosed as a right sacroiliac strain.	11
Employee's foot slipped on floor while leaning over air conditioning duct to establish a view for a photograph of equipment, causing acute back strain.	14
Employee was going up stairs, twisted or placed foot down at an angle when making step, and felt a pulling sensation in left knee. Injury diagnosed as an internal derangement of the left knee.	19
Employee strained himself while lifting a four-foot piece of plastic, weighing about 100 lbs. Injury diagnosed as a hernia, left groin. Operated on six days after accident.	21
Employee moved a surface plate into position to perform inspection of a part and 15 days later surgery was required to correct a right inguinal hernia.	21
While unloading metal frame, employee experienced abdominal muscle strain which required hernia repair operation.	35
Employee was operating a vacuum frame in reproduction and aggravated an old back injury. Injury diagnosed as a back strain.	35
With assistance of two other employees, employee was removing enclosure for high voltage air switch. Injury diagnosed as a back strain.	49
Injury occurred during installation of a cable on a gantry. Injury diagnosed as a bilateral, inguinal hernia.	68
Employee slipped in solvent recently spilled on the floor. Injury diagnosed as torn ligaments in knee.	102

SLIP (NOT FALL) OR OVER EXERTION:

DAYS LOST

Employee was walking and slipped on floor. She was wearing leather-sole shoes and the floor was of typical linoleum tile surface. Injury to lower back.

217

Employee was assisting moving an icemaker machine which weighed approximately 400 lbs. and felt a pain in the right side of his back. Injury diagnosed as a back strain.

295

EXPOSURE TO TEMPERATURE EXTREMES:

Employee was removing a valve from a steam line when hot water flowed out into the employee's left shoe, burning his foot. Injury diagnosed as 2nd and 3rd degree burns of the left heel.

4

CAUSE NOT GIVEN:

Employee bruised supraorbital ridge and nerve. Injury diagnosed as a supraorbital neuroma.

31