NIOSH Comments to DOL

COMMENTS FROM THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH ON THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION PROPOSED RULE ON SAFETY STANDARDS FOR FALL PROTECTION IN THE CONSTRUCTION INDUSTRY

29 CFR Part 1926
Docket No. S-206A

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health

11/3/92

INTRODUCTION

The National Institute for Occupational Safety and Health (NIOSH) submits the following comments to the Occupational Safety and Health Administration (OSHA) for inclusion in the reopened docket for 29 CFR 1926 subpart M, fall protection as applied to workers in the precast concrete construction industry. NIOSH had previously submitted comments to OSHA on the proposed revisions to subpart M [NIOSH 1987]. NIOSH has addressed many of these same issues in comments to OSHA on proposed rulemaking for 29 CFR 1910 subparts D and I [NIOSH 1990a; 1990b; 1990c].

RISK

According to the NIOSH National Traumatic Occupational Fatality (NTOF) database, the average annual fatality rate for the construction industry from 1980 through 1989 was 25.6 deaths per 100,000 civilian workers. The fatality rate (per 100,000) for this industry was 28.9 in 1980 and 21.7 in 1989. The overall fatality rates (per 100,000) for civilian employment in all sectors of the U.S. economy combined, decreased from 8.9 in 1980 to 5.6 in 1989.

The NTOF database indicates that 11,430 occupationally related deaths occurred across all construction industries over the 10-year period, 1980 through 1989. During this period, there were 2,930 fall-related fatalities in construction (Table 1). Approximately 40 percent of these fall-related deaths involved falls from buildings or other structures and 30 percent involved falls from ladders or scaffolds. The number of fatal falls by SIC code are presented in Table 1. Due to the limitations of the NTOF database, which were indicated in our prior testimony to this docket [NIOSH 1990a; 1990b; 1990c], NIOSH expects these numbers of deaths to be under-enumerations.

Data from the Bureau of Labor Statistics' Supplementary Data System (SDS) indicate that at least 22,911 construction workers per year were injured by falls from elevation during the years 1985 through 1987 (Table 2). This number <u>is not</u> a national estimate because not all states report to the SDS and the number of states reporting varies from year to year. The number of "falls from elevation" was derived from the "TYPE OF INCIDENT" variable in the SDS and may be further divided into 8 categories (see Table 2). Table 2 shows the number of falls from elevation in the SDS database from 1985 through 1987 by category of fall for both the construction industry in general, and for Standard Industrial Classification (SIC) 1791 specifically [OMB 1987]. SIC 1791 includes special contractors primarily engaged in the erection of structural steel and of similar products of prestressed or precast concrete. The SDS data category for falls from buildings is contained in the "Associated Object or Substance" variable. However, this optional variable is inconsistently completed by the participating states reporting into the SDS. This further limits the data available from which to estimate the number of construction worker injuries due to falls from buildings.

Incident investigation summaries in the OSHA *Integrated Management Information System* (IMIS) construction industry database were searched for the word "precast" to determine if there were any cases of fall-related injuries

involving precast concrete construction between October 26, 1984 and April 10, 1990. From this database, Table 3 is a verbatim transcript of the abstracts of eight cases involving falls that appear to involve precast concrete. In three cases, the victim was working in SIC 1622. Two victims worked in SIC 1799, while one victim worked in each of the following industries; SIC 1791, SIC 1771, and SIC 1542.

NIOSH does not have data to support more specific estimates for the number of deaths or other injuries that occur during construction activities involving precast concrete product.

FALL PROTECTION

NIOSH has previously submitted material to this docket from the Fatal Accident Circumstances and Epidemiology (FACE[1]) program related to fatalities from falls [NIOSH 1990a; 1990b; 1990c]. The FACE data contain details on 40 deaths (35 in construction) resulting from falls from elevated workplaces from October 1987 through September 1989. These data indicated 5 instances where workers wore fall protection equipment; in three instances the workers were not tied off, one worker used a damaged lanyard that failed, and one worker had a lanyard that had not been secured properly to the anchor point and the snap hook opened when subjected to the load imposed by the worker's fall [Bobick et al. 1990].

The NIOSH FACE project does not have specific data on fatal falls from precast concrete structures. The FACE data are genenerally applicable to falls from any elevated structure.

PROPOSED "MONITOR" PROGRAMS

NIOSH does not recommend the use of a spotter or monitor to replace barriers or personal fall protection equipment. Reliance on passive measures, such as safety harnesses, is generally recognized as more effective than reliance on active measures that require worker involvement and attention in order to function. Using a monitor to keep another worker from the edge would require the active involvement of both the monitor and the worker to ensure safety.

NIOSH agrees with the OSHA Safety and Health Standard 29 CFR 1926.550(a)(15)(iv) which states that "a person shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means" in the limited circumstance of operating boom equipment near power transmission lines [NIOSH 1991]. In this case, a spotter is recommended to assist the operator in maintaining assured clear distances from lines when the

[1]Effective October 1, 1992, the FACE program name has been changed to Fatality Assessment and Control Evaluation.

operator's viewing angle or obstructions to the operator's view make it difficult for the operator to judge the distance between the boom and the line.

Table 1

Distribution of Fatal Work-related Falls (Cause of Death Codes: E880 to E888)* From 1980 Through 1989
for Selected Detailed Sub-industries of the U.S. Construction Industry**

INDUSTRY (SIC)***	CAUSE OF DEATH (ICD-9)*					
	E882 (Fall from or out of building or other structure)	E881.1 (Fall from scaffolding)	E884.9 (Other fall from one level to another)	E881.0 (Fall from ladder)	OTHER	TOTAL
1761 (Roofing, Siding, & Sheet Metal Work)	185	8	12	16	22	243
1793 (Glass & Glazing Work)	109	32	53	5	36	235
1731 (Electrical Work)	26	14	19	44	21	124
SIC Major Group 17 (Construction - Special Trade Contractors)	23	33	10	26	12	104
1751 (Carpentry Work)	35	12	15	15	18	95
1711 (Plumbing, Heating & Air-Conditioning)	15	11	8	15	19	68
1791 (Structural Steel Erection)	30	11	11	3	11	66
SIC Major Group 16 (Heavy Construction Other Than Building Construction - Contractors)	23	13	7	3	12	58
Other Construction	75	44	30	12	32	193
Unknown	653	376	231	180	304	1744
Total	1174	554	396	319	487	2930

*Source: The International Classification of Diseases, 9th Revision, Clinical Modification, 1980 [DHHS 1980].
**Source: National Traumatic Occupational Fatalities Surveillance System, NIOSH, Division of Safety Research, Morgantown, WV.
***Source: Standard Industrial Classification Manual, Executive Office of the President, Office of Management and Budget, 1987 [OMB 1987].

Table 2

Workers' Compensation Claims Reported to the Bureau of Labor Statistics' Supplementary Data System Involving Injuries to Construction Workers Due to Falls From Elevations Which Occurred from 1985 Through 1987*

Fall Category	Construction (SIC Major Group 15, 16, 17)	SIC 1791
Fall from level to level	21,064	606
Fall from ladder	18,718	289
Fall from scaffold	12,428	180
Fall from vehicle	7,473	137
Fall into shaft	3,971	63
Fall on stairs	3,871	47
Fall from elevation, unspecified	989	64
Fall from piled material	221	11
Total	68,735	1,397

*Data based on complete computer files sent to NIOSH by the BLS for the years 1985 through 1988 where the year of occurrence of the injury was between January 1, 1985 and December 31, 1987. Note that the number of states reporting was not consistent between reporting years, therefore, no attempt has been made to generate national estimates.

Table 3

Verbatim Transcript of OSHA Investigations of Falls Involving Precast Concrete Construction, October 26, 1984 Through April 10, 1990

01475556517918404028403281100014464804SCAFFOLD COLLAPSED, THROWING EMPLOYEE TO THE GROUND AT APPROXIMATELY 11:00 A.M., ON MARCH 28, 1984 AN EMPLOYEE FELL FROM THE FIFTH FLOOR LEVEL OF AN EIGHT STORY PRECAST TYPE STRUCTURE. THREE EMPLOYEES WERE INSTALLING A 24 INCH BY 24 INCH 40 FOOT LONG PRECAST COLUMN, WEIGHING ABOUT 36,000 POUNDS, WHICH WAS BEING HOISTED INTO PLACE BY A CRANE. AN OUTRIGGER TYPE SCAFFOLD WAS BEING USED BY THE EMPLOYEES WHICH ENABLED THEM TO WORK OUTSIDE THE PERMETER OF THE BUILDING TO MAKE THE NECESSARY CONNECTIONS FOR THE COLUMN. THE 3/4 INCH DIAMETER, 36 INCH LONG, ALLTHREAD ATTACHMENT BOLT WAS REMOVED FROM THE SCAFFOLD AND THE COLUMN. THE SCAFFOLD, WITH THE EMPLOYEE, THEN FELL 58 FEET FROM THE 5TH FLOOR LEVEL TO THE GROUND. THE EMPLOYEE WAS TAKEN TO ST. VINCENT HOSPITAL, WHERE HE DIED ON APRIL 2, 1984.

10207755917718509260000000000014215297FELL THRU OPENING THE EMPLOYEE WAS WELDING FORTY FOOT LONG AND EIGHT FOOT WIDE DOUBLE "T" PRECAST CONCRETE SLABS TOGETHER ON THE ROOF OF A BUILDING EIGHTY-FIVE FEET ABOVE THE GROUND. THE EMPLOYEE HAD FINISHED WELDING A RUN OF SLABS AND WAS BACKING UP ON THE ROOF IN ORDER TO START ON ANOTHER RUN WHEN HE BACKED INTO A 4'4"BY 3'8" HOLE WHERE A FAN WAS GOING TO BE PLACED. AS THE EMPLOYEE WAS BACKING UP HE WAS PULLING THE WELDINGS LEADS WHICH HE WAS USING TO WELD THE SLABS. THE EMPLOYEE DIED FROM INJURIES, WHICH WERE SUSTAINED FROM THE 85' FALL. THE HOLE THROUGH WHICH THE EMPLOYEE FELL WAS UNGUARDED AND UNCOVERED.

10196337917998607010000000000000671792FALL FROM PRECAST BEAM 182 FEET TO BASEMENT ON JUNE 30 1986 AT APPROXIMATELY 12:50 PM EMPLOYEE #1 CLIMBED ONTO THE PRECAST CONCRETE BEAM TO TO PUS THE 1 1/4" BAR INTO POSITION AND LINE UP THE COLLARS AND BARS AND THREAD THEM INTO POSITION AND MAKE BARS CONTINOUS HE HAD NOT GOT TO THE POINT OF INSTALLING THE SLEEVES BECAUSE ALL 4 SLEEVES WERE STILL ON THE BEAMS HE WAS NOT USING TOOLS OR WRENCHES HE WAS ON THE NORTH END OF BEAM FACING WEST IN A CROUCHED POSITION HE LOST HIS GRIP OR GOT DIZZY AND FELL BACKWARDS AND HIT A 2X10 BOARD ACROSS THE SHAFT 26 FEET BELOW AND ROLLED OFF THE BOARD AND CONTINUED HIS FALL APPROXIMATELY 212 FEET INTO THE 3RD BASEMENT TO THE CONCRETE FLOOR HE WAS PROUNOUNCED DEAD ON ARRIVAL AT WISH AND HOSPITAL

10361321216228610300000000000014511844CONSTRUCTION EMPLOYEE FELL 40 FEET FROM BRIDGE DECK EMPLOYEE #1 WAS SETTING BRACKET HOLDERS AND PLACING 4 X 4 INCH RUNNERS ACROSS THE BRACKETS. HE STEPPED ON ONE OF THE RUNNERS AND A STAR HANGER, WHICH HAD BEEN COLD SET INTO THE PRECAST CONCRETE BEAM, FAILED. HE FELL 40 FEET TO THE GROUND AND WAS KILLED. FALL PROTECTION WAS NOT PROVIDED (NETS, GUARD RAILS, SAFETY BELT AND LIFELINE).

1045581191542870624000000000000998682PRECAST CONCRETE PANEL ROOF COLLAPSE
ON JUNE 24, 1987 AT APPROX 10:15 AM EMPLOYEES #2 & 3 HAD JUST COMPLETED PEACING THE FINAL 12" PRE-CAST CONCRETE ROOF PLANK ON A 1 STORY CONCRETE BLOCK BUILDING. SUDDENLY WITHOUT WARNING, THE ROOF PLANKS BEGAN COLLAPSING. EMPLOYEE #1 ESTIMATING THE BUILT-UP ROOFING TO BE COMPLETED STANDING ON THE ROOF FELL BETWEEN THE COLLAPSING 12" PRE-CAST CONCRETE PLANKING AND WAS CRUSHED. EMPLOYEE #2 WAS THROWN TO THE EXTERIOR OF THE BUILDING. EMPLOYEE #3 ROPE THE PLANKING DOWN. EMPLOYEE #1 DIED OF MULTIPLE INTERNAL INJURIES EMPLOYEE #2 WAS HOSPITALIZED WITH LACERATIONS, & EMPLOYEE #3 RECIEVED A MINOR ABRASION ON ONE FOREARM.

1013564591799880121000000000000607259FALL
EMPLOYEE #1 WAS A LABORER ON A TWO MAN PRECAST CONCRETE CREW. HE AND ANOTHER EMPLOYEE HAD TAKEN DOWN THE WIRE ROPE GUARDRAILS AT THE CORNER OF THE 5TH FLOOR OF A HIGH RISE OFFICE BUILDING UNDER CONSTRUCTION. THE EMPLOYEES FINISHED CUTTING THE PRECAST CONCRETE AT THE EDGE OF THE BUILDING AND WERE IN THE PROCESS OF RE-INSTALLING THE WIRE ROPE GUARDRAILS. EMPLOYEE #1 WAS PULLING TENSION IN THE WIRE ROPE TOP RAIL WHEN HE WALKED OFF THE EDGE OF THE BUILDING BACKWARDS. NEITHER EMPLOYEE WAS TIED OFF WITH A SAFETY BELT AND LAUYARD.

1056755401622881221000000000000894543STRUCK BY TIRE AND CRUSHED
EMPLOYEE #1 WAS PART OF TWO MAN CREW MOVING BRIDGE SECTION THAT WERE PRECAST UP FROM THE LOADING OINT TO INSTALLATION POINT WHILE EQUIPMENT WAS IN MOTION EMPLOYEE WENT TO STEP ON A STEERING BAR AND MISSED HIS STEP FALLING TO THE GROUND AND BEING PARTIALLY RUN OVER BY AN OUTER TIRE EMPLOYEE WAS CONSCIOUS AT ALL TIMES AND TRANSPORTED TO HOSPITAL WHERE HE DIED

1068563391622881011000000000014218978FALL FROM STRUCK BY
A HIGHWAY CONSTRUCTION CREW HAD REPLACEDOLD WOODEN BRIDGE WITH A PRECAST BOX CULVERT THEY WERE TO SET A PRECAST HEADWALL ON THE CULVERT THE CRANE BROUGHT TWO PIECES OF PRECAST CONCRETE IN SET IT DOWN UNHOOKED AND MOPVED AWAY THER WERE NO SUPPORTS ADDED EMPLOYEE WS ATTEMPTING TO LEVEL THE CONCRETE PANELS WHEN THEY COLLAPSED HE FELL WITH HE PANELS 9 FOR 5IN TO HIS DEATH

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