#256
Library

UNITED STATES GOVERNMENT

Memorandum

U.S. CONSUMER PRODUCT SAFETY COMMISSION

TO : Milton J. Schulz, Acting Compliance Officer, Chicago Area Office
Through: Stephen Lemberg, Assistant General Counsel DSL

DATE: December 19, 1977

FROM : Carole Roth, OGC CR

SUBJECT: CPSC Jurisdiction over Industrial Hardhats

This is in response to your memorandum of November 28, 1977 requesting information on Commission jurisdiction over industrial hardhats.

According to section 3 of the Consumer Product Safety Act (CPSA), a consumer product is any article produced or distributed "for the personal use, consumption or enjoyment" of a consumer. The legislative history of the act indicates that true industrial products or products which are not customarily produced or distributed for sale to or for the use of consumers are not intended to be included within the Commission's authority under the CPSA. Furthermore, the occasional use of industrial products by consumers is not sufficient to bring a product within the Commission's jurisdiction.

Thus, it appears that industrial hardhats are not "consumer products" as that term is used in the CPSA. In addition, even if the hardhats were to be considered consumer products, the Commission would most likely not have the authority to regulate them because of the provisions of section 31 of the CPSA. That section states that "the Commission shall have no authority under [the CPSA] to regulate any risk of injury associated with a consumer product if such risk could be eliminated or reduced to a sufficient extent by actions taken under the Occupational Safety and Health Act of 1970."

ADVISORY OPINION

256

Memorandum

SAFETY COMMISSION

TO : OFFICE OF THE GENERAL COUNSEL

DATE: November 28, 1977

FROM : Chicago Area Office/CPSC-815

SUBJECT: Industrial Hardhats

Attached is an inquiry which was received from the Region V OSHA Office. The question is whether CPSC has any jurisdiction over these hats.

After discussing the problem with the local OSHA people, we informed them that it was our opinion that the problem was outside our jurisdiction. However, we did assure them that we would obtain an official opinion. Would you advise us please.

Milton J. Schulz
Acting Compliance Officer

RECEIVED
DEC 5 1977
Consumer Product Safety Commission
Office of the General Counsel

O+1cc - OS w/attachment
1cc - SMH (FYI)
1cc - MJS/DLD (FYI)

MJS/kc

U.S. DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
REGION V

DATE: November 8, 1977
REPLY TO ATTN OF: 50

SUBJECT: Hard Hats Which Do Not Meet Safety Standards

TO: Sam Hart, Area Director
Consumers Products Safety Commission

The enclosed is a report concerning an employee fatality that involved a hard hat manufactured by the Apex Corporation. It is understood that the manufacturing company is located in South Carolina, and that it is owned by White Industries. Also included is a test report prepared by the NIOSH testing laboratory in Pittsburg.

It is our understanding that the Apex Company has been approached by OSHA representatives concerning their hard hats, but that they have resisted either changing the product or stopping sales. The OSHA law has no provision for citation of manufacturers of equipment that do not meet standards. OSHA standards (29 CFR 1910.135) adopts the ANSI Z89.1 - 1969 standard. We have copies of ANSI and most of the other applicable consensus safety and health standards in our Regional Office should you wish to examine them.

It is requested that you make a determination of what assistance the CPSC can provide in this situation, and advise.

Al Conley for
Barry J. White
Regional Administrator

Enclosures

RECEIVED
DEC 5 1977
Consumer Product Safety Commission
Office of the General Counsel

U.S. DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
REGION V

DATE: November 8, 1977
REPLY TO ATTN OF: 50

SUBJECT: Apex Model PG-Z and E2-A Safety Hard Hat; Need For Immediate Withdrawal From Service.

TO: Region 5 Area Directors and District Office Supervisors

The enclosed report and correspondence indicates that hard hats made by the Apex Company do not meet the 1910.135 standard. It is understood that there may be some of these hats in the hands of our CSHOs. Please take the following immediate action.

(a) Determine whether any of your personnel have these hard hats, or whether you have any in inventory.

(b) If hats are found, withdraw them from service and discard them.

(c) Authorize local purchases as necessary to replace the withdrawn hats. (Billing to the management office as usual - Note - hard hats are not inventorized so Region cannot assist you.)

Indicate the following:

_____ number of Apex hard hats found.

_____ date hats were withdrawn.

_____ approximate billing to Region associated with hard hat replacement.

Al Corley for
Barry J. White
Regional Administrator

Enclosure

U.S. DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
REGION V

DATE: October 25, 1977

REPLY TO ATTN OF: A-TOL

SUBJECT: NIOSH Report on Safety Equipment

TO: Barry White, Regional Administrator

Enclosed please find a copy of the NIOSH Report concerning the Apex hard hats which were involved in the fatality in Toledo, Ohio.

I discussed this matter with you at the first Pheasant Run meeting and you requested a copy of the report. These hard hats are still being manufactured and sold, and still contain the information that they "meet or exceed ANSI Z 89.1 or Z89.2 requirements".

Tom Buchele

Thomas Buchele
Compliance Officer

TB/ve
Encl: 1

mfg by White Industries

RECEIVED
OCT 27 1977
Reg. Adm.
Chgo. Reg. OSHA Off.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL

April 1, 1977

NATIONAL INSTITUTE FOR OCCUPAT
SAFETY AND HEALTH — ALOSH
944 CHESTNUT RIDGE ROAD
MORGANTOWN, WEST VIRGINIA 26

Mr. Thomas R. Buchele, CSHO
U.S. Department of Labor, OSHA
Toledo Area Office, Region V
Federal Office Building - Room 734
Toledo, Ohio 43604

Dear Mr. Buchele:

In response to your written request of March 9, 1977, with regard to a fatality which occurred in Sylvania, Ohio to an individual wearing an Apex PG-2 helmet, we have conducted a technical investigation of Apex helmets and prepared a report thereof which is attached (I). The report covers three essential points:

1. A review of results obtained by this laboratory with regard to Apex E2-A helmets (NIOSH No. 76-106) published in July 1975.

2. Results obtained with the two Apex PG-2 helmets provided by you and received by this laboratory on March 8, 1977 (Certified Receipt No. 126406).

3. Results of studies by this laboratory on 60 Apex PG-2 helmets purchased in March 1977 as a result of your inquiry.

Our report concludes:

> "Our tests demonstrate that Apex PG-2 helmets are not manufactured uniformly enough to guarantee an acceptable product at any given time. The helmets we purchased did <u>not</u> comply with the minimum impact resistance performance requirements of either ANSI Z89.1 or Z89.2. There is no statistical evidence that the helmets submitted by Mr. Buchele performed any differently than those we evaluated".

We find it very disturbing that Apex has apparently made no discernable effort to upgrade the quality of their helmets in the 1-1/2 years since our initial report was released in July, 1975. We are confident that Apex was fully aware of the results of that study through their trade association, the Industrial Safety Equipment Association, as they are members of the head protection group thereof.

While the two Apex PG-2 helmets you provided appear to have barely met the impact performance requirements, it must be recognized that they were of a different manufacturing date than the helmet involved in the fatality. Results from the 60 Apex PG-2 helmets purchased by NIOSH in March, 1977 and manufactured between August and November, 1976 provide the basis for our conclusion that statistically one cannot state that the specific helmet involved in the fatality would have met the performance criteria, rather it is highly probable that it would <u>not</u>.

In your letter you noted that the object striking the individual disintegrated upon impact. I would observe, that such disintegration upon impact is a highly effective means of energy dissipation. Thus, the energy transmitted to the helmet and thus the individual would be much less than that associated with a solid object which did not come apart upon impact. One may not necessarily conclude, therefore, that the insult clearly exceed the required capacity of the protective device (helmet)!

We must observe that Apex helmets tested over 1-1/2 years ago failed to meet the impact resistance requirements and that recently purchased Apex helmets also failed such requirements. While we cannot conclude that such poor performance characteristics caused this fatality we can conclude that it was most probably contributory thereto.

If we can provide additional information with regard to this matter, please advise me.

Very truly yours

John B. Moran

John B. Moran

Enclosure

cc: Mr. Thomas Seymour
Special Safety Assistant
Dept. of Labor Bldg. Rm N 3463
200 Constitution Avenue, N.W.
Washington, D.C. 20210

Dr. Eula Bingham
Assistant Secretary, OSHA
Dept. of Labor Bldg. Rm S 2315
200 Constitution Avenue, N.W.

Mr. Barry White
Director, Region V, OSHA
U.S. Dept. of Labor, OSHA
32nd Floor - Rm 3263
230 S. Dearborn Street
Chicago, Ill. 60604

IMPACT TESTS

ON

APEX PG-2 (POLY-GUARD)

INDUSTRIAL SAFETY HELMETS

William I. Cook

SAFETY EQUIPMENT SECTION

TESTING AND CERTIFICATION BRANCH

APPALACHIAN LABORATORY FOR OCCUPATIONAL SAFETY AND HEALTH

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

MARCH 1977

IMPACT TESTS

ON

APEX PG-2 (POLY-GUARD)

INDUSTRIAL SAFETY HELMETS

Reference: Letter of March 9, 1977 from Mr. Tom Buchele, CSHO, OSHA (attached).

1. PURPOSE

NIOSH has been requested by Mr. Buchele, OSHA to evaluate the impact properties of the Apex PG-2 industrial safety helmet to determine if it complies with the impact requirements of the ANSI Z89 Standard, On January 4, 1977, a Mr. Matteo LoPiccolo was severely injured while wearing an Apex PG-2 helmet. The helmet was struck on the top by a frozen sand ball which broke up during impact. The shell and suspension of the helmet broke under the impact load; the victim received a severe skull fracture and died in a hospital from apparent complications 11 days later.

2. BACKGROUND

NIOSH has never previously evaluated the Apex PG-2 helmet. NIOSH has, however, previously evaluated the Apex E2-A helmet and reported the results of that evaluation in HEW Publication No. (NIOSH) 76-106 "Report on Class B Industrial Helmets" published in July 1975. That evaluation indicated that the Apex E2-A was severely deficient in impact protection. The results of those (performed according to ANSI Z89.2) tests are summarized below.

Test Conditioning Temperature	Average Allowable Force, Maximum	Sample Size	Average Measured Force (Apex E2-A)	Maximum Individual Force
0° F	850 lb.	10	910 lb.	968 lb.
120° F	850 lb.	10	1648 lb.	2075 lb.

To date, this helmet is still available on the market and still claims conformance to the ANSI Z89 standards among others.

3. DESCRIPTION OF HELMETS SUBMITTED BY OSHA.

Three helmets were received in two boxes bearing Mr. Buchele's business address. One box (certified receipt number 126407) was received on March 7, 1977, and contained the helmet involved in the fatality. This helmet, a yellow Apex PG-2, was manufactured in April 1973. On March 8, 1977, the second box (certified receipt number 126406) containing 2 helmets was received. The helmets in the second box were also yellow Apex PG-2 helmets which Mr. Buchele had obtained from the company employing Mr. LoPiccolo. These helmets were manufactured during September 1973. The employer told Mr. Buchele that all three of the helmets had been purchased on the same order. One helmet had the name "Joe" scratched into the peak and was assigned the number NIOSH 102-H. The other helmet had some worn lettering on the peak (which may have been made with a black felt pen) which appears to be the letters "PD". It was assigned the number NIOSH 103-H. The helmet involved in the fatality was assigned the number NIOSH 101-H. All the assigned numbers were written on the left underside and on the right upperside of the peak with a green felt tip pen.

4. PROCUREMENT OF ADDITIONAL SAMPLES.

We purchased about 60 Apex PG-2 Poly Guard helmets from a supplier in Washington, Pa. We obtained 12 white helmets and the rest were yellow. Since only two used helmets were available for evaluation, it was necessary to obtain a large number of new helmets to determine compliance with the ANSI standard. The helmets we purchased were manufactured between August 1976 and November 1976.

TESTING PROTOCOL

All impact tests were performed on an electronic force transducer system instead of the Brinell system described in the ANSI standard. Since the electronic system is much more accurate and precise than the Brinell system, we have adopted it in place of the Brinell system in our testing programs. Our evaluations have indicated that in no case is the electronic system more severe than the Brinell system.

All helmets were exposed to the appropriate conditioning temperature for at least 4 hours prior to being impacted from 5 feet with an 8 pound impactor. Conditioning temperatures of 0° F, 120° F, and 140° F were used as required by the Z89 standards. Pieces of carbon paper and white paper were placed in the crown of each helmet to detect contact of the helmet shell with the headform.

The maximum allowable average transmitted force for helmets conditioned either at 0° F or 120° F is 850 pounds and no individual helmet may transmit more than 1000 pounds force. In addition, Z89.2 requires that helmets conditioned at 140° F not make "substantial contact" with the test headform when tested for impact resistance. NIOSH interprets "substantial contact" as any evidence of contact between the shell and headform in conjunction with a transmitted force in excess of 850 pounds.

6. TEST RESULTS

A copy of the data pages is attached and a summary presented here.

Conditioning Temperature	Ave. transmitted force, lbs.	Max. force	No. > 1000#	Sample size
0° F	1491.4	5895	8	25
120° F	2060.9	4360	20	25
140° F	5223.0	5810	10	10

One of the tests at 120° F was not included in the above calculations, since the meter went off scale with full scale set at 2000 pounds and an accurate force measurement was unavailable. The wide variability in the date from helmets conditioned at 0° F and 120° F appears to us to be the result of a marginal design, poor quality control, or both. There was, for example, a large disparity in the results of tests on helmets (conditioned at 0° F) manufactured in October 1976 and those manufactured in November 1976. The average transmitted forces were 827 and 1750 pounds respectively.

Nineteen of twenty-five of the helmets conditioned at 0° F experienced fracture of at least some part of the suspension system. The test results were, consequently, very dependent upon which point in time the suspension broke. If it broke early into the impact, the helmet bottomed, but if it broke as the impactor was rebounding, the transmitted force was not excessive.

Helmets conditioned at 120° F and 140° F did not evidence any breakage, but nearly all of those helmets bottomed severely. In many cases, the helmet shells contacted the headform so severely that the paper and carbon paper placed in the crown of the helmet were pulverized.

Tests were also performed on the two helmets designated NIOSH 102-H and NIOSH 103-H. After being conditioned at 0° F for 4 hours, they transmitted 808 and 810 pounds, respectively. The suspension systems broke similarly to those we purchased for evaluation. There is no statistical difference between the transmitted forces measured for these helmets and those obtained on the helmets we purchased.

7. CONCLUSIONS

Our tests demonstrate that Apex PG-2 helmets are not manufactured uniformly enough to guarantee an acceptable product at any given time. The helmets we purchased did <u>not</u> comply with the minimum impact resistance performance requirements of either ANSI Z89.1 or Z89.2. There is no statistical evidence that the helmets submitted by Mr. Buchele performed any differently than those we evaluated.

The results of this evaluation suggest that Apex Safety Products [illegible] done little, if anything, in the past 1 1/2 years to upgrade their hel[illegible] product line and bring it into conformance with the ANSI standards [illegible] though they still label their helmets as complying with CSA-Z94.1-T, GGG-[illegible]-142-C, GGG-H-177, EEI-AP.1-61, ANSI-Z89.1-1969, ANSI-Z89.2-1971, and USAS Z2.1-1959 (of which the EEI and USAS have been obsolete for several years).

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration
Toledo Area Office - Region V
Room 734, Federal Office Building
Toledo, Ohio 43604

RECEIVED
'77 MAR 11 AM 11:31
SAFETY TCL

March 9, 1977

Mr. Bill Cook
Testing & Certification Branch
Room 17
944 Chestnut Creek Road
Morgantown, W. Virginia 26505

Dear Mr. Cook:

I am sending these three (3) Apex hard hats to you and requesting reports on any possible tests you may be able to conduct on them. All of these helmets came from the same purchase and the broken helmet was being worn by an employee who was involved in a fatality. [Although we realize that the hat wasn't designed to withstand the force imposed on it, in this case we would like the helmets checked to see if they meet minimum requirements.]

The accident occurred on a sewer line project in Sylvania, Ohio on January 4, 1977. The deceased was working in the bottom of a trench about 20 ft. wide and 15 to 18 ft. below ground level. The man was in the bottom of the trench laying sewer pipe. At about 10:30 a.m. on the day of the accident a backhoe that had been digging the excavation was swung up to the side of the trench to connect to a piece of concrete sewer pipe. A frozen ball of moist sand that was lodged on the top side of the bucket rolled loose and fell into the trench striking the deceased on the hard hat just front and left of top center. The clump of dirt broke up but it was estimated to be about 8 to 9 inches in diameter and weighing 6 to 8 pounds. The water table is very high in this area (about 9 ft.) and the soil is very wet. The clump of sand fell from a height of about 10 to 12 ft. above the ground level to the depth of about 12 to 15 ft. down into the trench or about 22 to 27 ft. before striking the employee. The deceased fell to the ground and began bleeding from the nose and mouth. He was rushed to the hospital about 2 miles away and died about 11 days later from complications. A copy of the autopsy is enclosed.

e ·cal weather conditions on January 4, 1977 are as follows: Weather was general-
d. Temperatures was high of 27°F. and low of 10°F. At the time of the acci-
. about 10:30 a.m. the temperature was 22°F., winds were westerly at 4 m.p.h.
ere was a trace of snow ending at 7:10 a.m. and then becoming partly cloudly.
ere was 2 inches of snow on the ground. Humidity was 77% and barometric pressure
is 29.7. These statistics were compiled at the U.S. Weather Bureau at Toledo Air-
ort about 18 miles from the site of the accident.

e men started at 7:30 a.m. on that morning so the helmet had been exposed to these
onditions for about 3 hours at least.

f you have any further questions, please contact me at the OSHA Office, Federal
ffice Building, 234 Summit Street in Toledo, Ohio. Also, please send any reports
o my attention at the same address.

Very truly yours,

Thomas R. Buchele

Thomas R. Buchele, CSHO

ACCIDENT--MISCELLANEOUS
(INDUSTRIAL)

No. 77-37

CORONER'S VERDICT
AND
Testimony on the Body of

Matteo LoPiccolo

Harry F. Mignery M.D.
Coroner

LOUIS G. MARTIN, M.D.--Deputy Coroner

OCCUPATIONAL SAFETY & HEALTH ADMIN
RECEIVED
FEB 15 1977
TOLEDO, OHIO

LUCAS COUNTY)

Be It Remembered, That on the 15th day of January A. D. 19 77 information was given to me, H. F. Mignerey, M. D., Coroner of said County, that the dead body of a man, ~~XXXXXXXXXX~~ supposed to have come to his death from violence, has been found at Flower Hospital in the City of Sylvania, ~~Toledo~~, Lucas County aforesaid, on the 15th day of January, 19 77

I visited the place and found the said dead body at _____

After viewing the same, and inquiring into the circumstances that caused the death of the said person, I summoned the following persons, to-wit: none

to appear before me at my office, Toledo Legal Building, 416 N. Erie Street at _____ o'clock P.M., A.M., on the _____ day of _____, 19____. In obedience to said summons, the said person appeared, except _____ and were sworn by me as witnesses.

I then proceeded to inquire in what manner, and by whom, the said person came to his death. (Their testimony was taken by me and reduced to writing, and subscribed to by the several witnesses, and the same is hereto attached, and fully appears; I having heard the testimony) I ~~XXXX~~ carefully examined the said dead body on the _____ day of _____, 19____, find as follows, to-wit:

I, H. F. Mignerey, M. D., Coroner of said County, having diligently inquired, to true presentment make in what manner Matteo LoPiccolo, whose dead body was found by me at _____ on the _____ day of _____, 19____, came to his death. The said Matteo LoPiccolo was married, ~~XXXXXXXXXXXXXXXXXXXX~~ about 54 years of age, a resident of 11141 Pemberton, Sterling Heights, Michigan and a native of Palermo, Italy, had _____ eyes, _____ hair, and _____ beard, and _____ mustache, _____ complexion, and was about _____ feet _____ inches in height, _____ pounds in weight, and of good habit, and was a laborer; A&P Mancinelli Construction Co. by occupation, with the following marks and wounds upon his body: compound fracture of skull due to being struck by frozen chunk of earth that fell from back-hoe into excavation where he was working about 10:28 A.M. in 7200 block of Sylvania Avenue (at McCord Road). Was wearing plastic helmet which was cracked by impact. Had compound fracture skull; temporal hematoma, laceration brain; subdural hematoma, peritonitis due to perforated stress ulcer duodenum. AUTOPSY ORDERED BY CORONER

Upon full inquiry concerning all the facts, I find that the said Matteo LoPiccolo came to his death, on the 15th day of January, 1977 at ~~XXXXXX~~ Flower Hospital, Sylvania, Ohio -- By reason of peritonitis (unknown); due to perforated stress ulcer of duodenum (unknown); due to compound fracture of skull with cerebral laceration, subdural hematoma (11 days).

ACCIDENT--MISCELLANEOUS (INDUSTRIAL), 1/4/77, struck on head by falling mass of frozen earth in excavation in 7200 block of Sylvania Avenue, Sylvania Township, LUCAS COUNTY, OHIO.

Thomas [illegible]

SPECIMEN:	FLOWER HOSPITAL Toledo Ohio #77-37 1-15-77	SURGEON
		LAB NO.
PRE OPERATIVE DIAGNOSIS		
	Date:	
OPERATIVE DIAGNOSIS	Paraffin Sect. ☐ 24 Hour ☐ Frozen ☐	
	Surgeon:	
SPECIAL:		
	Charge:	

TISSUE

AUTOPSY # 4, 1977

LO DICCIO, Mr. (Matthew) MATTEO

Age: 54
Dr. [illegible]
L. [illegible] (Coroner)
([illegible])
Hosp. # 07[illegible]

ADMITTED: 1-6-77
DIVISION: 1-15-77
AUTOPSY: 1-15-77

[illegible] CLASS DIAGNOSIS:

[illegible]

1. [illegible] post operative craniotomy for compound fracture of skull with cerebral laceration.
   a. Craniotomy defect involving left fronto-parietal region.
   b. Fracture base of skull involving left middle fossa including greater wing of sphenoid bone. (Anterior fossa and cribriform plate intact).
   c. Subdural hematoma involving entire left cerebral hemisphere.
   d. Contusion and laceration of left fronto-parietal and temporal lobes.
   e. Cerebrocarp injury to inferior aspect of right temporal lobe and right cerebral hemisphere.
2. Perforated duodenal ulcer with generalized peritonitis.
3. Ischemic nephrosis.
4. Severe pulmonary edema (? bronchopneumonia, right).

[illegible]

1. Generalized arteriosclerosis, moderate.
2. Congestion of [illegible] viscera.
3. Hiatal gallery, moderate.
4. Nodular hyperplasia of prostate, slight.
5. Marked jaundice.

[illegible]

[illegible]

1-18-77

FLOWER HOSPITAL
5200 HARROUN ROAD
SYLVANIA, OHIO 43560

1/15/77

AUTOPSY # 4, 1977

LO PICCOLO, Mr. Matthew

Drs. B. Shuer and
L. Martin (Dep.Coroner)

ADMITTED: 1-4-77
EXPIRED: 1-15-77
AUTOPSY: 1-16-77

Age: 54
Hospital # 07700095

Clinical Abstract: This 54 year old white male was admitted through the Emergency Room at 11:50 A.M. on January 4, 1977. He had sustained a head injury on a construction site. In the hospital, he was discovered to have a compound fracture of the left side of the skull. During surgery, he was found to have injured left carotid vessels and middle meningeal artery with formation of subdural and extradural hematomas as well as laceration of brain. Later in the course, he developed respiratory problems and terminally he was jaundiced and went into renal failure.

GROSS DESCRIPTION

General Appearance: This body is that of a 54 year old white male, moderately built and well nourished. There is a healing surgical incision over the left side of the scalp extending from the forehead down to the ear. The face does not show any injuries and the skin over the rest of the body is also unremarkable except for marked jaundice.

Body Cavities: The pleural and pericardial cavities are normal and show no fluid or adhesions. The peritoneal cavity, however, shows generalized peritonitis with foul-smelling thick purulent fluid and many delicate fibrinous adhesions binding all viscera. The fluid in the peritoneal cavity is estimated to be about 500 ml. On exploration, there is a large area of perforation involving the anterior aspect of the first part of the duodenum. This area is partly sealed-off by omentum and the inferior surface of the liver.

Cardiovascular System: The heart weighs 450 grams and appears quite unremarkable. The epicardial surface is smooth and the chambers of the heart do not show any evidence of thrombosis or endocarditis. The cardiac valves are also unremarkable and show no narrowing or dilatation. The measurements are as follows: Tricuspid valve - 14 cm., pulmonary valve - 8 cm., aortic valve - 7.5 cm., mitral valve - 10.5 cm., right ventricle - 0.4 cm., and left ventricle - 1.2 cm. The cardiac chambers are slightly dilated. The aorta and its branches are intact and show moderate atherosclerosis. There is, however, no recent or old occlusion of these vessels. The coronary arteries are patent throughout but show moderate atherosclerosis with focal narrowing of the lumen. No recent or old thrombosis is seen and examination of the myocardium fails to show any evidence of recent or old infarction.

Respiratory System: The larynx is unremarkable but there is a tracheostomy opening where the mucosa appears slightly congested. The tracheobronchial tree is filled with foamy mucoid fluid and both lungs are heavy and wet. The right lung weighs 1000 grams, while the left one 900 grams. There is moderate anthracosis but no significant emphysema is seen. The pleural surface is smooth and

2-1-77

Alimentary System: The mouth, pharynx, and esophagus do not show any abnormality. The stomach is dilated and its mucosa congested. No ulcers are, however, noted. The duodenum shows marked congestion of the mucosa especially in the proximal part. The perforation has been described above; the anterior wall of the first part of the duodenum has been replaced by a defect which measures 2½ cm. in diameter. The perforated area is partly surrounded by omentum and inferior surface of the liver. There is also a penetrating ulcer over the posterior wall of the proximal duodenum, the base of which involves the head of pancreas. The small intestines show altered blood and the mucosa is congested. The appendix is normal and the colon does not show any abnormality.

The pancreas is normal in size and shape and does not show any evidence of calcification or fibrosis. No evidence of malignancy is seen.

The liver is large and it weighs 2500 grams. It is markedly congested but the congestion appears acute. The undersurface of the liver shows hemorrhagic exudate in the area which overlies the perforated duodenal ulcer. The rest of the hepatic capsule is unremarkable. The gallbladder and the biliary tract is also normal. No stones or tumor is identified.

Genitourinary system: The kidneys are large, congested and swollen. Each kidney weighs 200 grams and on cut surfaces the parenchyma bulges. Otherwise, the kidneys are fairly intact and there is no reduction in the width of the cortex and the cortical areas do not show any scars or granularity. The renal arteries and veins are also unremarkable. The urinary tract is also normal except for bladder mucosa which is rather congested. The prostate is moderately enlarged and shows a few nodules which appear benign. The penis and the testes are normal.

Hematopoietic system: The spleen weighs 300 grams and appears acutely congested. No other abnormality is seen. The lymph nodes in the porta hepatis and in the mediastinum are enlarged but are soft and show no evidence of tumor. The bone marrow appears unremarkable.

Endocrine Glands: No pathologic change is seen in the adrenals or parathyroid glands. The thyroid gland is moderately enlarged and shows a few nodules on both sides. The pituitary gland is grossly normal.

Musculoskeletal system: Musculoskeletal system is unremarkable.

Skull and Brain: The left side of the scalp has been shaved and there is a healing surgical incision which measures 15 cm. in length. It extends from the forehead across the fronto-parietal region towards the ear. The incision overlies the large surgical defect over the fronto-parietal area. This defect is covered with organizing blood. On opening the skull, there is a thinly spread subdural hematoma which extends all over the left cerebral hemisphere. The lateral aspect of the fronto-parietal lobe shows an area of laceration and contusion with considerable softening. It measures 5 cm. in diameter. The anterior and the inferior aspect of the left temporal lobe also shows similar changes. In addition, the right cerebellar hemisphere and the inferior aspect of the right temporal lobe also show areas of hemorrhage and softening. The brain weighs 1550 grams.

FLOWER HOSPITAL
5200 HARROUN ROAD
SYLVANIA, OHIO 43560

...s dura from the base of the skull is stripped and the base examined carefully. ...is a fracture of the skull which involves the middle fossa including the greater ... the sphenoid bone. There is no extension of fracture in the anterior fossa ... cribriform plate is intact.

...slices of the fixed brain show no other lesions. The above described brain lesions ...ve the cortex with immediately underlying white matter.

MICROSCOPY

Cardiovascular system: Sections of the heart do not show any evidence of recent ...l infarction. No inflammation is seen either. Occasional small foci of myocardial ...sis are, however, evident.

Respiratory system: Multiple sections from both lungs show marked congestion and ... Sections of the right lung, however, also show focal hemorrhage as well as ... of bronchopneumonia. No evidence of organization is seen. Occasional small ...ary veins contain recent fibrin thrombi.

Alimentary tract: Sections from the distal stomach and proximal duodenum reveal ...ated duodenal ulcer as well as a penetrating ulcer. The latter is located ...e posterior wall and shows involvement of the underlying head of pancreas with ...ficient fibrosis. The ruptured ulcer shows very little remaining ulcerated ... the serosa around the ruptured area is covered with inflammatory exudate. ...ions of the small intestine and colon show autolysis. No pathologic change is ... Multiple sections of the omentum reveal hemorrhagic necrosis as well as acute ...tory exudate. No other abnormality is seen.
...ions of the pancreas reveal no pathologic change. The liver, however, shows ... acute congestion with centrilobular necrosis. There is also some cholestasis. ... taken from the undersurface of the liver show hemorrhagic exudate over the ...ring the ruptured duodenal ulcer.

Genitourinary tract: The kidneys are markedly autolysed but the distal tubules ...ed indicating some ischemic change. However, the overall appearance is not ...ssive and there is no evidence of glomerular disease or inflammation. The ... contains occasional hyperplastic glandular nodules and the urinary bladder is ...ble.

...poietic system: The spleen is markedly congested and shows increased number ... cells in the sinusoids.

...crine glands: The adrenals are normal and the thyroids contain multiple ...e nodules which are benign. The pituitary glands show acute congestion and ...rosis.

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SYLVANIA, OHIO 43560

Brain: Multiple sections of the brain have been examined. The dura is covered with blood on both sides and on both sides there are changes of organization. The sections of the brain taken from the areas of contusion as well as countercoup injury reveal hemorrhagic necrosis of the brain substance with early glial reaction in the surrounding brain parenchyma. Some meningeal inflammatory exudate is also present in the area of injury but no evidence of generalized meningeal inflammation is noted. Around the base of brain, some blood vessels contain fibrin thrombi. These are recent and show no evidence of organization. Other sections of the brain are unremarkable.

FINAL DIAGNOSES

Primary Diagnoses:

1. Status 11 days post operative craniotomy for compound fracture of skull with cerebral laceration.
   (a). Craniotomy defect involving left frontoparietal region.
   (b). Fracture base of skull involving left middle fossa including greater wing of sphenoid bone. (Anterior fossa and cribriform plate intact).
   (c). Subdural hematoma involving entire left cerebral hemisphere.
   (d). Contusion and laceration of left frontoparietal and temporal lobes.
   (e). Countercoup injury to inferior aspect of right temporal lobe and right cerebral hemisphere.
2. (a). Penetrating duodenal ulcer, posterior.
   (b). Perforated duodenal ulcer, anterior
   (c). Generalized peritonitis.

   Ischemic nephrosis.

   Severe pulmonary edema with focal bronchopneumonia, right.

Secondary Diagnoses:

1. Generalized atherosclerosis, moderate.
2. Congestion of abdominal viscera.
3. Nodular goiter, moderate.
4. Nodular hyperplasia of prostate, slight.
5. Marked jaundice.

DISCUSSION: Postmortem examination confirms the clinical, surgical and radiological diagnoses. The skull fracture extended into the greater ring of the sphenoid bone involving the sphenoid sinus. The drainage of the cerebral spinal fluid through the sinus probably occurred through this route.

The lung showed only focal bronchopneumonia but marked congestion and edema was present. The immediate anatomic cause of death is obviously the perforated duodenal ulcer. The latter was located over the anterior wall of the first part while the other ulcer was posterior and had penetrated the underlying pancreas. The lack of fibrosis in the latter speaks against the chronicity and it, therefore, appears possible that the duodenal ulcers could have occurred due to the stress of terminal illness. Finding of fibrin thrombi in the vessels of brain and lung suggest disseminated intravascular coagulation which is probably secondary to gram negative septicemia accompanying the generalized peritonitis.

/pk

Khalid Hamed, M.D.

-18°	AVE	1491.44	MAX	5895	s	1406.19	n	25	t 2.28
50°		2060.88		4360		1218.67		24	4.87
60°		5223.00		5810		567.06		10	24.39

Number HYEX PG

Technician(s) J. LOVE / G FLETCHER

Room temp. 24 °C Drop height 6.2" Impactor MONORAIL

Spec. No.	Cond. temp., °C	transit time, ms	Amp. sens., lb/v	Peak volts	Peak force, lbs.	Spec. No.	Pen. depth, mm
++ 1	-18	4.66	500	2.24	1120		
++ 2	-18	4.65		6.84	3420		
++ 3	-18	4.65		5.86	2930		
++ 4	-18	4.69		11.79	5895		
++ 5	-18	4.63		10.20	5100		
++ 6	50	4.65		1.09	545		
++ 7	50	4.66		1.11	555		
++ 8	50	4.65	200	2.17	434		
++ 9	50	4.67	100	4.25	425		
++ 10	50	4.66	100	4.17	417		
11	60	4.57	500	10.78	5390		
+ 12	60	4.59	1000	5.47	5470		
++ 13	60	4.56		4.07	4070		
+ 14	60	4.57		5.52	5520		
+ 15	60	4.63		5.81	5810		
+ 16	60	4.59		5.26	5260		
++ 17	60	4.60		4.36	4360		
+ 18	60	4.62		5.15	5150		
+ 19	60	4.59		5.66	5660		
+ 20	60	4.60		5.54	5540		

Ave. Force_____ max._____ s_____ n_____ t_____ P/F/Q_____

Ave. pen. depth_____ s_____ n_____ t_____ P/F/Q_____

Load cell impact and penetration data sheet.

nv '76

Date 3/10/77 - 3/17/77 Label Number APEX PG

Technician(s) J LOVE / G FLETCHER

Room temp. 24°C Drop height 62" Impactor MONORAIL

Spec. No.	Cond. temp., °C	transit time, ms	Amp. sens., lb/v	Peak volts	Peak force, lbs.	Spec. No.	Pen. depth, mm
+ 21	-18	4.61	500	1.25	625		
++ 22	-18	4.64		3.36	1680		
++ 23	-18	4.66		4.58	2290		
++ 24	-18	4.61		1.69	845		
+ 25	-18	4.61		1.64	820		
+ 26	-18	4.60		1.72	860		
+ 27	-18	4.62		1.62	818		
+ 28	-18	4.61		1.82	910		
+ 29	-18	4.71	100	9.21	921		
30	-18	4.59	500	1.67	835		
++ 31	50	4.60	200	14.19	*		
++ 32	50	4.61	500	7.62	3810		
++ 33	50	4.71		5.78	2890		
X 34	50	4.57		540	2700		
++ 35	50	4.61		5.90	2950		
++ 36	50	4.58		6.11	3055		
++ 37	50	4.61		5.20	2600		
++ 38	50	4.62		4.06	2030		
++ 39	50	4.63		5.82	2910		
++ 40	50	4.63		3.73	1865		

Av rce_____ max._____ s_____ n_____ t_____ P/F/Q_____

e. pen. depth_____ s_____ n_____ t_____ P/F/Q_____

OCT '76
NOV '76
AUG '76

Load cell impact and penetration data sheet.

Date 3/17/77 Label Number APEX PG

Technician(s) J LOVE / G FLETCHER

Room temp. 23°C Drop height 62" Impactor MONORAIL

Spec. No.	Cond. temp., °C	transit time, ms	Amp. sens., lb/v	Peak volts	Peak force, lbs.	Spec. No.	Pen. depth, mm
++ 44	-18	4.58	500	1.72	860		
++ 45	-18	4.59		1.18	590		
++ 46	-18	4.60		2.59	1295		
++ 47	-18	4.59		1.15	575		
++ 48	-18	4.59		1.82	910		
++ 49	-18	4.63		1.90	950		
++ 50	-18	4.61		1.61	805		
++ 51	-18	4.59		1.63	815		
++ 52	-18	4.62		1.49	745		
+ 53	-18	4.59		1.35	675		
++ 54	50	4.60		8.54	4270		
++ 55	50	4.59		8.72	4360		
++ 56	50	4.60		2.51	1255		
++ 57	50	4.61		5.49	2745		
++ 58	50	4.62		2.80	1400		
++ 59	50	4.59		3.52	1760		
++ 60	50	4.61		2.48	1240		
++ 61	50	4.61		2.02	1010		
++ 62	50	4.59		2.83	1415		
++ 63	50	4.59		5.64	2820		

Ave Force_____ max._____ s_____ n_____ t_____ P/F/Q_____

pen. depth_____ s_____ n_____ t_____ P/F/Q_____

Load cell impact and penetration data sheet.

\+ OCT '76
++ NOV '76

Label Number APEX PG

Technician(s) J. LOVE / G FLETCHER

Room temp. 24° Drop height 62" Impactor MONORA

Spec. No.	Cond. temp., °C	transit time, ms	Amp. sens., lb/v	Peak volts	Peak force, lbs.	Spec. No.	Pe dep
[illegible]	-18	4.59	100	8.10	810		
[illegible]	-18	1.59	200	4.04	808		

Ave Force _____ max. _____ s _____ n _____ t _____ P/F/Q _____

Ave depth _____ s _____ n _____ t _____ P/F/Q _____

Load cell impact and penetration data sheet.