OFFICE OF THE MEDICAL EXAMINER
701 W. Jefferson St.
Phoenix, AZ 85007

MEDICAL EXAMINER REPORT

DECEDENT: Garret Joseph Zuppiger **CASE:** 13-04440

DATE OF EXAMINATION: 07/02/2013 **TIME:** 13:55 Hours

PATHOLOGICAL DIAGNOSES

I. Smoke inhalation.
   A. Thin layers of soot deposition in oropharynx, larynx, trachea and mainstem bronchi.
   B. Cardiac blood: Carboxyhemoglobin of 21% saturation.

II. Thermal inhalational injury.

III. Level I toxicology testing (see separate Toxicology Report).
   A. Cardiac blood: Positive for ethyl alcohol of 0.04 g%.
   B. Vitreous humor: Positive for ethyl alcohol of 0.01 g% (trace amount); negative for methanol, isopropanol and acetone.
   C. Brain: Positive for benzene and toluene by GC/MS.
   D. Lung: Positive for toluene by GC/MS.

IV. Decompositional changes.

CAUSE OF DEATH: Fire-related injuries
MANNER: Accident

9/23/2013
Date Signed

Kathleen M Enstice MD
KATHLEEN M. ENSTICE, M.D.
MEDICAL EXAMINER

On July 1, 2013, Yavapai County officials requested assistance from the Maricopa County Office of the Medical Examiner with the medicolegal death investigations of 19 firefighters who died in the Yarnell Hill wildfire on June 30, 2013. Under the Maricopa County Manager's authority and direction, the Maricopa County Office of the Medical Examiner examined the firefighters' remains for the purpose of forensic identification and postmortem evaluation. The Maricopa County Office of the Medical Examiner also agreed to provide consultative services to investigating authorities and the Yavapai County Medical Examiner. The Yavapai County Medical Examiner agreed it will certify the firefighters' death certificates. The following Maricopa County Office of the Medical Examiner case numbers were designated for this incident: 13-04425, 13-04426, 13-04427, 13-04428, 13-04429, 13-04430, 13-04431, 13-04432, 13-04433, 13-04434, 13-04435, 13-04436, 13-04437, 13-04438, 13-04439, 13-04440, 13-04441, 13-04442, and 13-04443.

IDENTIFICATION
The decedent is received in a zippered orange bag (#18) sealed by yellow lock #042693. A red OME ID band is on the left wrist, labeled with "U.M.; 13-4440".

EVIDENCE OF MEDICAL INTERVENTION
None.

CLOTHING AND PERSONAL EFFECTS
The decedent is lying on top of a silver-tone fire shelter. The left hand is within the upper aspect of the shelter, and the lower extremities lie within the lower aspect of the shelter. The shelter is fragmented in multiple areas.

The decedent is clad in two tan gloves, a long-sleeved button front yellow protective shirt, a black short-sleeved tee shirt, with "Granite Mountain Interagency Hot Shot Crew" imprinted in red above the front left pocket; green protective pants with a brown belt that has an oval metal buckle imprinted with "Granite Mountain, R-3, Prescott Fire, Hot Shot Crew". Within the waistband of the pants is a label "28-32 SHORT". Worn underneath the pants is a pair of Hanes dark blue boxer briefs, size Medium. Worn over the long-sleeved yellow shirt is a dark green vest with multiple straps that is fastened around the waist and buckled in the back. The metal buckle shows evidence of thermal changes and cannot be unfastened, resulting in a cut that is made on the posterior side of the surrounding strap. Within a pocket of the green vest are three metal tools. A round small tin of chewing tobacco is in the left front pants pocket. A yellow and an orange wedge are in the clothing pockets. An open pocket knife is underneath the right hip surrounded by burned and charred material, inside (i.e., on top of) the fire shelter. A black "Casio" watch is on the left wrist. The right front pants pocket has two melted soft ear plugs and a partially melted blue plastic Bic lighter.

Accompanying the decedent is a part of a black sock, two boot fragments consisting of partial soles, a partly melted black "Bullard" hard hat ("WILD FIRE SERIES HELMET"), and a tall blue plastic water bottle with a black lid that is partly melted, which contains residual water. A pair of oval goggles with an elastic band is around the neck, with the front of the goggles along the anterior neck. The lenses of the goggles are composed of fine screen-like mesh.

CONDITION OF BODY
The unembalmed body is cold following refrigeration. The joints of the extremities are fixed in position due to thermal changes. Lividity cannot be assessed due to postmortem decompositional changes, which include bloating, green discoloration, slippage and marbling of the skin; and a decompositional odor.

EVIDENCE OF THERMAL INJURY
The distal right extremity has postmortem charring and associated fire fracturing of the ankle, foot, and digits, resulting in deformation of the right foot. The distal left tibia and fibula have postmortem charring and associated fire fracturing, resulting in disarticulation of the left ankle, foot, and digits; which also have extensive postmortem charring.

GENERAL EXTERNAL EXAMINATION
The unclad body is of an estimated 67 inch, 170 pound adult male, appearing compatible with the reported age of 27 years. The scalp has 1 ½ inch long wavy light brown-red hair. The decedent wears a ½ inch red mustache and beard. The eyes have indeterminate irides. The cherry red conjunctivae have no congestion, petechiae, icterus or edema. The nasal bridge and septum are intact. The external auditory canals are unremarkable. The lips and oral mucosa have no lesions. The maxilla and mandible have native dentition in good repair. The symmetric neck has no injuries or palpable masses. The well-developed chest and back are symmetric. The flat abdomen is firm. The external genitalia are of a normally developed circumcised adult male with bilaterally descended testes. The anus is atraumatic. Apart from thermal changes described above, the paired extremities have no clubbing, cyanosis or edema. The clean, intact fingernails are short. The toenails are not identified in association with marked thermal changes. No needle punctures, needle track marks or hesitation marks are identified.

IDENTIFYING MARKS, TATTOOS, SCARS
1. One pierce mark in the left earlobe (no pierce mark identified in the right earlobe).
2. A horizontal 7 x 2 inch green tattoo of "zuppiger" on the right abdomen.
3. A horizontal 3 x 1 inch green tattoo of a fish-like shape with "BAD" on the right upper back.
4. A 3 inch multicolored tattoo resembling a puzzle piece on the medial distal right shin.
5. A horizontal 4 x 1 inch green tattoo of "DREAM AS IF YOU'LL LIVE FOREVER LIVE AS IF YOU'LL DIE TODAY" on the anterior right arm.

INTERNAL EXAMINATION
The body is opened by a standard Y-shaped thoracoabdominal incision. All body organs are in their normal anatomic positions. The internal organs have moderate decompositional changes and mild thermal changes, with minimal surrounding adipose tissue. The subcutaneous fat layer is 1.1 cm thick at mid-abdominal level. The serosal surfaces are intact. The right pleural cavity contains 180 ml of cherry red-maroon fluid. The left pleural cavity contains 150 ml of cherry red-maroon fluid. No blood or excess fluid is in the remaining body cavities.

HEAD/NERVOUS SYSTEM
The intact reflected scalp, galea and temporalis muscles have no injury. The calvarium and skull base are of normal thickness, with no fractures. The intact dura mater has no epidural or subdural hemorrhages. The blood in the dural sinuses is not clotted. The leptomeninges are thin and transparent. The symmetric 1750 gram brain has a normal gyral configuration, moderate to marked swelling, and faint cherry red-pink discoloration, but no subarachnoid hemorrhage or exudate. The brain is softened in association with decompositional changes. The faint cherry red-tan cerebral cortex has no contusions. The cerebral white matter has faint pink discoloration. The faint cherry red-tan caudate nuclei, thalami and basal ganglia are symmetric. The symmetric brainstem and cerebellum are unremarkable. The substantia nigra is normally pigmented. The normally formed blood vessels at the brain base have no atherosclerosis, aneurysm or thrombi. The paired cranial nerves and mammillary bodies are normally distributed. The slit-like ventricles have no hemorrhage. The upper cervical spinal cord is unremarkable. The atlanto-occipital articulation is intact.

NECK
The intact cervical spine, strap muscles, blood vessels, prevertebral tissues, hyoid bone and laryngeal and tracheal cartilages have no hemorrhages. The epiglottis, laryngeal mucosa, and the tracheal mucosa to the level of the carina, have a thin confluent layer of black soot deposition that overlies thermal changes characterized by sloughing of the mucosa and cherry red-maroon discoloration. Otherwise, the patent upper airway has no obstruction or aspiration. The tongue has a thin layer of soot deposition and mild thermal changes, but no hemorrhage.

CARDIOVASCULAR SYSTEM
The 350 gram heart has intact epicardial surfaces. The patent coronary ostia have normal takeoff angles. The coronary arteries arise normally and follow a co-dominant distribution, with no thrombi or atherosclerosis. The moderately soft, cherry red-brown myocardium has no fibrosis. The atrial and ventricular septa are intact. At one cm below the valve annuli, ventricular thicknesses are: left ventricle 1.3 cm, interventricular septum 1.4 cm and right ventricle 0.5 cm. The cardiac chambers have mild decompositional dilatation. The endocardial surfaces have no hemorrhage or fibrosis. The normally formed cardiac valves have thin, pliable leaflets. The valve circumferences are appropriate to the caliber of the cardiac chambers. The valve cusps and surfaces have no fusion or vegetations. The aorta and its branches arise normally, are of normal caliber and follow the usual course. Elasticity is normal. The smooth intimal surfaces have cherry red-pink discoloration, with no aneurysm formation or dissection. The heart and major blood vessels contain minimal cherry red-maroon blood.

RESPIRATORY SYSTEM
The pleural surfaces of the normally formed 670 gram right and 620 gram left lungs have scant anthracotic pigmentation. The well-expanded cherry red-maroon parenchyma exudes abundant cherry red-maroon blood and edema fluid, with no masses, consolidation, scars or cavitations. The patent bronchi are of normal caliber and cherry red-maroon blood and edema fluid, but no obvious soot. The normally developed, patent pulmonary arteries have no thromboemboli.

DIGESTIVE/HEPATOBILIARY SYSTEM
The unobstructed oropharynx has thermal changes and a thin layer of soot deposition. The proximal-most aspect of the esophagus has thermal changes characterized by mucosal sloughing, with the remaining esophagus having an intact faint pink mucosa. The gastroesophageal junction is unremarkable. The stomach has intact cherry red-tan mucosa, with no hemorrhage, ulcers or masses. The gastric lumen has no contents. The small and large intestines and appendix are unremarkable. The large intestines contain brown stool. The lobular cherry red-tan pancreas has autolysis, but no fat necrosis, hemorrhage, cysts or fibrosis. The patent pancreatic ducts are of normal caliber. The normally formed 1150 gram liver has an intact smooth capsule covering moderately firm cherry red-brown-black parenchyma with no masses, fibrosis or fatty change. The patent intrahepatic and extrahepatic ducts are of normal caliber. The gallbladder has viscid bile and velvety mucosa.

GENITOURINARY SYSTEM
The normally formed 120 gram right and 130 gram left kidneys have capsules that strip with ease from the moderately soft, smooth, cherry red-maroon cortical surfaces. The cortices are moderately delineated from the medullary pyramids. The patent renal calyces, pelves, ureters and renal vessels are of normal caliber. The urinary bladder contains 3 ml of cloudy urine and has smooth mucosa with faint pink discoloration. The trigone is patent. The prostate gland is not enlarged. The tan testicular parenchyma strings easily.

HEMATOPOIETIC SYSTEM
The normally formed 230 gram spleen has an intact gray capsule covering extremely soft cherry red-maroon parenchyma. The lymph nodes have their normal appearance and distribution.

ENDOCRINE SYSTEM
The symmetrical thyroid gland has uniform brown parenchyma. The normally formed adrenal glands and pituitary gland have no masses or hemorrhage.

MUSCULOSKELETAL SYSTEM
The supporting musculature and soft tissues have cherry red discoloration and moderate decompositional changes. The axial and appendicular skeletal regions have no degenerative changes or atraumatic lesions.

EVIDENCE
The following items of evidence are collected, inventoried and held for release to Joshua Nelson #5222 (Yavapai County Sheriff's Office):

- two brown gloves
- one knife (burned)
- one orange wedge
- one yellow wedge
- one fire "shelter"
- one black helmet (burned)
- one blue water bottle (melted)
- one pair of goggles
- one pair of green protective pants; size 28-32 SHORT (burned)
- two miscellaneous boot fragments (burned)
- one green vest (burned)
- three miscellaneous metal tools
- one short-sleeved black tee shirt
- one long-sleeved yellow protective shirt, size medium 15 ½ x 33 (burned)
- miscellaneous pieces of fabric (burned)
- one blue Bic lighter (melted)
- one brown belt with oval metal belt buckle
- one tin of chewing tobacco
- one black Casio wristwatch
- one part of a black sock

One blood stain blot/filter paper is collected and retained.
Pleural cavity fluid, purple top tube, is collected and retained.
Nasal swabs are collected and retained.

RADIOGRAPHS
Ten postmortem full body x-rays reveal a lower permanent dental implant.

SPECIAL STUDIES
Vitreous humor, red top tube, is collected and submitted for electrolyte analysis, with the following results:

Glucose	<2 mg/dL
Urea nitrogen	38 mg/dL
Creatinine	1.1 mg/dL
Chloride	109 mmol/L
Potassium	31.0 mmol/L
Sodium	123 mmol/L

Cardiac blood, red top tube, is collected and submitted for carboxyhemoglobin analysis, with the following result:

Carboxyhemoglobin	21% saturation

TOXICOLOGY SPECIMENS

Cardiac blood, 2 oz container, is collected and submitted for level I toxicologic analysis.
Vitreous humor, red top tube, is collected and submitted for volatile analysis.
Lung, red top tube, is collected and submitted for volatile testing.
Brain, red top tube, is collected and submitted for volatile testing.
Urine, gray top tube, is collected and held.
Pleural cavity fluid, 2 oz container, is collected and held.
Bile, gray top tube, is collected and held.
Spleen, two 2 oz containers, is collected and held.
Subcutaneous tissue, psoas muscle, kidney, liver, lung, brain; 2 oz containers each, are collected and held.
Known head hair is collected and held.

FINAL SUMMARY

Based on the investigative history as available to me and my above noted autopsy findings, it is my opinion that Garret Joseph Zuppiger, a 27 year old male, died of fire-related injuries.

The ethyl alcohol detected in cardiac blood and vitreous was most likely due to decompositional changes. The presence of benzene and toluene were likely due to burning of NOMEX fibers and ethanol.

The manner of death is accident.

KME/svp D: 7/3/13 T: 7/8/13

The Maricopa County Medical Examiner's Office is required by statute (A.R.S. § 11-594(A) (2) and (4)) to certify the cause and manner of death following completion of the death investigation of each case over which it assumes jurisdiction, and to promptly execute a death certificate, on a form provided by the state registrar of vital statistics, indicating cause and manner of death. The form provided by the state registrar of vital statistics includes five manners of death: homicide, suicide, accident, natural, and undetermined. The determination of manner of death is a forensic determination by the pathologist predicated upon the totality of all then-known forensic evidence and other circumstances surrounding the cause of death; it is not a legal determination of criminal or civil responsibility of any person(s) for the death.

MARICOPA COUNTY OFFICE OF THE MEDICAL EXAMINER
REPORT OF TOXICOLOGICAL EXAMINATION

Case Number: 13-04440
Decedent: GARRET JOSEPH ZUPPIGER
Date Submitted: 07/02/2013
Report Date: 07/26/2013

Specimens Collected: NASAL SWAB, BILE, URINE, BLOT/FILTER PAPER, KNOWN HEAD HAIR, VITREOUS, PLEURAL BLOOD, PSOAS MUSCLE, SUBCUTANEOUS TISSUE, SPLEEN, KIDNEY, CARDIAC BLOOD, LIVER, LUNG, BRAIN
Medical Examiner: KATHLEEN M. ENSTICE, MD

RESULTS*:

Vitreous: Positive for
Ethyl alcohol 0.01 g% (trace amount)
None detected for methanol, isopropanol and acetone

Cardiac Blood: Positive for
Ethyl alcohol 0.04 g%
Carboxyhemoglobin (21% saturation)
None detected for methanol, isopropanol, acetone, amphetamine, methamphetamine, phencyclidine, cocaine, benzoylecgonine, methadone, morphine, codeine, benzodiazepines, barbiturates, antihistamines, phenothiazines, tricyclic antidepressants, fentanyl, oxycodone, and acid neutral drugs

Brain: Positive by GC/MS for
Benzene
Toluene

Lung: Positive by GC/MS for
Toluene

Urine: None detected for amphetamine, methamphetamine, phencyclidine, cocaine, methadone, codeine, antihistamines, phenothiazines, and tricyclic antidepressants

*If results are not listed for any specimen(s), that/those specimen(s) is/are deemed to be on "HOLD"

N. A. Wade
Norman A. Wade
Laboratory Director

Jurisdictional Agency: YAVAPAI SO
By: svp, Tox.1/2000, DAWN