Clark County Coroner
1704 Pinto Lane
Las Vegas, NV 89106
(702) 455-3210

AUTOPSY REPORT

Case Number: 17-10064

October 6, 2017

AUTOPSY REPORT

PATHOLOGICAL EXAMINATION ON THE BODY OF

STEPHEN CRAIG PADDOCK

PATHOLOGIC FINDINGS

I. Intraoral gunshot wound of head, contact range.
   A. Entrance: roof of mouth with abundant soot.
   B. Associated injuries: perforation of the roof of the mouth, the base of the skull (with internal beveling), the brainstem, the cerebellum, the left occipital lobe, and partially into the occipital bone (with external beveling); subdural hemorrhage and subarachnoid hemorrhage; contusions along the wound track and of the base of the brain; fractures of the supraorbital portions of the frontal bones, base of the skull, the left petrous bone and the occipital bone; bilateral periorbital soft tissue hemorrhage.
   C. Recovered: moderately deformed copper jacketed gray metal missile and fragments of copper jacket and gray metal between occipital dura and partly into occipital skull.
   D. Exit: no corresponding exit.
   E. Trajectory: front-to-back and upward.
II. Hypertensive cardiovascular disease.
   A. Hypertensive vasculopathy and atherosclerosis, per neuropathology consultation.
   B. Globally sclerosed glomeruli; glomerulomegaly, per histology.
   C. Slightly increased perivascular fibrosis and scattered hypertrophied myocytes, per histology.
III. Blunt force injuries to extremities.
   A. Abrasion of right upper calf.
   B. Faint contusion of left calf.
   C. Abrasion of right knee.
IV. Overweight (BMI = 29.6 kg/m^2).
   A. Dilated cardiomegaly (550 grams).
V. Degenerative changes of spine.

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VI. Diverticula.
VII. Mild degenerative changes of mitral valve.
VIII. Appendectomy.

OPINION

CAUSE OF DEATH: This 64-year-old man, Stephen Craig Paddock, died of an intraoral gunshot wound of the head.

MANNER OF DEATH: SUICIDE

DATE: 2/5/18

Lisa Gavin, MD, MPH
Medical Examiner
Clark County Coroner
Las Vegas, NV
LG/ag

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POSTMORTEM EXAMINATION ON THE BODY OF

Stephen Craig Paddock

ADULT POSTMORTEM EXAMINATION

An autopsy examination is performed on the body of tentatively identified as Paddock, Stephen Craig at the Clark County Office of the Coroner/Medical Examiner (CCOCME), on 6th day of October 2017, commencing at 1622 hours. Identification is later confirmed by fingerprint comparison.

The body is received within a sealed body bag (seal #541486), which is opened on 10/6/2017 at 1625 hours by #421. The body is identified by a Clark County Office of the Coroner/Medical Examiner (CCOCME) "toe tag" around the right great toe, which includes: CCOCME Case #17-10064; Name: Paddock, Stephen (T); Date of Death: 10-2-17; Time of Death: 1200 hours; CCOCME Investigator: #342.

The autopsy is conducted in the presence of Detective T. Alsup (P#5782), Detective M. Colon (P#7585), Crime Scene Analyst S. Fletcher (P#6650) of the Las Vegas Metropolitan Police Department; also present is Special Agent R. H. Marriott and Special Agent G. Kwan of the Federal Bureau of Investigation.

EXTERNAL EXAMINATION (EXCLUDING INJURIES)

The body is that of a well-developed, overweight, adult White male who weighs approximately 224 pounds, is 73 inches in length (body mass index, BMI = 29.6).

The body is received clad in a brown long sleeve shirt, black pants, blue boxer shorts, two white-black socks, and two charcoal shoes. Of note, during processing a brass-like casing adjacent to the head is found.

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The body is cold (refrigerated). Rigor mortis is receding. Fixed pink livor mortis extends over the posterior surface of the body. Evidence of postmortem change includes: green discoloration of the right lower quadrant of the abdomen.

The scalp hair is gray-white, straight and short with male pattern baldness.

The irides appear lighter in color. The pupils are round. The corneas are clouded. Tache noire is present of the sclerae which are otherwise injected and focally hemorrhagic. The conjunctivae are a mixture of pale and congested.

The nose and ears appear normally formed. In the right ear is white tissue paper. In the left ear is bloody tissue paper.

The decedent wears an unkept beard.

The anterior teeth are in poor condition with a majority of the maxillary teeth being absent.

The neck is unremarkable.

The thorax is well developed.

The abdomen is flat.

The anus contains hemorrhoids.

The spine is normally formed and the surface of the back is remarkable for nevi.

The external genitalia are those of a normal adult male, with the testes descended bilaterally into the normally rugated scrotum.

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The upper and lower extremities appear well developed and without absence of digits. Some pitting edema is noted of the lower legs, particularly in a sock-like distribution.

IDENTIFYING MARKS/SCARS:

On the left mid-aspect of the back is a 1 inch brown macule. A 3/8 inch light brown-white macule on the right ventral arm near the elbow is identified.

EVIDENCE OF MEDICAL INTERVENTION:

There is no evidence of medical intervention.

EVIDENCE OF INJURY

INTRAORAL GUNSHOT WOUND OF HEAD:

ENTRANCE: On the roof of the mouth centered approximately 6-1/2 inches below the top of the head and 1/4 inch to the left of anterior midline is an entrance gunshot wound consisting of a 1/2 x 5/8 inch defect with a marginal abrasion that appears widest at the 6 o'clock position (1/4 inch). Abundant soot is present within the roof of the mouth.

ASSOCIATED INJURIES: Perforation of the roof of the mouth, the base of the skull (with internal beveling), the brain stem, the cerebellum, the left occipital lobe and partially into the occipital bone (with external beveling) is seen with contusions of the brain along the wound track. Contusions of the base of the brain are seen along with brain swelling. Fractures of the supraorbital portions of the frontal bones, the left petrous bone, the base of the skull, and the bilateral occipital bones are seen. Subdural hemorrhage and subarachnoid hemorrhage are present. Bilateral periorbital soft tissue hemorrhage is noted.

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RECOVERED: Recovered between the occipital dura and the occipital skull is a moderately deformed copper jacketed gray missile; additionally minute jacket and missile fragments are recovered in the same location.

EXIT: There is no corresponding exit.

TRAJECTORY: The wound track travels from the decedent's front-to-back and upward.

BLUNT FORCE INJURIES OF EXTREMITIES:

On the right upper calf is a 1/2 x 1/4 inch red-brown abrasion. On the left calf is a 1/4 x 3/16 inch faint pink contusion. On the right knee is a 1/4 x 1/8 inch red abrasion.

INTERNAL EXAMINATION (EXCLUDING INJURIES)

BODY CAVITIES:

Focal adhesions are present between the loops of bowel. All body organs are in normal and anatomic position with apparent surgical absence of the appendix. The serosal surfaces are glistening.

HEAD (CENTRAL NERVOUS SYSTEM):

The brain weighs 1410 grams and is swollen. The dura mater and falx cerebri are not adherent to the brain. The cerebral hemispheres are asymmetrical due to injury. The uninjured structures at the base of the brain are free of abnormality. Sections through the uninjured cerebral hemispheres reveal no lesions within the cortex, subcortical white matter, or deep parenchyma of either hemisphere. Sections through the uninjured brain stem and cerebellum reveal no lesions. The spinal cord is not removed. Sections of the brain are submitted for further Forensic Neuropathological Evaluation (see separate report).

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NECK:

Examination of the soft tissues of the neck, including strap muscles and large vessels, reveals no abnormalities. The hyoid bone and larynx are intact. The tongue is normal.

CARDIOVASCULAR SYSTEM:

The heart weighs 550 grams and is dilated. The pericardial sac is free of significant fluid or adhesions. The pericardial surfaces are glistening.

The coronary arteries arise normally and follow the distribution of a right dominant pattern with no significant atherosclerosis.

The chambers and valves are proportionate. Mild degenerative changes are present of the mitral valve. The remaining valves and cusps are normally formed, thin and pliable and free of vegetations and degenerative changes. The myocardium is remarkable for increased perivascular fibrosis. Fatty infiltration of the right ventricle is noted. A focal area of pallor is noted in the lateral left ventricle near the base of the heart. The atrial and ventricular septa are intact. The tricuspid valve measures 12.5 cm; the mitral valve measures 11.5 cm; the pulmonic valve measures 7.8 cm; the aortic valve measures 8.0 cm. The right ventricle measures 0.5 cm in thickness; the left ventricle measures 1.9 cm in thickness; and the septum measures 1.9 cm in thickness.

The aorta and its major branches arise normally and follow the usual course, with no significant atherosclerosis. The orifices of the major aortic vascular branches are patent. The vena cava and its major tributaries are patent and return to the heart in the usual distribution and are unremarkable.

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RESPIRATORY SYSTEM:

The right and left lungs weigh 1060 and 750 grams, respectively. The upper and lower airways are unobstructed. The mucosal surfaces are smooth and yellow-tan. The pleural surfaces are glistening. The pulmonary parenchyma is a dark red-purple in the dependent portions and lighter pink in the anterior portions. The cut surface exudes moderate amounts of blood, particularly in the dependent portions. The pulmonary arteries are normally developed and without thromboemboli and atherosis. There is no saddle embolus on the in situ examination of the pulmonary trunk.

LIVER AND BILIARY SYSTEM:

The liver weighs 1490 grams. The hepatic capsule is smooth, glistening, and intact, covering brown slightly fatty parenchyma. The gallbladder contains a moderate amount of brown-tan liquid bile without stones; some cholesterolosis is noted of the gallbladder mucosa.

ALIMENTARY TRACT:

The esophagus is lined by gray smooth mucosa. The gastric mucosa contains the usual rugal folds. The lumen contains approximately 50 ml of brown liquid. The serosa of the small bowel is unremarkable. The serosa of the large bowel is remarkable for diverticula. The small bowel contains some partially digested food. The large bowel contains a mixture of softened and semi-firm stool. Diverticula are intact and present particularly in the sigmoid colon. The appendix is surgically absent. The pancreas contains fatty infiltration.

GENITOURINARY TRACT:

The right and left kidneys weigh 140 and 150 grams, respectively. The renal capsules are opaque and strip with difficulty from the underlying granular, scarred, and brown

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cortical surfaces. The cortices are of normal thickness and delineated from the medullary pyramids. The calyces and pelves are dilated but free of stones. The urinary bladder contains a moderate amount of yellow urine; the mucosa is gray-tan and smooth. The prostate is not enlarged. The testes are unremarkable.

RETICULOENDOTHELIAL SYSTEM:

The spleen weighs 140 grams and has an intact capsule covering a purple diffluent parenchyma. The splenic white pulp is indiscernible. The bone marrow (rib) is red-purple. There is no prominent lymphadenopathy. The thymus is dispersed in the anterior mediastinal fat.

ENDOCRINE SYSTEM:

The pituitary gland is of large size. The thyroid gland is of normal position, large size and normal texture. The adrenal glands have a yellow cortex and an autolyzing gray medulla.

MUSCULOSKELETAL SYSTEM:

Degenerative changes are present of the spine. The soft tissues are not unusual. The cervical spinal column is stable on internal palpation.

MICROSCOPIC EXAMINATION (slide #)

Conduction system - AV node (#1): network of muscle fibers in subendocardial tissues; mildly increased perivascular fibrosis.
Conduction system - SA node (#2): ganglion cells and nerve fibers identified.
Coronary arteries (#3): mild atherosclerosis.
Heart - RV (#4): increased fatty infiltration.
Heart - septum (#5): scattered hypertrophied myocytes.

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Heart - LV (#6): scattered hypertrophied myocytes; minimally increased perivascular fibrosis.
Heart - apex (#7): myocyte disarray.
Lung - right (#8): autolysis.
Lung - left (#9): autolysis; patchy areas of atelectasis.
Liver (#10): mild diffuse macrosteatosis; portal tracts without increased fibrosis or increased inflammatory cells; vascular congestion; autolysis.
Spleen (#10): prominent white pulp; hyalinized vessels.
Pancreas (#11): increased fatty infiltration; autolysis; islet cells not identified.
Kidneys (#12): several globally sclerosed glomeruli; glomerulomegaly; tubular autolysis.
Adrenal (#13): intracellular cortical fat/lipid identified.
Thyroid (#13): follicles of variable diameters; early autolysis.
Bone marrow (#14): trilineage hematopoiesis; early autolysis.

RADIOGRAPHS

Radiographs of the head and neck identify a radiopaque missile just beneath the occipital skull at midline; additional minute fragments are seen extending from a front-to-back trajectory. Fractures of the occipital bones and the base of the skull are noted. The cervical spine and hyoid bone appear intact. Dental restorations are present within the few remaining teeth within the mouth. Radiograph of the chest reveals a moderately enlarged cardiac silhouette. Radiographs of the chest, abdomen, and the pelvis reveal degenerative changes present of the spine. Radiographs of the chest, abdomen, pelvis, lower extremities and upper extremities reveal no clear evidence of acute skeletal injury. Metallic portions of clothing are visible within some of the radiographs. In addition, a radiopaque casing is visible within some of the radiographs of the head, neck and chest (pre-processing radiographs).

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SPECIMENS OBTAINED/RESULTS

TISSUE: Representative sections of all of the major organs are retained.

TOXICOLOGY: Heart blood, peripheral blood, vitreous, urine, liver, bile, gastric contents and brain are obtained at autopsy.

TOXICOLOGY RESULTS: A Forensic Toxicological Analysis is performed and reported separately.

VITREOUS SCREEN: A vitreous screen shows slightly elevated urea nitrogen (35 mg/dL) and creatinine (1.6 mg/dL) levels; no evidence of hyperglycemia is seen.

MICROBIOLOGY:

Bacterial cultures of the blood grew Staphylococcus aureus, Streptococcus salivarius, Clostridium perfringens and Streptococcus parasanguinis, which is most likely due to post mortem overgrowth.

Bacterial cultures of the right lung show scant growth of Staphylococcus aureus, Streptococcus mitis/oralis and Gemella morbillorum, which is most likely due to post mortem overgrowth.

Bacterial cultures of the left lung show scant growth of Staphylococcus aureus and light growth of Streptococcus mitis, which is most likely due to post mortem overgrowth.

Stool cultures for cytomegalovirus and Enterovirus showed none isolated; no Shiga toxins were detected. No Salmonella, Shigella or Campylobacter were isolated; no ova or parasites were seen.

Bacterial cultures of the urine show no growth.

RT-PCR for Influenza and Respiratory Viral Pathogens shows no RNA detected. FilmArray for Respiratory Pathogens shows no DNA or RNA detected.

URINALYSIS: A reflex urinalysis identified turbid urine with trace ketones, protein, blood, bacteria and epithelial cells.

STANFORD NEUROPATHOLOGY CONSULTANTS

STANFORD UNIVERSITY MEDICAL CENTER
300 PASTEUR DRIVE, EDWARDS BLDG R-241, STANFORD, CALIFORNIA 94305
TEL #: (650) 723-6041 FAX #: (650) 498-5394
Hannes Vogel, MD – Director

Patient: **PADDOCK (TENT), STEPHEN CRAIG**

Pathology No: **SHS-17-54361**

Med. Rec. No.:
Sex: M Age: 64
Date of Birth: 4/9/1953
Account No.: Default

Date of Procedure:
Date Received: 11/27/2017 1:24:00 PM

Physician(s):
LISA ANN GAVIN, M.D.
CLARK COUNTY CORONER / MEDICAL EXAMINER
1704 PINTO LANE
LAS VEGAS, NV 89106

SPECIMEN SUBMITTED:
BRAIN AUTOPSY: CASE#17-10064

DIAGNOSIS:

1. **AUTOPSY BRAIN, PREFIXATION WEIGHT 1410 GRAMS, AND PITUITARY GLAND**
2. **STATUS POST INTRAORAL GUNSHOT WOUND OF HEAD WITH PENETRATION OF BRAINSTEM, CEREBELLUM, LEFT OCCIPITAL LOBE**
3. **INTRACRANIAL HEMORRHAGE, ACUTE, SECONDARY TO #2**
   a. **SUBDURAL**
   b. **SUBARACHNOID**
   c. **PARENCHYMAL, MULTIFOCAL, CONTUSIVE, PETECHIAL**
   d. **PITUITARY GLAND**
4. **HYPERTENSIVE VASCULOPATHY AND ATHEROSCLEROSIS**

VOGEL

COMMENT: The hypertensive changes are commensurate with the stated age of the deceased and evidence from the general autopsy of hypertensive cardiovascular disease.

The extent of formation of corpora amylacea as noted in the microscopic description is a known incidental finding in the brains of asymptomatic older adults. In this example of strikingly numerous corpora amylacea there is no apparent etiology, consistent with the lack of any published significance to this abundance in some individuals.

GROSS NEUROPATHOLOGY: (H. Vogel, M.D.)

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Hannes Vogel, MD – Director

Patient: **PADDOCK (TENT), STEPHEN CRAIG** Pathology No: **SHS-17-54361**

Received through the courtesy of Dr. Gavin of the Clark County Coroner Office, Las Vegas, NV and by direct transfer from Coroner John Fudenberg on Monday November 27, 2017, and designated with the decedent name Paddock (Tent), Stephen as well as an autopsy report and identifying paperwork is formalin fixed brain tissue in a sealed plastic container.

No dura is received. The prefixation weight of the brain is 1410 grams. The written record of the postmortem prosection of the brain is noted in the received autopsy report. An intraoral gunshot injury is described in which the trajectory included in sequence, the roof of the mouth, the base of the skull (with internal beveling), the brain stem, the cerebellum, the left occipital lobe and partially into the occipital bones. Also described are: contusions of the base of the brain with brain swelling; and subdural and subarachnoid hemorrhage, locations unspecified. The cerebral hemispheres were asymmetrical, prefixation, due to injury. Further quoting the autopsy report: "The uninjured structures at the base of the brain are free of abnormality. Sections through the uninjured cerebral hemispheres reveal no lesions within the cortex, subcortical white matter, or deep parenchyma of either hemisphere. Sections through the uninjured brain stem and cerebellum reveal no lesions. The spinal cord was not removed." Representative portions were retained for formalin fixation.

The fixed brain tissue is received in pieces of varying sizes, as follows, with gross abnormalities if present. Neuroanatomic origins of all portions were substantiated by Dr. Gavin. Photographs were taken for documentation.

1. Frontal lobe; subarachnoid and petechial parenchymal hemorrhages
2. Cingulate gyri
3. Corpus callosum and partial basal ganglia, two pieces. Thalamus appears slightly mottled
4. Hippocampus, two pieces, sides unspecified; one with fresh contusion
5. Splenium of the corpus callosum
6. Cerebellum and injured midbrain, pons; several pieces
7. Occipital lobe, side unspecified

Representative sections are submitted as follows: A) frontal lobe, B) frontal lobe, C) corpus callosum and cingulate gyrus, D) basal ganglia with probable anterior commissure, E) thalamus, F) thalamus G) possible amygdala, H) putamen, I, J, K, L) designated hippocampus, M) thalamus and claustrum, N) designated temporal lobe with contusion, O) occipital lobe, side unspecified, P) midbrain with red nucleus, Q) injured pons, R) medulla, S) cerebellum, T)injured vermis, U) pituitary, V) optic chiasm, W) basal ganglia and internal capsule, X) basal ganglia and anterior commissure, Y) basal ganglia and possible amygdala

MICROSCOPIC NEUROPATHOLOGY: (H. Vogel, M.D.)

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All sections are viewed with hematoxylin and eosin and Luxol fast blue/periodic acid Schiff (LFB/PAS). The histological sections of regions designated as injured or containing contused brain are confirmed microscopically, evidenced by perivascular microhemorrhage. Grossly identifiable subarachnoid hemorrhage is also confirmed microscopically as acute. The pituitary gland shows acute parenchymal hemorrhage.

Sections including hemispheric white matter demonstrate hyaline thickening of arterial vessels with focal perivascular hemosiderin deposition, characteristic of hypertensive vasculopathy. No microinfarcts are noted. Large subarachnoid arterial blood vessels show moderate atherosclerosis.

None of the sections show any evidence of an either acute or chronic inflammatory reaction, within brain parenchyma and leptomeninges, providing no support for a diagnosis of either an infectious or autoimmune encephalitis or meningitis. The cerebellum is histologically normal and shows no obvious neuronal loss or reactive changes.

The most striking abnormality in sections of the hippocampus, peri- third ventricular wall, optic nerve, corpus callosum, medial surfaces of frontal lobes are unusually large numbers of corpora amylacea in subpial, perivascular, and minor subependymal distributions characteristic of the usual age-related accumulation of corpora amylacea in these favored locations. Some of the subpial regions with numerous corpora amylacea display interface ("Chaslin's") gliosis. The LFB/PAS stains highlight the corpora amylacea. No abnormal accumulations of corpora amylacea are found in gray matter as seen in Lafora disease, or except in rare foci, in white matter as seen in polyglucosan body disease.

The following special stains and immunohistochemical stains were performed with results described.

1. LFB/PAS: no evidence of demyelination
2. Bielschowsky silver impregnation, block J: no neurofibrillary tangles or senile plaques of the Alzheimer type
3. Beta-amyloid, blocks B, G, J: no vascular or plaque deposition
4. AT8 (phosphor tau), blocks B, C, D, G, L, N: no neurofibrillary tangles or senile plaques of the Alzheimer type in the hippocampus; no subcortical expression of tau at depths of sulci or perivascular as seen in chronic traumatic encephalopathy, frontal lobe
5. Alpha-synuclein, blocks C, G, P: no Lewy body pathology
6. TDP-43, blocks B, G, N: no abnormal cytoplasmic staining as seen in frontotemporal lobar degeneration (FTLD)
7. Ubiquitin, blocks J, N, Y: no abnormal cytoplasmic staining as seen in FTLD

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8. GFAP, blocks C, E, F, M: some mild increase in perivascular and subpial astrogliosis, without obvious neuronal loss
9. Beta-amyloid precursor protein, block C: no axonal injury

CLINICAL HISTORY:

64 year old man expired of self-administered intraoral gunshot wound. No known past medical history.

I have reviewed the specimen and agree with the interpretation above. HANNES VOGEL, M.D.
Electronically signed 12/27/2017 1:34 PM

NMS LABS

NMS Labs
3701 Welsh Road, PO Box 433A, Willow Grove, PA 19090-0437
Phone: (215) 657-4900 Fax: (215) 657-2972
e-mail: nms@nmslabs.com
Robert A. Middleberg, PhD, F-ABFT, DABCC-TC, Laboratory Director

CONFIDENTIAL

Toxicology Report

Report Issued 10/24/2017 12:03

To: **10294**
Clark County Coroner's Office
Attn: David Mills
1704 Pinto Lane
Las Vegas, NV 89106

Patient Name PADDOCK (TENT), STEPHEN C.
Patient ID 17-10064
Chain 17314232
Age 64 Y **DOB** Not Given
Gender Male
Workorder 17314232

Positive Findings:

Compound	Result	Units	Matrix Source
Betahydroxybutyric Acid	**21**	**mcg/mL**	**001 - Peripheral Blood**
Arsenic	**12**	**mcg/L**	**001 - Peripheral Blood**
Bismuth	**0.92**	**mcg/L**	**001 - Peripheral Blood**
Mercury	**37**	**mcg/L**	**001 - Peripheral Blood**
Selenium	**290**	**mcg/L**	**001 - Peripheral Blood**
Antimony	**9.6**	**mcg/L**	**001 - Peripheral Blood**
Lead	**7.3**	**mcg/dL**	**001 - Peripheral Blood**
Caffeine	**Positive**	**mcg/mL**	**001 - Peripheral Blood**
Theobromine	**Positive**	**mcg/mL**	**001 - Peripheral Blood**
Chlorpheniramine	**13**	**ng/mL**	**002 - Peripheral Blood**
Nordiazepam	**42**	**ng/mL**	**006 - Urine**
Oxazepam	**170**	**ng/mL**	**006 - Urine**
Temazepam	**140**	**ng/mL**	**006 - Urine**

See Detailed Findings section for additional information

Disclaimer: Specimens for elemental testing should be collected in certified metal-free containers. Elevated results for elemental testing may be caused by environmental contamination at the time of specimen collection and should be interpreted accordingly. It is recommended that unexpected elevated results be verified by testing another specimen.

Testing Requested:

Analysis Code	Description
9142B	Cyanide Screen, Blood
2693B	Metals/Metalloids Acute Poisoning Panel, Blood
0420B	Betahydroxybutyric Acid, Blood
8054B	Postmortem, Expanded with NPS, Blood (Forensic)
8092B	Postmortem, Expert, Blood (Forensic)
8051U	Postmortem, Basic, Urine (Forensic)

Specimens Received:

ID	Tube/Container	Volume/ Mass	Collection Date/Time	Matrix Source	Miscellaneous Information
001	Gray Top Tube	10.65 mL	10/06/2017 19:00	Peripheral Blood	
002	Gray Top Tube	9.65 mL	10/06/2017 19:00	Peripheral Blood	
003	Gray Top Tube	9.65 mL	10/06/2017 19:00	Heart Blood	
004	Gray Top Tube	5 mL	10/06/2017 19:00	Heart Blood	
005	Red Top Tube	1 mL	10/06/2017 19:00	Vitreous Fluid	

ID	Tube/Container	Volume/ Mass	Collection Date/Time	Matrix Source	Miscellaneous Information
006	Green Vial	10.65 mL	10/06/2017 19:00	Urine	
007	Green Vial	6.75 mL	10/06/2017 19:00	Bile	
008	White Plastic Container	32.47 g	10/06/2017 19:00	Liver Tissue	
009	White Plastic Container	24.92 g	10/06/2017 19:00	Brain Tissue	
010	White Plastic Container	22.08 g	10/06/2017 19:00	Muscle Tissue	SKELETAL MUSCLE
011	White Plastic Container	28 g	10/06/2017 19:00	Gastric Fluid	THIN LIGHT BROWN FLUID, pH=4

All sample volumes/weights are approximations.

Specimens received on 10/10/2017.

Detailed Findings:

Analysis and Comments	Result	Units	Rpt. Limit	Specimen Source	Analysis By
Betahydroxybutyric Acid	21	mcg/mL	20	001 - Peripheral Blood	GC/MS
Arsenic	12	mcg/L	5.0	001 - Peripheral Blood	ICP/MS
Bismuth	0.92	mcg/L	0.50	001 - Peripheral Blood	ICP/MS
Mercury	37	mcg/L	3.0	001 - Peripheral Blood	ICP/MS
Selenium	290	mcg/L	20	001 - Peripheral Blood	ICP/MS
Result verified by repeat analysis.					
Antimony	9.6	mcg/L	1.0	001 - Peripheral Blood	ICP/MS
Lead	7.3	mcg/dL	0.50	001 - Peripheral Blood	ICP/MS
Results verified by repeat analysis.					
Caffeine	Positive	mcg/mL	0.10	001 - Peripheral Blood	GC/MS
Theobromine	Positive	mcg/mL	5.0	001 - Peripheral Blood	GC/MS
Chlorpheniramine	13	ng/mL	10	002 - Peripheral Blood	LC-MS/MS
Nordiazepam	42	ng/mL	20	006 - Urine	LC-MS/MS
Oxazepam	170	ng/mL	20	006 - Urine	LC-MS/MS
Temazepam	140	ng/mL	20	006 - Urine	LC-MS/MS

Other than the above findings, examination of the specimen(s) submitted did not reveal any positive findings of toxicological significance by procedures outlined in the accompanying Analysis Summary.

Reference Comments:

1. Antimony - Peripheral Blood:

   Pentavalent antimony compounds are used in medicine as parasiticides. Additionally, antimony has been used in the production of pigments, alloys, and flame-retardants.

   Typical normal antimony concentrations in blood are less than 5 mcg/L. Patients administered stibogluconate sodium for leishmaniasis developed an average peak blood antimony concentration of 8800 mcg/L at 1.3 hr post-intramuscular dosing.

   NMS Labs has demonstrated that certain collection tubes can artifactually increase measured antimony concentrations rendering reported concentrations difficult to interpret.

Reference Comments:

2. Arsenic - Peripheral Blood:

   Arsenic is a metallic element. It is prevalent in the earth's crust and can therefore be found in numerous environmentally-related sources, e.g., well water, shellfish and soil. Individuals who are exposed to these sources may have acutely or chronically elevated body burdens of arsenic. Arsenic exists in numerous chemical compounds as well as several chemical forms. Not all arsenical compounds are equal in toxicity.

   In unexposed normal individuals, arsenic concentrations in blood are usually less than 10 mcg/L, but may be higher after seafood consumption. Other potential factors causing increased concentrations of arsenic include consumption of well-water with high arsenic content. In reported poisoning fatalities, a range of 600 - 9300 mcg/L blood (mean, 3300 mcg/L) has been reported.

3. Betahydroxybutyric Acid (BHB; Betahydroxybutyrate; Ketone) - Peripheral Blood:

   Ketoacidosis related to diabetes or alcoholism can be an important factor in determining cause of death. The primary ketone body produced through ketogenesis is acetoacetate. Acetoacetate may then break down to form acetone and betahydroxybutyric acid. Ketogenic diets and other means of clinically induced, mild ketogenesis have been applied to the treatment of Epilepsy, Alzheimer's disease and other disorders.

   In blood, betahydroxybutyric acid concentrations below 50 mcg/mL are considered normal while concentrations greater than 250 mcg/mL are indicative of ketoacidosis. Ketoacidosis may produce polyuria, polydipsia, weight loss, dizziness, nausea, vomiting, confusion, stupor and coma. There may be an odor of acetone on the breath. Severe ketoacidosis may result in death if left untreated.

4. Bismuth - Peripheral Blood:

   Bismuth is used industrially to produce low-melting alloys, pigments and chemical additives. It is also used therapeutically as astringents, antacids, skin powders, radio-opaque agents and to treat ulcers, indigestion, diarrhea, syphilis and warts. Normal blood concentrations are usually less than 1.0 mcg/L. The primary result of bismuth overdosage is renal damage, but encephalopathy and peripheral neuropathy can also occur. Other signs of bismuth toxicity may include discoloration of the tongue, gums or skin, salivation, nausea, vomiting, abdominal pain, tremors, ataxia, memory loss, mental confusion, and seizures. Toxic bismuth blood concentrations arising from the chronic oral use of bismuth subnitrate ranged from 50 to 1600 mcg/L. Two death cases associated with bismuth toxicity reported bismuth blood concentrations in excess of 1000 mcg/L.

5. Caffeine (No-Doz) - Peripheral Blood:

   Caffeine is a xanthine-derived central nervous system stimulant. It also produces diuresis and cardiac and respiratory stimulation. It can be readily found in such items as coffee, tea, soft drinks and chocolate. The reported qualitative result for this substance is indicative of a finding commonly seen following typical use and is usually not toxicologically significant. If confirmation testing is required please contact the laboratory.

6. Chlorpheniramine (Chlor-Trimeton®) - Peripheral Blood:

   Chlorpheniramine is a potent antihistamine that has been used alone and in combination with other cold symptom relief medications, both prescribed and sold over-the-counter. It may also be provided by injection or as a nasal spray. Oral doses usually range from 4 to 12 mg with both normal and controlled release formulations available.
   Peak concentrations of 10 ng/mL chlorpheniramine were obtained 3 hours following single oral administration of 8 mg. Toxic effects have been reported in adults at concentrations greater than 400 ng/mL (serum) and in infants at concentrations above 65 ng/mL (postmortem blood). The blood to plasma ratio of chlorpheniramine is approximately 1.2.
   Common adverse effects include sedation, dizziness, nausea and dry mouth. Signs and symptoms of acute chlorpheniramine toxicity include tremor, seizures, disorientation, loss of consciousness, fever, respiratory depression and cardiac arrhythmias.

Reference Comments:

7. Lead - Peripheral Blood:

   Lead is an environmental toxicant that may deleteriously affect the nervous, hematopoietic, endocrine, renal, and reproductive systems. In the general population, the major exposure routes are inhalation of lead dusts and fumes and ingestion of lead from contaminated hands and food stuffs. Drinking water may also contribute to the total body burden. In children, paint chips from lead based paints may be a source of exposure. According to the U.S. Centers for Disease Control and Prevention (CDC), the blood lead reference level for adults is less than 5 mcg/dL. For workplace information, refer to the U.S. Occupational Safety and Health Administration (OSHA) website.

   In young children, lead exposure is a particular hazard because children absorb lead at a higher rate than do adults, and because the developing nervous system of children are more susceptible to the effect of lead. The U.S. Centers for Disease Control and Prevention (CDC) reference value based on the 97.5th percentile of the blood lead level distribution in U.S. children aged 1-5 years is 5 mcg/dL.

8. Mercury - Peripheral Blood:

   Mercury is a trace element, which is widely used, in industrial and agricultural products and processes, and in medicine and dentistry. Dietary intake of mercury in man ranges from approximately 1 to 30 mcg per day. Industrial exposure to mercury occurs through inhalation or by dermal absorption. Mercury exposure can be due to elemental, inorganic and organic forms of the element.

   Total blood mercury levels of up to 6 mcg/L have been measured in persons with low fish consumption and up to 200 mcg/L blood in individuals consuming large quantities of predatory marine fish. Typically, 'normal' mercury blood concentrations are less than 10 mcg/L.

   Postmortem total blood mercury concentrations ranging from 20 - 110 mcg/L with an average of 60 mcg/L have been reported in a Japanese population.

   The average oral lethal dose of inorganic mercury salts is approximately 1 gram. Toxic effects of inorganic mercury poisoning include gastroenteritis and tubular necrosis leading to renal failure. Elemental mercury is most dangerous when volatilized leading to pulmonary and CNS effects. Postmortem blood mercury concentrations can vary according to the form of mercury and the time since exposure. In two cases of inorganic mercury poisoning, blood concentrations of 1700 and 2100 mcg/L were measured. Blood concentrations of mercury after both fatal and non-fatal elemental mercury poisoning usually exceed 200 mcg/L.

9. Nordiazepam (Chlordiazepoxide Metabolite) - Urine:

   Nordiazepam is a pharmacologically active metabolite of several benzodiazepine anxiolytic/sedative/hypnotic agents, e.g., diazepam (Valium®). Nordiazepam is also the major active entity in clorazepate (Tranxene®), a benzodiazepine agent used for agitation, seizures and anxiety. The action of this compound is based on its CNS-depressant activity.

10. Oxazepam (Serax®) - Urine:

    Oxazepam is a benzodiazepine. It is frequently seen as the metabolite of diazepam and other benzodiazepines; however, it is pharmacologically active and may be given as the primary medication for the short-term relief of symptoms of anxiety and in the management of alcohol withdrawal.

    Signs associated with overdose with oxazepam are similar to those observed with other benzodiazepines, e.g., drowsiness, lethargy, respiratory depression and coma.

11. Selenium - Peripheral Blood:

    Selenium is an essential trace metal. It is also used in various industries, e.g., electronic semiconductors and rubber. In medicinals, selenium can be found in shampoos and dietary supplements. The compound exists in elemental, organic, and inorganic forms. Reported reference concentrations of selenium in blood of normal individuals range from 60 - 230 mcg/L. These concentrations are diet dependent.

    Adverse effects to selenium have included irritation of the skin and mucous membranes, nausea, diarrhea, fatigue, alopecia, joint pain, abdominal pain, tremor, corrosive gastritis, cyanosis, coma, and death.

Reference Comments:

12. Temazepam (Diazepam Metabolite; Normison®) - Urine:

    Temazepam is a benzodiazepine hypnotic agent used in the short-term relief of insomnia. Its major metabolite, oxazepam, is also a pharmacologically active depressant. Temazepam is also a metabolite of diazepam (Valium®). The usual adult dosage of temazepam is 30 mg, however, 15 mg may be adequate.

    In overdose, temazepam shares the same clinically observed signs and symptoms as other benzodiazepines, e.g., sedation, lethargy, loss of consciousness and respiratory depression.

    Alcohol greatly enhances the activity of benzodiazepines.

13. Theobromine (Xantheose) - Peripheral Blood:

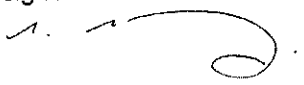
    Theobromine is a methylxanthine alkaloid found in tea and cocoa products and has been reported to pass into the breast milk of nursing mothers. Theobromine has the general properties of the xanthines, including diuresis and smooth muscle stimulation. The reported qualitative result for this substance was based upon a single analysis only. If confirmation testing is required please contact the laboratory.

Sample Comments:

001 Physician/Pathologist Name: DR. GAVIN

Unless alternate arrangements are made by you, the remainder of the submitted specimens will be discarded thirteen (13) months from the date of this report; and generated data will be discarded five (5) years from the date the analyses were performed. Chain of custody documentation has been maintained for the analyses performed by NMS Labs.

Workorder 17314232 was electronically signed on 10/24/2017 11:24 by:



Laura M. Labay, Ph.D., F-ABFT, DABCC-TC
Forensic Toxicologist

Analysis Summary and Reporting Limits:

All of the following tests were performed for this case. For each test, the compounds listed were included in the scope. The Reporting Limit listed for each compound represents the lowest concentration of the compound that will be reported as being positive. If the compound is listed as None Detected, it is not present above the Reporting Limit. Please refer to the Positive Findings section of the report for those compounds that were identified as being present.

Acode 0420B - Betahydroxybutyric Acid, Blood - Peripheral Blood

-Analysis by Gas Chromatography/Mass Spectrometry (GC/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Betahydroxybutyric Acid	20 mcg/mL		

Acode 2693B - Metals/Metalloids Acute Poisoning Panel, Blood - Peripheral Blood

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Arsenic	5.0 mcg/L		

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Bismuth	0.50 mcg/L		

Analysis Summary and Reporting Limits:

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Mercury	3.0 mcg/L		

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Selenium	20 mcg/L		

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Thallium	0.50 mcg/L		

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Antimony	1.0 mcg/L		

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Lead	0.50 mcg/dL		

Acode 50012B - Benzodiazepines Confirmation, Blood (Forensic) - Peripheral Blood

-Analysis by High Performance Liquid Chromatography/ TandemMass Spectrometry (LC-MS/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
7-Amino Clonazepam	5.0 ng/mL	Flurazepam	2.0 ng/mL
Alpha-Hydroxyalprazolam	5.0 ng/mL	Hydroxyethylflurazepam	5.0 ng/mL
Alprazolam	5.0 ng/mL	Hydroxytriazolam	5.0 ng/mL
Chlordiazepoxide	20 ng/mL	Lorazepam	5.0 ng/mL
Clobazam	20 ng/mL	Midazolam	5.0 ng/mL
Clonazepam	2.0 ng/mL	Nordiazepam	20 ng/mL
Desalkylflurazepam	5.0 ng/mL	Oxazepam	20 ng/mL
Diazepam	20 ng/mL	Temazepam	20 ng/mL
Estazolam	5.0 ng/mL	Triazolam	2.0 ng/mL

Acode 50012U - Benzodiazepines Confirmation, Urine (Forensic)

-Analysis by High Performance Liquid Chromatography/ TandemMass Spectrometry (LC-MS/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
1-Hydroxymidazolam	5.0 ng/mL	Alprazolam	5.0 ng/mL
7-Amino Clonazepam	5.0 ng/mL	Chlordiazepoxide	20 ng/mL
Alpha-Hydroxyalprazolam	10 ng/mL	Clobazam	20 ng/mL

Analysis Summary and Reporting Limits:

Compound	Rpt. Limit	Compound	Rpt. Limit
Desalkylflurazepam	5.0 ng/mL	Lorazepam	10 ng/mL
Diazepam	20 ng/mL	Nordiazepam	20 ng/mL
Estazolam	5.0 ng/mL	Oxazepam	20 ng/mL
Hydroxyethylflurazepam	5.0 ng/mL	Temazepam	20 ng/mL
Hydroxytriazolam	5.0 ng/mL		

Acode 52440B - Chlorpheniramine Confirmation, Blood (Forensic) - Peripheral Blood

-Analysis by High Performance Liquid Chromatography/ TandemMass Spectrometry (LC-MS/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Chlorpheniramine	10 ng/mL		

Acode 5970B - Synthetic Cannabinoids Confirmation Panel 2 (Qualitative), Blood - Peripheral Blood

-Analysis by High Performance Liquid Chromatography/ TandemMass Spectrometry (LC-MS/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
5F-AB-001	1.0 ng/mL	FUB-AMB	0.10 ng/mL
5F-ADB	0.20 ng/mL	FUB-JWH-018	0.20 ng/mL
5F-AMB	0.10 ng/mL	FUB-PB-22	0.10 ng/mL
5F-APICA	1.0 ng/mL	MA-CHMINACA	0.20 ng/mL
5F-APINACA (5F-AKB-48)	2.0 ng/mL	MDMB-CHMCZCA	0.10 ng/mL
5F-MN-18	0.10 ng/mL	MDMB-CHMINACA	0.10 ng/mL
5F-PB-22	0.10 ng/mL	MDMB-FUBINACA	0.10 ng/mL
AMB	0.10 ng/mL	MMB-CHMICA	0.10 ng/mL
APICA	0.20 ng/mL	MMB-CHMINACA (MDMB-CHMICA)	0.10 ng/mL
APINACA (AKB-48)	1.0 ng/mL	MO-CHMINACA	0.10 ng/mL
CUMYL-THPINACA	0.10 ng/mL	NM-2201	0.10 ng/mL
EG-2201	0.20 ng/mL	THJ-018	0.10 ng/mL
FUB-144	0.10 ng/mL	THJ-2201	0.10 ng/mL
FUB-AKB-48	0.20 ng/mL		

Acode 8051U - Postmortem, Basic, Urine (Forensic)

-Analysis by Enzyme Immunoassay (EIA) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Barbiturates	0.30 mcg/mL	Methadone / Metabolite	300 ng/mL
Benzodiazepines	50 ng/mL	Opiates	300 ng/mL
Cannabinoids	20 ng/mL	Oxycodone / Oxymorphone	100 ng/mL
Cocaine / Metabolites	150 ng/mL	Phencyclidine	25 ng/mL

-Analysis by Enzyme Immunoassay (EIA) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Amphetamines	500 ng/mL	Fentanyl / Acetyl Fentanyl	2.0 ng/mL
Buprenorphine / Metabolite	5.0 ng/mL	MDMA	300 ng/mL

-Analysis by Headspace Gas Chromatography (GC) for:

Analysis Summary and Reporting Limits:

Compound	Rpt. Limit	Compound	Rpt. Limit
Acetone	5.0 mg/dL	Isopropanol	5.0 mg/dL
Ethanol	10 mg/dL	Methanol	5.0 mg/dL

Acode 8054B - Postmortem, Expanded with NPS, Blood (Forensic) - Peripheral Blood

-Analysis by Enzyme-Linked Immunosorbent Assay (ELISA) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Barbiturates	0.040 mcg/mL	Salicylates	120 mcg/mL
Cannabinoids	10 ng/mL		

-Analysis by Headspace Gas Chromatography (GC) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Acetone	5.0 mg/dL	Isopropanol	5.0 mg/dL
Ethanol	10 mg/dL	Methanol	5.0 mg/dL

-Analysis by High Performance Liquid Chromatography/TandemMass Spectrometry QTRAP (LC-MS/MS QTRAP) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
5F-AB-001	1.0 ng/mL	FUB-144	0.10 ng/mL
5F-ADB	0.20 ng/mL	FUB-AKB-48	0.20 ng/mL
5F-ADB-PINACA	1.0 ng/mL	FUB-AMB	0.10 ng/mL
5F-ADBICA	1.0 ng/mL	FUB-JWH-018	0.20 ng/mL
5F-AMB	0.10 ng/mL	FUB-PB-22	0.10 ng/mL
5F-APICA	1.0 ng/mL	JWH-018	0.10 ng/mL
5F-APINACA (5F-AKB-48)	2.0 ng/mL	JWH-122	0.10 ng/mL
5F-MN-18	0.10 ng/mL	MA-CHMINACA	0.20 ng/mL
5F-PB-22	0.10 ng/mL	MDMB-CHMCZCA	0.10 ng/mL
AB-CHMINACA	1.0 ng/mL	MDMB-CHMINACA	0.10 ng/mL
AB-FUBINACA	1.0 ng/mL	MDMB-FUBINACA	0.10 ng/mL
AB-PINACA	0.20 ng/mL	MMB-CHMICA	0.10 ng/mL
ADB-CHMINACA	0.10 ng/mL	MMB-CHMINACA (MDMB-CHMICA)	0.10 ng/mL
ADB-FUBINACA	1.0 ng/mL	MO-CHMINACA	0.10 ng/mL
ADB-PINACA	0.20 ng/mL	NM-2201	0.10 ng/mL
ADBICA	1.0 ng/mL	PX1	0.10 ng/mL
AM-2201	0.10 ng/mL	PX2	0.20 ng/mL
AMB	0.10 ng/mL	THJ-018	0.10 ng/mL
APICA	0.20 ng/mL	THJ-2201	0.10 ng/mL
APINACA (AKB-48)	1.0 ng/mL	UR-144	0.20 ng/mL
APP-CHMINACA (PX3)	0.20 ng/mL	XLR-11	0.20 ng/mL
CUMYL-THPINACA	0.10 ng/mL		
EG-2201	0.20 ng/mL		

Analysis Summary and Reporting Limits:

-Analysis by High Performance Liquid Chromatography/Time of Flight-Mass Spectrometry (LC/TOF-MS) for: The following is a general list of compound classes included in this screen. The detection of any specific analyte is concentration-dependent. Note, not all known analytes in each specified compound class are included. Some specific analytes outside these classes are also included. For a detailed list of all analytes and reporting limits, please contact NMS Labs.
Amphetamines, Anticonvulsants, Antidepressants, Antihistamines, Antipsychotic Agents, Benzodiazepines, CNS Stimulants, Cocaine and Metabolites, Hallucinogens, Hypnosedatives, Hypoglycemics, Muscle Relaxants, Non-Steroidal Anti-Inflammatory Agents, Opiates and Opioids.

Acode 8092B - Postmortem, Expert, Blood (Forensic) - Peripheral Blood

-Analysis by Enzyme-Linked Immunosorbent Assay (ELISA) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Benzodiazepines	100 ng/mL	Opiates	20 ng/mL
Buprenorphine / Metabolite	0.50 ng/mL	Oxycodone / Oxymorphone	10 ng/mL
Cannabinoids	10 ng/mL	Salicylates	120 mcg/mL
Cocaine / Metabolites	20 ng/mL		

-Analysis by Gas Chromatography/Mass Spectrometry (GC/MS) for: Anesthetics, Anticoagulant Agents, Antifungal Agents, Antihypertensive Agents, Anxiolytics (Benzodiazepine and others), Hypnosedatives (Barbiturates, Non-Benzodiazepine Hypnotics, and others) and Non-Steroidal Anti-Inflammatory Agents (excluding Salicylate).

-Analysis by Gas Chromatography/Mass Spectrometry (GC/MS) for: The following is a general list of compound classes included in the Gas Chromatographic screen. The detection of any particular compound is concentration-dependent. Please note that not all known compounds included in each specified class or heading are included. Some specific compounds outside these classes are also included. For a detailed list of all compounds and reporting limits included in this screen, please contact NMS Labs.
Amphetamines, Analgesics (opioid and non-opioid), Anorectics, Antiarrhythmics, Anticholinergic Agents, Anticonvulsant Agents, Antidepressants, Antiemetic Agents, Antihistamines, Antiparkinsonian Agents, Antipsychotic Agents, Antitussive Agents, Antiviral Agents, Calcium Channel Blocking Agents, Cardiovascular Agents (non-digitalis), Local Anesthetics Agents, Muscle Relaxants and Stimulants (Amphetamine-like and others).

-Analysis by Headspace Gas Chromatography (GC) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Acetone	5.0 mg/dL	Isopropanol	5.0 mg/dL
Ethanol	10 mg/dL	Methanol	5.0 mg/dL

Acode 9142B - Cyanide Screen, Blood - Peripheral Blood

-Analysis by High Performance Liquid Chromatography/ TandemMass Spectrometry (LC-MS/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Cyanide	0.10 mcg/mL		

NMS LABS

NMS Labs
3701 Welsh Road, PO Box 433A, Willow Grove, PA 19090-0437
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e-mail: nms@nmslabs.com
Robert A. Middleberg, PhD, F-ABFT, DABCC-TC, Laboratory Director

CONFIDENTIAL

Toxicology Report

Report Issued 10/30/2017 13:03

To: **10294**
Clark County Coroner's Office
Attn: David Mills
1704 Pinto Lane
Las Vegas, NV 89106

Patient Name PADDOCK (TENT), STEPHEN C.
Patient ID 17-10064
Chain 17322918
Age 64 Y **DOB** Not Given
Gender Male
Workorder 17322918

Positive Findings:

Compound	Result	Units	Matrix Source
Antimony	**0.49**	**mcg/g**	**001 - Hair**
Barium	**1.6**	**mcg/g**	**001 - Hair**
Lead	**1.3**	**mcg/g**	**001 - Hair**
Mercury	**4.7**	**mcg/g**	**001 - Hair**
Barium	**5.0**	**mcg/g**	**002 - Pubic Hair**
Bismuth	**0.15**	**mcg/g**	**002 - Pubic Hair**
Mercury	**3.6**	**mcg/g**	**002 - Pubic Hair**

See Detailed Findings section for additional information

Disclaimer: Specimens for elemental testing should be collected in certified metal-free containers. Elevated results for elemental testing may be caused by environmental contamination at the time of specimen collection and should be interpreted accordingly. It is recommended that unexpected elevated results be verified by testing another specimen.

Testing Requested:

Analysis Code	Description
2693H	Metals/Metalloids Acute Poisoning Panel, Hair

Specimens Received:

ID	Tube/Container	Volume/ Mass	Collection Date/Time	Matrix Source	Miscellaneous Information
001	White Plastic Container	0.128 g	10/14/2017 13:10	Hair	SCALP HAIR
002	White Plastic Container	0.128 g	10/14/2017 13:10	Pubic Hair	
003	Green Plastic Container	16.06 g	10/14/2017 13:10	Bone	"VERTEBRAL COLUM"

All sample volumes/weights are approximations.

Specimens received on 10/17/2017.

Detailed Findings:

Analysis and Comments	Result	Units	Rpt. Limit	Specimen Source	Analysis By
Antimony	0.49	mcg/g	0.20	001 - Hair	ICP/MS
Barium	1.6	mcg/g	1.0	001 - Hair	ICP/MS
Lead	1.3	mcg/g	1.0	001 - Hair	ICP/MS
Mercury	4.7	mcg/g	0.76	001 - Hair	ICP/MS
Barium	5.0	mcg/g	0.98	002 - Pubic Hair	ICP/MS
Bismuth	0.15	mcg/g	0.098	002 - Pubic Hair	ICP/MS
Mercury	3.6	mcg/g	0.76	002 - Pubic Hair	ICP/MS

Other than the above findings, examination of the specimen(s) submitted did not reveal any positive findings of toxicological significance by procedures outlined in the accompanying Analysis Summary.

Reference Comments:

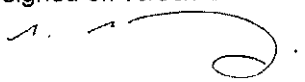
1. Antimony - Hair:
   Normally: Less than 0.2 mcg/g.
   Not for clinical diagnostic purposes.
2. Barium - Hair, Pubic Hair:
   Normally: Less than 2 mcg/g.
   Not for clinical diagnostic purposes.
3. Bismuth - Pubic Hair:
   No reference data available.
   Not for clinical diagnostic purposes.
4. Lead - Hair:
   Normally: Less than 15 mcg/g.
   Not for clinical diagnostic purposes.
5. Mercury - Hair, Pubic Hair:
   Generally: Less than 2 mcg/g.
   Concentrations are diet and environment dependent.
   Not for clinical diagnostic purposes.

Sample Comments:

001 Physician/Pathologist Name: DR. GAVIN

Unless alternate arrangements are made by you, the remainder of the submitted specimens will be discarded thirteen (13) months from the date of this report; and generated data will be discarded five (5) years from the date the analyses were performed. Chain of custody documentation has been maintained for the analyses performed by NMS Labs.

Workorder 17322918 was electronically signed on 10/30/2017 12:11 by:



Laura M. Labay, Ph.D., F-ABFT, DABCC-TC
Forensic Toxicologist

Analysis Summary and Reporting Limits:

All of the following tests were performed for this case. For each test, the compounds listed were included in the scope. The Reporting Limit listed for each compound represents the lowest concentration of the compound that will be reported as being positive. If the compound is listed as None Detected, it is not present above the Reporting Limit. Please refer to the Positive Findings section of the report for those compounds that were identified as being present.

Acode 2693H - Metals/Metalloids Acute Poisoning Panel, Hair - Pubic Hair

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Antimony	0.19 mcg/g	Lead	0.98 mcg/g
Arsenic	0.98 mcg/g	Selenium	3.9 mcg/g
Barium	0.98 mcg/g	Thallium	0.098 mcg/g
Bismuth	0.098 mcg/g		

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Mercury	0.76 mcg/g		

Acode 2693H - Metals/Metalloids Acute Poisoning Panel, Hair

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Antimony	0.20 mcg/g	Lead	1.0 mcg/g
Arsenic	1.0 mcg/g	Selenium	4.0 mcg/g
Barium	1.0 mcg/g	Thallium	0.10 mcg/g
Bismuth	0.10 mcg/g		

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Mercury	0.76 mcg/g		

NMS LABS

NMS Labs
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Robert A. Middleberg, PhD, F-ABFT, DABCC-TC, Laboratory Director

CONFIDENTIAL

Supplemental Report

Report Issued 12/11/2017 11:02
Last Report Issued 10/24/2017 12:03

To: **10294**
Clark County Coroner's Office
Attn: David Mills
1704 Pinto Lane
Las Vegas, NV 89106

Patient Name PADDOCK (TENT), STEPHEN C.
Patient ID 17-10064
Chain 17314232
Age 64 Y **DOB** Not Given
Gender Male
Workorder 17314232

Positive Findings:

Compound	Result	Units	Matrix Source
Betahydroxybutyric Acid	21	mcg/mL	001 - Peripheral Blood
Arsenic	12	mcg/L	001 - Peripheral Blood
Bismuth	0.92	mcg/L	001 - Peripheral Blood
Mercury	37	mcg/L	001 - Peripheral Blood
Selenium	290	mcg/L	001 - Peripheral Blood
Antimony	9.6	mcg/L	001 - Peripheral Blood
Lead	7.3	mcg/dL	001 - Peripheral Blood
Caffeine	Positive	mcg/mL	001 - Peripheral Blood
Theobromine	Positive	mcg/mL	001 - Peripheral Blood
Chlorpheniramine	13	ng/mL	002 - Peripheral Blood
Creatinine (Vitreous Fluid)	1.6	mg/dL	005 - Vitreous Fluid
Sodium (Vitreous Fluid)	127	mmol/L	005 - Vitreous Fluid
Potassium (Vitreous Fluid)	>20	mmol/L	005 - Vitreous Fluid
Chloride (Vitreous Fluid)	112	mmol/L	005 - Vitreous Fluid
Urea Nitrogen (Vitreous Fluid)	35	mg/dL	005 - Vitreous Fluid
Nordiazepam	42	ng/mL	006 - Urine
Oxazepam	170	ng/mL	006 - Urine
Temazepam	140	ng/mL	006 - Urine

See Detailed Findings section for additional information

Disclaimer: Specimens for elemental testing should be collected in certified metal-free containers. Elevated results for elemental testing may be caused by environmental contamination at the time of specimen collection and should be interpreted accordingly. It is recommended that unexpected elevated results be verified by testing another specimen.

Testing Requested:

Analysis Code	Description
9142B	Cyanide Screen, Blood
2693B	Metals/Metalloids Acute Poisoning Panel, Blood
0420B	Betahydroxybutyric Acid, Blood
8054B	Postmortem, Expanded with NPS, Blood (Forensic)
1919FL	Electrolytes and Glucose Panel (Vitreous), Fluid (Forensic)
8092B	Postmortem, Expert, Blood (Forensic)
8051U	Postmortem, Basic, Urine (Forensic)

Specimens Received:

ID	Tube/Container	Volume/ Mass	Collection Date/Time	Matrix Source	Miscellaneous Information
001	Gray Top Tube	10.65 mL	10/06/2017 19:00	Peripheral Blood	
002	Gray Top Tube	9.65 mL	10/06/2017 19:00	Peripheral Blood	
003	Gray Top Tube	9.65 mL	10/06/2017 19:00	Heart Blood	
004	Gray Top Tube	5 mL	10/06/2017 19:00	Heart Blood	
005	Red Top Tube	1 mL	10/06/2017 19:00	Vitreous Fluid	
006	Green Vial	10.65 mL	10/06/2017 19:00	Urine	
007	Green Vial	6.75 mL	10/06/2017 19:00	Bile	
008	White Plastic Container	32.47 g	10/06/2017 19:00	Liver Tissue	
009	White Plastic Container	24.92 g	10/06/2017 19:00	Brain Tissue	
010	White Plastic Container	22.08 g	10/06/2017 19:00	Muscle Tissue	SKELETAL MUSCLE
011	White Plastic Container	28 g	10/06/2017 19:00	Gastric Fluid	THIN LIGHT BROWN FLUID, pH=4

All sample volumes/weights are approximations.

Specimens received on 10/10/2017.

Detailed Findings:

Analysis and Comments	Result	Units	Rpt. Limit	Specimen Source	Analysis By
Betahydroxybutyric Acid	21	mcg/mL	20	001 - Peripheral Blood	GC/MS
Arsenic	12	mcg/L	5.0	001 - Peripheral Blood	ICP/MS
Bismuth	0.92	mcg/L	0.50	001 - Peripheral Blood	ICP/MS
Mercury	37	mcg/L	3.0	001 - Peripheral Blood	ICP/MS
Selenium	290	mcg/L	20	001 - Peripheral Blood	ICP/MS
Result verified by repeat analysis.					
Antimony	9.6	mcg/L	1.0	001 - Peripheral Blood	ICP/MS
Lead	7.3	mcg/dL	0.50	001 - Peripheral Blood	ICP/MS
Results verified by repeat analysis.					
Caffeine	Positive	mcg/mL	0.10	001 - Peripheral Blood	GC/MS
Theobromine	Positive	mcg/mL	5.0	001 - Peripheral Blood	GC/MS
Chlorpheniramine	13	ng/mL	10	002 - Peripheral Blood	LC-MS/MS
Creatinine (Vitreous Fluid)	1.6	mg/dL	0.050	005 - Vitreous Fluid	Colorimetry
Sodium (Vitreous Fluid)	127	mmol/L	80	005 - Vitreous Fluid	Chemistry Analyzer
Potassium (Vitreous Fluid)	>20	mmol/L	1.0	005 - Vitreous Fluid	Chemistry Analyzer
Chloride (Vitreous Fluid)	112	mmol/L	70	005 - Vitreous Fluid	Chemistry Analyzer
Glucose (Vitreous Fluid)	None Detected	mg/dL	35	005 - Vitreous Fluid	Chemistry Analyzer
Urea Nitrogen (Vitreous Fluid)	35	mg/dL	3.0	005 - Vitreous Fluid	Chemistry Analyzer
Nordiazepam	42	ng/mL	20	006 - Urine	LC-MS/MS
Oxazepam	170	ng/mL	20	006 - Urine	LC-MS/MS
Temazepam	140	ng/mL	20	006 - Urine	LC-MS/MS

Detailed Findings:

Analysis and Comments	Result	Units	Rpt. Limit	Specimen Source	Analysis By

Other than the above findings, examination of the specimen(s) submitted did not reveal any positive findings of toxicological significance by procedures outlined in the accompanying Analysis Summary.

Reference Comments:

1. Antimony - Peripheral Blood:

   Pentavalent antimony compounds are used in medicine as parasiticides. Additionally, antimony has been used in the production of pigments, alloys, and flame-retardants.

   Typical normal antimony concentrations in blood are less than 5 mcg/L. Patients administered stibogluconate sodium for leishmaniasis developed an average peak blood antimony concentration of 8800 mcg/L at 1.3 hr post-intramuscular dosing.

   NMS Labs has demonstrated that certain collection tubes can artifactually increase measured antimony concentrations rendering reported concentrations difficult to interpret.

2. Arsenic - Peripheral Blood:

   Arsenic is a metallic element. It is prevalent in the earth's crust and can therefore be found in numerous environmentally-related sources, e.g., well water, shellfish and soil. Individuals who are exposed to these sources may have acutely or chronically elevated body burdens of arsenic. Arsenic exists in numerous chemical compounds as well as several chemical forms. Not all arsenical compounds are equal in toxicity.

   In unexposed normal individuals, arsenic concentrations in blood are usually less than 10 mcg/L, but may be higher after seafood consumption. Other potential factors causing increased concentrations of arsenic include consumption of well-water with high arsenic content. In reported poisoning fatalities, a range of 600 - 9300 mcg/L blood (mean, 3300 mcg/L) has been reported.

3. Betahydroxybutyric Acid (BHB; Betahydroxybutyrate; Ketone) - Peripheral Blood:

   Ketoacidosis related to diabetes or alcoholism can be an important factor in determining cause of death. The primary ketone body produced through ketogenesis is acetoacetate. Acetoacetate may then break down to form acetone and betahydroxybutyric acid. Ketogenic diets and other means of clinically induced, mild ketogenesis have been applied to the treatment of Epilepsy, Alzheimer's disease and other disorders.

   In blood, betahydroxybutyric acid concentrations below 50 mcg/mL are considered normal while concentrations greater than 250 mcg/mL are indicative of ketoacidosis. Ketoacidosis may produce polyuria, polydipsia, weight loss, dizziness, nausea, vomiting, confusion, stupor and coma. There may be an odor of acetone on the breath. Severe ketoacidosis may result in death if left untreated.

4. Bismuth - Peripheral Blood:

   Bismuth is used industrially to produce low-melting alloys, pigments and chemical additives. It is also used therapeutically as astringents, antacids, skin powders, radio-opaque agents and to treat ulcers, indigestion, diarrhea, syphilis and warts. Normal blood concentrations are usually less than 1.0 mcg/L. The primary result of bismuth overdosage is renal damage, but encephalopathy and peripheral neuropathy can also occur. Other signs of bismuth toxicity may include discoloration of the tongue, gums or skin, salivation, nausea, vomiting, abdominal pain, tremors, ataxia, memory loss, mental confusion, and seizures. Toxic bismuth blood concentrations arising from the chronic oral use of bismuth subnitrate ranged from 50 to 1600 mcg/L. Two death cases associated with bismuth toxicity reported bismuth blood concentrations in excess of 1000 mcg/L.

5. Caffeine (No-Doz) - Peripheral Blood:

   Caffeine is a xanthine-derived central nervous system stimulant. It also produces diuresis and cardiac and respiratory stimulation. It can be readily found in such items as coffee, tea, soft drinks and chocolate. The reported qualitative result for this substance is indicative of a finding commonly seen following typical use and is usually not toxicologically significant. If confirmation testing is required please contact the laboratory.

6. Chloride (Vitreous Fluid) - Vitreous Fluid:

   Normal: 105 - 135 mmol/L

Reference Comments:

7. Chlorpheniramine (Chlor-Trimeton®) - Peripheral Blood:

   Chlorpheniramine is a potent antihistamine that has been used alone and in combination with other cold symptom relief medications, both prescribed and sold over-the-counter. It may also be provided by injection or as a nasal spray. Oral doses usually range from 4 to 12 mg with both normal and controlled release formulations available.
   Peak concentrations of 10 ng/mL chlorpheniramine were obtained 3 hours following single oral administration of 8 mg. Toxic effects have been reported in adults at concentrations greater than 400 ng/mL (serum) and in infants at concentrations above 65 ng/mL (postmortem blood). The blood to plasma ratio of chlorpheniramine is approximately 1.2.
   Common adverse effects include sedation, dizziness, nausea and dry mouth. Signs and symptoms of acute chlorpheniramine toxicity include tremor, seizures, disorientation, loss of consciousness, fever, respiratory depression and cardiac arrhythmias.

8. Creatinine (Vitreous Fluid) - Vitreous Fluid:

   Normal: 0.6 - 1.3 mg/dL

9. Glucose (Vitreous Fluid) - Vitreous Fluid:

   Normal: <200 mg/dL

   Postmortem vitreous glucose concentrations >200 mg/dL are associated with hyperglycemia.

   Since postmortem vitreous glucose concentrations decline rapidly after death both in vivo and in vitro, care should be taken in the interpretation of results. Stability of vitreous glucose for up to 30 days has been noted by NMS Labs when specimens are maintained frozen (-20°C).

10. Lead - Peripheral Blood:

    Lead is an environmental toxicant that may deleteriously affect the nervous, hematopoietic, endocrine, renal, and reproductive systems. In the general population, the major exposure routes are inhalation of lead dusts and fumes and ingestion of lead from contaminated hands and food stuffs. Drinking water may also contribute to the total body burden. In children, paint chips from lead based paints may be a source of exposure. According to the U.S. Centers for Disease Control and Prevention (CDC), the blood lead reference level for adults is less than 5 mcg/dL. For workplace information, refer to the U.S. Occupational Safety and Health Administration (OSHA) website.

    In young children, lead exposure is a particular hazard because children absorb lead at a higher rate than do adults, and because the developing nervous system of children are more susceptible to the effect of lead. The U.S. Centers for Disease Control and Prevention (CDC) reference value based on the 97.5th percentile of the blood lead level distribution in U.S. children aged 1-5 years is 5 mcg/dL.

11. Mercury - Peripheral Blood:

    Mercury is a trace element, which is widely used, in industrial and agricultural products and processes, and in medicine and dentistry. Dietary intake of mercury in man ranges from approximately 1 to 30 mcg per day. Industrial exposure to mercury occurs through inhalation or by dermal absorption. Mercury exposure can be due to elemental, inorganic and organic forms of the element.

    Total blood mercury levels of up to 6 mcg/L have been measured in persons with low fish consumption and up to 200 mcg/L blood in individuals consuming large quantities of predatory marine fish. Typically, 'normal' mercury blood concentrations are less than 10 mcg/L.

    Postmortem total blood mercury concentrations ranging from 20 - 110 mcg/L with an average of 60 mcg/L have been reported in a Japanese population.

    The average oral lethal dose of inorganic mercury salts is approximately 1 gram. Toxic effects of inorganic mercury poisoning include gastroenteritis and tubular necrosis leading to renal failure. Elemental mercury is most dangerous when volatilized leading to pulmonary and CNS effects. Postmortem blood mercury concentrations can vary according to the form of mercury and the time since exposure. In two cases of inorganic mercury poisoning, blood concentrations of 1700 and 2100 mcg/L were measured. Blood concentrations of mercury after both fatal and non-fatal elemental mercury poisoning usually exceed 200 mcg/L.

Reference Comments:

12. Nordiazepam (Chlordiazepoxide Metabolite) - Urine:

    Nordiazepam is a pharmacologically active metabolite of several benzodiazepine anxiolytic/sedative/hypnotic agents, e.g., diazepam (Valium®). Nordiazepam is also the major active entity in clorazepate (Tranxene®), a benzodiazepine agent used for agitation, seizures and anxiety. The action of this compound is based on its CNS-depressant activity.

13. Oxazepam (Serax®) - Urine:

    Oxazepam is a benzodiazepine. It is frequently seen as the metabolite of diazepam and other benzodiazepines; however, it is pharmacologically active and may be given as the primary medication for the short-term relief of symptoms of anxiety and in the management of alcohol withdrawal.

    Signs associated with overdose with oxazepam are similar to those observed with other benzodiazepines, e.g., drowsiness, lethargy, respiratory depression and coma.

14. Potassium (Vitreous Fluid) - Vitreous Fluid:

    Normal: <15 mmol/L
    Quantitative results for Potassium will be affected if performed on gray top tubes since these collection tubes contain potassium oxalate.

15. Selenium - Peripheral Blood:

    Selenium is an essential trace metal. It is also used in various industries, e.g., electronic semiconductors and rubber. In medicinals, selenium can be found in shampoos and dietary supplements. The compound exists in elemental, organic, and inorganic forms. Reported reference concentrations of selenium in blood of normal individuals range from 60 - 230 mcg/L. These concentrations are diet dependent.

    Adverse effects to selenium have included irritation of the skin and mucous membranes, nausea, diarrhea, fatigue, alopecia, joint pain, abdominal pain, tremor, corrosive gastritis, cyanosis, coma, and death.

16. Sodium (Vitreous Fluid) - Vitreous Fluid:

    Normal: 135 - 150 mmol/L
    Quantitative results for sodium will be affected if performed on gray top tubes since these collection tubes contain sodium fluoride.

17. Temazepam (Diazepam Metabolite; Normison®) - Urine:

    Temazepam is a benzodiazepine hypnotic agent used in the short-term relief of insomnia. Its major metabolite, oxazepam, is also a pharmacologically active depressant. Temazepam is also a metabolite of diazepam (Valium®). The usual adult dosage of temazepam is 30 mg, however, 15 mg may be adequate.

    In overdose, temazepam shares the same clinically observed signs and symptoms as other benzodiazepines, e.g., sedation, lethargy, loss of consciousness and respiratory depression.

    Alcohol greatly enhances the activity of benzodiazepines.

18. Theobromine (Xantheose) - Peripheral Blood:

    Theobromine is a methylxanthine alkaloid found in tea and cocoa products and has been reported to pass into the breast milk of nursing mothers. Theobromine has the general properties of the xanthines, including diuresis and smooth muscle stimulation. The reported qualitative result for this substance was based upon a single analysis only. If confirmation testing is required please contact the laboratory.

19. Urea Nitrogen (Vitreous Fluid) - Vitreous Fluid:

    Normal: 8 - 20 mg/dL

Sample Comments:

001 Physician/Pathologist Name: DR. GAVIN

Unless alternate arrangements are made by you, the remainder of the submitted specimens will be discarded thirteen (13) months from the date of this report; and generated data will be discarded five (5) years from the date the analyses were performed. Chain of custody documentation has been maintained for the analyses performed by NMS Labs.

Workorder 17314232 was electronically signed on 12/11/2017 09:12 by:

Laura M. Labay, Ph.D., F-ABFT, DABCC-TC
Forensic Toxicologist

Analysis Summary and Reporting Limits:

All of the following tests were performed for this case. For each test, the compounds listed were included in the scope. The Reporting Limit listed for each compound represents the lowest concentration of the compound that will be reported as being positive. If the compound is listed as None Detected, it is not present above the Reporting Limit. Please refer to the Positive Findings section of the report for those compounds that were identified as being present.

Acode 0420B - Betahydroxybutyric Acid, Blood - Peripheral Blood

-Analysis by Gas Chromatography/Mass Spectrometry (GC/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Betahydroxybutyric Acid	20 mcg/mL		

Acode 1919FL - Electrolytes and Glucose Panel (Vitreous), Fluid (Forensic) - Vitreous Fluid

-Analysis by Chemistry Analyzer for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Chloride (Vitreous Fluid)	70 mmol/L	Sodium (Vitreous Fluid)	80 mmol/L
Glucose (Vitreous Fluid)	35 mg/dL	Urea Nitrogen (Vitreous Fluid)	3.0 mg/dL
Potassium (Vitreous Fluid)	1.0 mmol/L		

-Analysis by Colorimetry (C) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Creatinine (Vitreous Fluid)	0.050 mg/dL		

Acode 2693B - Metals/Metalloids Acute Poisoning Panel, Blood - Peripheral Blood

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Arsenic	5.0 mcg/L		

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Bismuth	0.50 mcg/L		

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Mercury	3.0 mcg/L		

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Analysis Summary and Reporting Limits:

Compound	Rpt. Limit	Compound	Rpt. Limit
Selenium	20 mcg/L		

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Thallium	0.50 mcg/L		

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Antimony	1.0 mcg/L		

-Analysis by Inductively Coupled Plasma/Mass Spectrometry(ICP/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Lead	0.50 mcg/dL		

Acode 50012B - Benzodiazepines Confirmation, Blood (Forensic) - Peripheral Blood

-Analysis by High Performance Liquid Chromatography/ TandemMass Spectrometry (LC-MS/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
7-Amino Clonazepam	5.0 ng/mL	Flurazepam	2.0 ng/mL
Alpha-Hydroxyalprazolam	5.0 ng/mL	Hydroxyethylflurazepam	5.0 ng/mL
Alprazolam	5.0 ng/mL	Hydroxytriazolam	5.0 ng/mL
Chlordiazepoxide	20 ng/mL	Lorazepam	5.0 ng/mL
Clobazam	20 ng/mL	Midazolam	5.0 ng/mL
Clonazepam	2.0 ng/mL	Nordiazepam	20 ng/mL
Desalkylflurazepam	5.0 ng/mL	Oxazepam	20 ng/mL
Diazepam	20 ng/mL	Temazepam	20 ng/mL
Estazolam	5.0 ng/mL	Triazolam	2.0 ng/mL

Acode 50012U - Benzodiazepines Confirmation, Urine (Forensic)

-Analysis by High Performance Liquid Chromatography/ TandemMass Spectrometry (LC-MS/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
1-Hydroxymidazolam	5.0 ng/mL	Estazolam	5.0 ng/mL
7-Amino Clonazepam	5.0 ng/mL	Hydroxyethylflurazepam	5.0 ng/mL
Alpha-Hydroxyalprazolam	10 ng/mL	Hydroxytriazolam	5.0 ng/mL
Alprazolam	5.0 ng/mL	Lorazepam	10 ng/mL
Chlordiazepoxide	20 ng/mL	Nordiazepam	20 ng/mL
Clobazam	20 ng/mL	Oxazepam	20 ng/mL
Desalkylflurazepam	5.0 ng/mL	Temazepam	20 ng/mL
Diazepam	20 ng/mL		

Acode 52440B - Chlorpheniramine Confirmation, Blood (Forensic) - Peripheral Blood

Analysis Summary and Reporting Limits:

-Analysis by High Performance Liquid Chromatography/ TandemMass Spectrometry (LC-MS/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Chlorpheniramine	10 ng/mL		

Acode 5970B - Synthetic Cannabinoids Confirmation Panel 2 (Qualitative), Blood - Peripheral Blood

-Analysis by High Performance Liquid Chromatography/ TandemMass Spectrometry (LC-MS/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
5F-AB-001	1.0 ng/mL	FUB-AMB	0.10 ng/mL
5F-ADB	0.20 ng/mL	FUB-JWH-018	0.20 ng/mL
5F-AMB	0.10 ng/mL	FUB-PB-22	0.10 ng/mL
5F-APICA	1.0 ng/mL	MA-CHMINACA	0.20 ng/mL
5F-APINACA (5F-AKB-48)	2.0 ng/mL	MDMB-CHMCZCA	0.10 ng/mL
5F-MN-18	0.10 ng/mL	MDMB-CHMINACA	0.10 ng/mL
5F-PB-22	0.10 ng/mL	MDMB-FUBINACA	0.10 ng/mL
AMB	0.10 ng/mL	MMB-CHMICA	0.10 ng/mL
APICA	0.20 ng/mL	MMB-CHMINACA (MDMB-CHMICA)	0.10 ng/mL
APINACA (AKB-48)	1.0 ng/mL	MO-CHMINACA	0.10 ng/mL
CUMYL-THPINACA	0.10 ng/mL	NM-2201	0.10 ng/mL
EG-2201	0.20 ng/mL	THJ-018	0.10 ng/mL
FUB-144	0.10 ng/mL	THJ-2201	0.10 ng/mL
FUB-AKB-48	0.20 ng/mL		

Acode 8051U - Postmortem, Basic, Urine (Forensic)

-Analysis by Enzyme Immunoassay (EIA) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Barbiturates	0.30 mcg/mL	Methadone / Metabolite	300 ng/mL
Benzodiazepines	50 ng/mL	Opiates	300 ng/mL
Cannabinoids	20 ng/mL	Oxycodone / Oxymorphone	100 ng/mL
Cocaine / Metabolites	150 ng/mL	Phencyclidine	25 ng/mL

-Analysis by Enzyme Immunoassay (EIA) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Amphetamines	500 ng/mL	Fentanyl / Acetyl Fentanyl	2.0 ng/mL
Buprenorphine / Metabolite	5.0 ng/mL	MDMA	300 ng/mL

-Analysis by Headspace Gas Chromatography (GC) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Acetone	5.0 mg/dL	Isopropanol	5.0 mg/dL
Ethanol	10 mg/dL	Methanol	5.0 mg/dL

Acode 8054B - Postmortem, Expanded with NPS, Blood (Forensic) - Peripheral Blood

-Analysis by Enzyme-Linked Immunosorbent Assay (ELISA) for:

Analysis Summary and Reporting Limits:

Compound	Rpt. Limit	Compound	Rpt. Limit
Barbiturates	0.040 mcg/mL	Salicylates	120 mcg/mL
Cannabinoids	10 ng/mL		

-Analysis by Headspace Gas Chromatography (GC) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Acetone	5.0 mg/dL	Isopropanol	5.0 mg/dL
Ethanol	10 mg/dL	Methanol	5.0 mg/dL

-Analysis by High Performance Liquid Chromatography/TandemMass Spectrometry QTRAP (LC-MS/MS QTRAP) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
5F-AB-001	1.0 ng/mL	FUB-144	0.10 ng/mL
5F-ADB	0.20 ng/mL	FUB-AKB-48	0.20 ng/mL
5F-ADB-PINACA	1.0 ng/mL	FUB-AMB	0.10 ng/mL
5F-ADBICA	1.0 ng/mL	FUB-JWH-018	0.20 ng/mL
5F-AMB	0.10 ng/mL	FUB-PB-22	0.10 ng/mL
5F-APICA	1.0 ng/mL	JWH-018	0.10 ng/mL
5F-APINACA (5F-AKB-48)	2.0 ng/mL	JWH-122	0.10 ng/mL
5F-MN-18	0.10 ng/mL	MA-CHMINACA	0.20 ng/mL
5F-PB-22	0.10 ng/mL	MDMB-CHMCZCA	0.10 ng/mL
AB-CHMINACA	1.0 ng/mL	MDMB-CHMINACA	0.10 ng/mL
AB-FUBINACA	1.0 ng/mL	MDMB-FUBINACA	0.10 ng/mL
AB-PINACA	0.20 ng/mL	MMB-CHMICA	0.10 ng/mL
ADB-CHMINACA	0.10 ng/mL	MMB-CHMINACA (MDMB-CHMICA)	0.10 ng/mL
ADB-FUBINACA	1.0 ng/mL	MO-CHMINACA	0.10 ng/mL
ADB-PINACA	0.20 ng/mL	NM-2201	0.10 ng/mL
ADBICA	1.0 ng/mL	PX1	0.10 ng/mL
AM-2201	0.10 ng/mL	PX2	0.20 ng/mL
AMB	0.10 ng/mL	THJ-018	0.10 ng/mL
APICA	0.20 ng/mL	THJ-2201	0.10 ng/mL
APINACA (AKB-48)	1.0 ng/mL	UR-144	0.20 ng/mL
APP-CHMINACA (PX3)	0.20 ng/mL	XLR-11	0.20 ng/mL
CUMYL-THPINACA	0.10 ng/mL		
EG-2201	0.20 ng/mL		

-Analysis by High Performance Liquid Chromatography/Time of Flight-Mass Spectrometry (LC/TOF-MS) for: The following is a general list of compound classes included in this screen. The detection of any specific analyte is concentration-dependent. Note, not all known analytes in each specified compound class are included. Some specific analytes outside these classes are also included. For a detailed list of all analytes and reporting limits, please contact NMS Labs.
Amphetamines, Anticonvulsants, Antidepressants, Antihistamines, Antipsychotic Agents, Benzodiazepines, CNS Stimulants, Cocaine and Metabolites, Hallucinogens, Hypnosedatives, Hypoglycemics, Muscle Relaxants, Non-Steroidal Anti-Inflammatory Agents, Opiates and Opioids.

Acode 8092B - Postmortem, Expert, Blood (Forensic) - Peripheral Blood

Analysis Summary and Reporting Limits:

-Analysis by Enzyme-Linked Immunosorbent Assay (ELISA) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Benzodiazepines	100 ng/mL	Opiates	20 ng/mL
Buprenorphine / Metabolite	0.50 ng/mL	Oxycodone / Oxymorphone	10 ng/mL
Cannabinoids	10 ng/mL	Salicylates	120 mcg/mL
Cocaine / Metabolites	20 ng/mL		

-Analysis by Gas Chromatography/Mass Spectrometry (GC/MS) for: Anesthetics, Anticoagulant Agents, Antifungal Agents, Antihypertensive Agents, Anxiolytics (Benzodiazepine and others), Hypnosedatives (Barbiturates, Non-Benzodiazepine Hypnotics, and others) and Non-Steroidal Anti-Inflammatory Agents (excluding Salicylate).

-Analysis by Gas Chromatography/Mass Spectrometry (GC/MS) for: The following is a general list of compound classes included in the Gas Chromatographic screen. The detection of any particular compound is concentration-dependent. Please note that not all known compounds included in each specified class or heading are included. Some specific compounds outside these classes are also included. For a detailed list of all compounds and reporting limits included in this screen, please contact NMS Labs.
Amphetamines, Analgesics (opioid and non-opioid), Anorectics, Antiarrhythmics, Anticholinergic Agents, Anticonvulsant Agents, Antidepressants, Antiemetic Agents, Antihistamines, Antiparkinsonian Agents, Antipsychotic Agents, Antitussive Agents, Antiviral Agents, Calcium Channel Blocking Agents, Cardiovascular Agents (non-digitalis), Local Anesthetics Agents, Muscle Relaxants and Stimulants (Amphetamine-like and others).

-Analysis by Headspace Gas Chromatography (GC) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Acetone	5.0 mg/dL	Isopropanol	5.0 mg/dL
Ethanol	10 mg/dL	Methanol	5.0 mg/dL

Acode 9142B - Cyanide Screen, Blood - Peripheral Blood

-Analysis by High Performance Liquid Chromatography/ TandemMass Spectrometry (LC-MS/MS) for:

Compound	Rpt. Limit	Compound	Rpt. Limit
Cyanide	0.10 mcg/mL		

NMS LABS

February 5, 2018

Dr. Lisa Gavin
Clark County Coroner's Office
1704 Pinto Lane
Las Vegas, NV 89106

Re: NMS file nos.: WO# 17314232 and 17322918

Dear Dr. Gavin:

You have requested that I provide a report discussing my opinions and conclusions regarding Mr. Stephen Paddock's toxicology results as detailed in two reports issued by NMS Labs. Specifically, you would like to know if substances found in Mr. Paddock's biological samples may be the reason for the production of violent and aggressive behavior.

In order to comply with your request, I have reviewed the following:

Toxicology reports for Mr. Stephen Paddock issued by NMS Labs:
- WO# 17314232 (initial report dated 10/24/2017; supplemental report dated 12/11/2017)
- WO# 17322918 (dated 10/30/2017)

From my review of these two reports, Mr. Paddock's toxicology testing showed the presence several of substances. The positive findings from both reports, with the exception of the vitreous findings, are shown in the table below.

ANALYTE	RESULT
Antimony	9.6 mcg/L in Peripheral Blood 0.49 mcg/g in Scalp Hair
Arsenic	12 mcg/L in Peripheral Blood
Barium	1.6 mcg/g in Scalp Hair 5.0 mcg/g in Pubic Hair
Bismuth	0.92 mcg/L in Peripheral Blood 0.15 mcg/g in Pubic Hair
Lead	7.3 mcg/dL in Peripheral Blood 1.3 mcg/g in Scalp Hair
Mercury	37 mcg/L in Peripheral Blood 4.7 mcg/g in Scalp Hair 3.6 mcg/g in Pubic Hair
Selenium	290 mcg/L in Peripheral Blood
Caffeine	Positive in Peripheral Blood
Theobromine	Positive in Peripheral Blood
Chlorpheniramine	13 ng/mL in Peripheral Blood
Nordiazepam	42 ng/mL in Urine
Oxazepam	170 ng/mL in Urine
Temazepam	140 ng/mL in Urine
Betahydroxybutyric Acid	21 mcg/mL in Peripheral Blood

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My opinions about the possibility regarding the manifestation of violent and aggressive behavior are detailed as follows:

1. Elemental analysis was performed in blood and hair. Blood is used to determine circulating concentrations at the time of its collection. In postmortem cases, it theoretically represents what was present at the time of death. Hair is used to determine if there has been any chronic exposure to a substance. Because elements are ubiquitous, the potential for environmental contamination during sample collection and from storage containers needs to be considered before attributing the results to the tested samples. The findings show concentrations that are either consistent with normal amounts for barium in scalp hair, bismuth in blood, and lead in scalp hair or are slightly above normal for antimony in blood and hair, arsenic in blood, lead in blood, mercury in blood and hair, and selenium in blood.

   Arsenic, antimony and selenium even at elevated concentrations are not known to be associated with the production of violent and aggressive behavior.

   Lead has been linked to cognitive effects, however, for lead at the reported concentration of 7.3 mcg/mL in adults there is insufficient evidence that this concentration will cause violent and aggressive behavior (1).

   Clinical manifestations of mercury toxicity are dependent upon several variables such as route of exposure, chemical form, dosage received, and duration of exposure. Some signs and symptoms associated with its toxicity may include bronchial irritation from mercury vapor exposure, gastroenteritis from inorganic mercury exposure, paresthesia, ataxia, and hearing loss from methyl and/or ethyl mercury exposure, and tubular necrosis in the kidney from inorganic mercury and ethyl mercury exposure (2).

   Important considerations for this case are that the mercury has not been analytically differentiated, and that arsenic, selenium and mercury concentrations can be elevated as a consequence of dietary (seafood) consumption and/or environmental exposures. In samples collected at autopsy from a normal Japanese population, the arsenic concentration in blood averaged 56 mcg/L with a range of 50-60 mcg/L, and the total mercury concentration in blood averaged 59 mcg/L with a range of 16-110 mcg/L (3). There is also indication that the presence of selenium may have some beneficial effects on the mitigation of mercury toxicity (4).

   My opinion is that if Mr. Paddock was experiencing toxicity to any of the identified elements he would have experienced a constellation of symptoms specifically related to that element's known toxic profile.

2. Caffeine is a commonly used central nervous system stimulant. It is found in beverages such as coffee or soda, and some food products such as chocolate. It can promote physiological responses such as diuresis, and increased heart and respiratory rates. Theobromine is an ingredient in chocolate and a caffeine metabolite. The reported qualitative findings in blood for these two substances are not consistent with excessive use.

3. Chlorpheniramine is an antihistamine. Common adverse effects include sedation and dizziness. The reported concentration in blood (13 ng/mL) is consistent with therapeutic use.

4. Nordiazepam, oxazepam, and temazepam are benzodiazepines. Nordiazepam is a benzodiazepine metabolite, and oxazepam and temazepam may be present as parent drugs and/or metabolites. Benzodiazepines are prescribed to treat a wide range of conditions including, but not limited to, anxiety, insomnia, and agitation. The finding of these substances in urine and not in blood show that

Mr. Paddock had previously used or was exposed to this drug class. Substances present in the urine do not have any pharmacological activity.

5. Betahydroxybutyric Acid is a ketone body. This endogenous substance is used as a biological marker for ketoacidosis. Concentrations less than 50 mcg/mL are considered normal and, therefore, the reported concentration in blood (21 mcg/mL) is not consistent with an above normal concentration.

If you have any questions regarding this report please do not hesitate to contact me. Also, in the event information becomes available, that may affect the above opinions and conclusions, please forward such to me for evaluation.

Laura M. Labay, Ph.D., F-ABFT, DABCC-TC
Forensic Toxicologist

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4. Spiller HA. Rethinking mercury: the role of selenium in the pathophysiology of mercury toxicity. Clin Toxicol (Phila). 2017 Nov 10:1-14.