NMS Labs
200 Welsh Road, Horsham, PA 19044-2208
Phone: (215) 657-4900 Fax: (215) 657-2972
e-mail: nms@nmslabs.com
Robert A. Middleberg, PhD, F-ABFT, DABCC-TC, Laboratory Director

CONFIDENTIAL

Demo Report

Report Issued 03/15/2021 07:20

To: **88888**
Forensic Example Report
Attn: Example Reports
200 Welsh Road
Horsham, PA 19044

Patient Name 8151B-POS
Patient ID 8151B-POS
Chain 20002256
Age Not Given **DOB** Not Given
Gender Not Given
Workorder 20002256

Positive Findings:

Compound	Result	Units	Matrix Source
Ethanol	**85 ±6**	**mg/dL**	**001 - Blood**
Blood Alcohol Concentration (BAC)	**0.085 ±0.006**	**g/100 mL**	**001 - Blood**
Diazepam	**50 ±10**	**ng/mL**	**001 - Blood**
Nordiazepam	**50 ±11**	**ng/mL**	**001 - Blood**
Oxazepam	**50 ±13**	**ng/mL**	**001 - Blood**
Temazepam	**50 ±11**	**ng/mL**	**001 - Blood**
Clobazam	**50 ±10**	**ng/mL**	**001 - Blood**
Chlordiazepoxide	**50 ±11**	**ng/mL**	**001 - Blood**
Lorazepam	**50 ±10**	**ng/mL**	**001 - Blood**
Clonazepam	**50 ±10**	**ng/mL**	**001 - Blood**
7-Amino Clonazepam	**50 ±10**	**ng/mL**	**001 - Blood**
Alprazolam	**50 ±10**	**ng/mL**	**001 - Blood**
Alpha-Hydroxyalprazolam	**50 ±13**	**ng/mL**	**001 - Blood**
Midazolam	**50 ±10**	**ng/mL**	**001 - Blood**
Triazolam	**50 ±10**	**ng/mL**	**001 - Blood**
Hydroxytriazolam	**50 ±10**	**ng/mL**	**001 - Blood**
Hydroxyethylflurazepam	**50 ±11**	**ng/mL**	**001 - Blood**
Desalkylflurazepam	**50 ±10**	**ng/mL**	**001 - Blood**
Flurazepam	**50 ±13**	**ng/mL**	**001 - Blood**
Estazolam	**50 ±11**	**ng/mL**	**001 - Blood**
Delta-9 THC	**5.0 ±1.0**	**ng/mL**	**001 - Blood**
Cocaine	**50 ±11**	**ng/mL**	**001 - Blood**
6-Monoacetylmorphine - Free	**5.0 ±1.3**	**ng/mL**	**001 - Blood**
Fentanyl	**1.0 ±0.2**	**ng/mL**	**001 - Blood**

Quantitative results are reported as Result +/- Uncertainty of Measurement (UM). Ethanol results are reported at a coverage probability of 99.73%; all other analytes are reported at a coverage probability of 95.45%.

See Detailed Findings section for additional information

Testing Requested:

Analysis Code	Description
8151B	DUID/DRE Panel (w/Alcohol) ProofPOSITIVE®, Blood (Forensic)

Specimens Received:

ID	Tube/Container	Volume/ Mass	Collection Date/Time	Matrix Source	Labeled As

ID	Tube/Container	Volume/ Mass	Collection Date/Time	Matrix Source	Labeled As
001	Clear vial	Not Given	Not Given	Blood	Not Applicable

All sample volumes/weights are approximations.

Specimens received on 11/11/2020.

Detailed Findings:

Analysis and Comments	Result	Units	Rpt. Limit	Specimen Source	Analysis By
Ethanol	85	mg/dL	10	001 - Blood	Headspace GC
Blood Alcohol Concentration (BAC)	0.085	g/100 mL	0.010	001 - Blood	Headspace GC
Ethanol	Confirmed	mg/dL	10	001 - Blood	Headspace GC
Diazepam	50	ng/mL	20	001 - Blood	LC-MS/MS
Nordiazepam	50	ng/mL	20	001 - Blood	LC-MS/MS
Oxazepam	50	ng/mL	20	001 - Blood	LC-MS/MS
Temazepam	50	ng/mL	20	001 - Blood	LC-MS/MS
Clobazam	50	ng/mL	20	001 - Blood	LC-MS/MS
Chlordiazepoxide	50	ng/mL	20	001 - Blood	LC-MS/MS
Lorazepam	50	ng/mL	5.0	001 - Blood	LC-MS/MS
Clonazepam	50	ng/mL	2.0	001 - Blood	LC-MS/MS
7-Amino Clonazepam	50	ng/mL	5.0	001 - Blood	LC-MS/MS
Alprazolam	50	ng/mL	5.0	001 - Blood	LC-MS/MS
Alpha-Hydroxyalprazolam	50	ng/mL	5.0	001 - Blood	LC-MS/MS
Midazolam	50	ng/mL	5.0	001 - Blood	LC-MS/MS
Triazolam	50	ng/mL	2.0	001 - Blood	LC-MS/MS
Hydroxytriazolam	50	ng/mL	5.0	001 - Blood	LC-MS/MS
Hydroxyethylflurazepam	50	ng/mL	5.0	001 - Blood	LC-MS/MS
Desalkylflurazepam	50	ng/mL	5.0	001 - Blood	LC-MS/MS
Flurazepam	50	ng/mL	2.0	001 - Blood	LC-MS/MS
Estazolam	50	ng/mL	5.0	001 - Blood	LC-MS/MS
Delta-9 THC	5.0	ng/mL	0.50	001 - Blood	LC-MS/MS
Cocaine	50	ng/mL	20	001 - Blood	GC/MS
6-Monoacetylmorphine - Free	5.0	ng/mL	1.0	001 - Blood	LC-MS/MS
Fentanyl	1.0	ng/mL	0.10	001 - Blood	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. 6-Monoacetylmorphine - Free (6-MAM; Heroin Metabolite) - Blood:

   6-monoacetylmorphine (6-MAM) is the 6-monoacetylated form of morphine, which is pharmacologically active. When present, it is generally indicative of heroin (diacetylmorphine) use. 6-MAM has also been reported to occur as an artifact in samples with unusually high blood morphine concentrations.

   A healthy man administered 12 mg heroin intravenously achieved peak blood concentrations at two minutes post injection of 150 ng/mL of 6-MAM and 44 ng/mL of morphine, which declined with half-lives of 6 minutes and 33 minutes, respectively.

2. 7-Amino Clonazepam (Clonazepam Metabolite) - Blood:

   Clonazepam is an intermediate to long-acting benzodiazepine hypnotic used in the treatment of insomnia and in the prevention and treatment of various seizure disorders. It also possesses anxiolytic, and muscle relaxant properties. It shares the actions and adverse reactions of other CNS-depressants including drowsiness, sedation, impairment of cognition, judgment and memory, confusion and disorientation. Initial adult dose typically starts at 1.5 mg daily and should generally not exceed 20 mg daily. Steady-state plasma concentrations at a daily dose of 6 mg are about 29 - 75 ng/mL for clonazepam and 23 - 137 ng/mL for its primary metabolite, 7-aminoclonazepam. In a report on clonazepam in 8 impaired drivers, concentration ranges of clonazepam and 7-aminoclonazepam were from 15 - 125 ng/mL (median 39 ng/mL), and 11 - 68 ng/mL (median 38 ng/mL). Other drugs may also have been present. The CNS depressant properties and sedating effects confirm that this drug has the potential to significantly impair driving abilities.

3. Alpha-Hydroxyalprazolam (Alprazolam Metabolite) - Blood:

   Alpha-Hydroxyalprazolam is an active metabolite of alprazolam. It has approximately 66% of the potency of the parent drug. It is typically present at concentrations less than 10% of the parent.

4. Alprazolam (Xanax®) - Blood:

   Alprazolam is a low-dose benzodiazepine used for the treatment of anxiety disorders and short-term relief of anxiety associated with depressive symptoms. Alpha-hydroxyalprazolam is an active metabolite of alprazolam. They share the actions and adverse reactions of other CNS-depressants. Alcohol greatly enhances the activity of benzodiazepines. Common adverse effects of alprazolam include drowsiness, fatigue, sedation, dizziness, weakness, unsteadiness and disorientation. Signs of CNS depression can include the presence of horizontal gaze nystagmus, lack of convergence of the eyes, normal pupil size with slow reaction to light and reduced pulse and blood pressure. For anxiety, daily doses of 0.8 to 4 mg are effective, whereas for phobic and panic disorders, 6 to 9 mg daily is recommended. Reported therapeutic plasma concentrations of alprazolam are proportional to dose given: 3 mg/day produced steady-state levels of 30 ng/mL; 6 mg/day: 60 ng/mL; and 9 mg/day: 100 ng/mL. In a population of 219 drivers arrested for driving under the influence, Alprazolam concentrations ranged from 5 - 1580 ng/mL, with a mean of 103 ng/mL. Other drugs may also have been present. Studies confirm that alprazolam is capable of causing significant impairment to driving and psychomotor abilities across a wide range of concentrations.

5. Blood Alcohol Concentration (BAC) - Blood:

   I certify that I am the analyst of record for this report. In this capacity, I am authorized by NMS Labs to provide the final analytical review of the results in this case. This report cannot be released without my review, and I am responsible for the accuracy of results contained herein. This laboratory is accredited and licensed, and complies with accreditation standards for internal chain of custody, standard operating procedures, analysis of appropriate blanks, calibrators and controls, and other quality control and quality assurance measures, all of which I am familiar with, and that ensure test result accuracy. A complete list of accreditations and licensures are listed on our website at www.nmslabs.com. I have considered the information available to me at this time, and it is my opinion that testing was properly performed in compliance with laboratory standards and policies, and the results are supported by the analytical data and accurately reflect the toxicological findings for this subject. If lawfully subpoenaed, I will testify to the above facts in a court of law.

6. Chlordiazepoxide (Librium®) - Blood:

   Chlordiazepoxide is a benzodiazepine used for the management of seizure disorders, anxiety and alcohol withdrawal. The compound is extensively metabolized to at least 4 active metabolites: Norchlordiazepoxide, demoxepam, nordiazepam and oxazepam. They share the actions and adverse reactions of other CNS-depressants. Alcohol greatly enhances the activity of benzodiazepines. For mild to moderate anxiety, a usual adult oral dosage is 5 to 10 mg given 3 to 4 times a day. After a single 30 mg oral dose, a peak plasma level of 1600 ng/mL was reported at 4 hr. With chronic therapy of 55 mg chlordiazepoxide daily, chlordiazepoxide, norchlordiazepoxide and demoxepam concentrations were reported as averaging 2200 ng/mL, 1400 ng/mL and 670 ng/mL, respectively; nordiazepam values with similar treatment were found to have a steady-state value of 300 ng/mL. Common adverse effects of chlordiazepoxide include drowsiness, fatigue, sedation, dizziness,

Reference Comments:

weakness, unsteadiness and disorientation. Signs of CNS depression can include the presence of horizontal gaze nystagmus, lack of convergence of the eyes, normal pupil size with slow reaction to light, and reduced pulse and blood pressure. In a population of 66 drivers suspected of driving under the influence who tested positive for chlordiazepoxide, blood concentrations ranged from 25 - 10000 ng/mL with a median of 1200 ng/mL. Other drugs may also have been present. Patients taking chlordiazepoxide under a doctor's supervision are less likely to be impaired than if abusing the medication. Single doses of chlordiazepoxide have been shown to significantly impair psychomotor performance for up to 2.5 hours. Chlordiazepoxide may cause impairment in the skills necessary for safe driving.

7. Clobazam (Frisium®; Urbanyl®) - Blood:

   Clobazam is a benzodiazepine drug used in the control of seizure disorders. It shares the actions and adverse reactions of other CNS-depressants, although these are generally mild. Following a single 20 mg oral dose, the mean peak plasma concentration was 465 ng/mL (range 220 - 710 ng/mL) after 1.7 hours. Following a single 40 mg oral dose, the mean peak plasma concentration: 730 ng/mL at 2.5 hours. The plasma concentration decreased to 360 ng/mL at 12 hours, 180 ng/mL at 48 hours and 17 ng/mL at 96 hours. Common adverse effects of clobazam include ataxia, somnolence and double vision. Patients taking clobazam under a doctor's supervision are less likely to be impaired than if abusing the medication. Ten healthy adults given nightly doses of 20 mg clobazam for six days and assessed on a closed driving course. Overall there was little evidence of any impairment in their driving. When used according to directions at moderate doses, clobazam does not appear to cause impairment in the skills necessary for safe driving.

8. Clonazepam (Klonopin®) - Blood:

   Clonazepam is an intermediate to long-acting benzodiazepine hypnotic used in the treatment of insomnia and in the prevention and treatment of various seizure disorders. It also possesses anxiolytic, and muscle relaxant properties. It shares the actions and adverse reactions of other CNS-depressants including drowsiness, sedation, impairment of cognition, judgment and memory, confusion, and disorientation. Initial adult dose typically starts at 1.5 mg daily and should generally not exceed 20 mg daily. Steady-state plasma concentrations at a daily dose of 6 mg are about 29 - 75 ng/mL for clonazepam and 23 - 137 ng/mL for its primary metabolite, 7-amino clonazepam. In a population of 103 drivers arrested for driving under the influence, Clonazepam concentrations ranged from 5 - 160 ng/mL, with a mean of 40 ng/mL. The CNS depressant properties and sedating effects confirm that this drug has the potential to significantly impair driving abilities.

9. Cocaine - Blood:

   Cocaine is a DEA Schedule II controlled central nervous stimulant drug. Effects following cocaine use can include euphoria, excitement, restlessness, risk taking, sleep disturbance, and aggression. A period of mental and physical fatigue and somnolence follow the use of cocaine after the excitant-stimulant effects wear off. Cocaine is metabolized to the inactive compounds benzoylecgonine, ecgonine methyl ester, and ecgonine. Benzoylecgonine and ecgonine methyl ester can form from cocaine breakdown after death and even after sample collection. The average blood cocaine concentration in 906 impaired drivers was 87 ng/mL (range 5 - 2390 ng/mL). Blood cocaine concentrations in patients admitted to an emergency room for cocaine related medical complaints were 260 ng/mL (SD = 500 ng/mL). Cocaine concentrations in plasma following oral administration of 2 g/day over 6 days, averaged 1260 ng/mL.

10. Delta-9 THC (Active Ingredient of Marijuana) - Blood:

    Delta-9-THC is the principle psychoactive ingredient of marijuana (cannabis, hashish). It is also the active component of the prescription medication Marinol®. Whole blood THC concentrations are typically half those in a corresponding plasma sample. After smoking a user-preferred 300 mcg/kg dose average plasma THC concentrations at 35 minutes were reported at 16.1 (range 4.7 - 30.9) ng/mL, and had declined to 1.5 (range 0.4 - 3.2) ng/mL after 190 minutes. Marijuana use causes relaxation, distorted perception, euphoria and feelings of well being, along with confusion, dizziness, somnolence, ataxia, speech difficulties, lethargy and muscular weakness. Effects of marijuana use on driving ability may include weaving, inattention, poor coordination and slowed reaction time with increased error rates in complex tasks. These effects worsen with increased THC concentrations. Peak effects typically last from 1-4 hours. THC concentrations in the blood decline rapidly after use, and may be undetectable within 1-3 hours following smoking. Numerous studies have associated marijuana use with impaired driving performance.

Reference Comments:

11. Desalkylflurazepam (Flurazepam Metabolite) - Blood:

    Flurazepam is a long-acting benzodiazepine sedative/hypnotic used for the short-term treatment of refractory insomnia. The usual adult dose is 30 mg in adults and 15 mg in geriatric and debilitated patients. Flurazepam is metabolized to the active metabolites N-desalkylflurazepam and hydroxyethylflurazepam. The mean peak plasma concentration following a 30 mg oral dose of flurazepam was 23 ng/mL of desalkylflurazepam/mL at 12 hours post dose. They share the actions and adverse reactions of other CNS-depressants. Alcohol greatly enhances the activity of benzodiazepines. Common adverse effects of benzodiazepines include drowsiness, fatigue, sedation, dizziness, weakness, unsteadiness and disorientation. Signs of CNS depression can include the presence of horizontal gaze nystagmus, lack of convergence of the eyes, normal pupil size with slow reaction to light, and reduced pulse and blood pressure. Patients taking flurazepam under a doctor's supervision are less likely to be impaired than if abusing the medication. Both single and repeated doses of flurazepam have been shown to significantly impair psychomotor performance and driving skills for up to several days after administration due to the long half-life of the metabolite desalkylflurazepam.

12. Diazepam (Valium®) - Blood:

    Diazepam is a benzodiazepine used primarily for its sedative anxiolytic and muscle-relaxing effects. It is metabolized to the active metabolites nordiazepam, oxazepam and temazepam. Diazepam and its metabolites are central nervous system depressants. Diazepam is subject to abuse. Alcohol greatly enhances the activity of benzodiazepines. Common adverse effects of diazepam include drowsiness, fatigue, sedation, dizziness, weakness, unsteadiness, and disorientation. Signs of CNS depression can include horizontal gaze nystagmus, lack of convergence of the eyes, normal pupil size with slow reaction to light, and reduced pulse and blood pressure. The reported diazepam concentration in a chronic steady-state regimen of 5 mg twice daily ranges from 100 - 400 ng/mL with nordiazepam being in the range of 130 - 500 ng/mL. Oxazepam and temazepam may be present in low concentrations. In a population of 765 drivers arrested for driving under the influence, Diazepam concentrations ranged from 5 - 3200 ng/mL, with a mean of 250 ng/mL. Studies confirm that diazepam is capable of causing significant impairment to driving and psychomotor abilities, across a wide range of concentrations.

13. Estazolam (ProSom®) - Blood:

    Estazolam is an intermediate acting benzodiazepine hypnotic used in the treatment of insomnia. It shares the actions and adverse reactions of other CNS-depressants. It also possesses anxiolytic, muscle relaxant and anticonvulsant properties. Its adverse effects can include sedation, respiratory depression, confusion, and disorientation. The recommended adult dosage is 1 mg at bedtime, which may be gradually increased to 2 mg if necessary. Reported peak plasma concentrations of estazolam after a single oral 2 mg dose ranged from 75 - 140 ng/mL (mean, 98 ng/mL) at an average time of 2.5 hr. There are no specific studies addressing the effects of estazolam on driving, however its CNS depressant properties imply that it has the potential to impair driving performance.

14. Ethanol (Ethyl Alcohol) - Blood:

    Ethanol (beverage alcohol) is a central nervous system depressant. It causes impairment of cognitive, perceptual and psychomotor capabilities manifested as decrements in alertness, judgment, perception, coordination, response time and sense of care and caution. Potential effects on driving include, but are not limited to, weaving, crossing center or fog lines, failure to obey traffic signals, wide turns, inappropriate speed for conditions, and involvement in collisions. Generally, a person's level of intoxication will increase with rising blood alcohol concentration. Effects are more pronounced in individuals with limited tolerance, especially minors, however at blood alcohol concentrations of 80 mg/dL (0.08 g/100 mL or 0.08% w/v), virtually all individuals exhibit impairment on some critical driving measures.

    Analysis performed in duplicate by, internally standardized, headspace Gas Chromatography (GC). The average of the two headspace GC results is reported.

    NMS Labs is an approved Laboratory for Alcohol analysis in the Commonwealth of Pennsylvania.

15. Fentanyl (Duragesic®; Sublimaze®) - Blood:

    Fentanyl is a DEA Schedule II synthetic morphine substitute anesthetic/analgesic. It is reported to be 80 to 200 times as potent as morphine and has a rapid onset of action as well as addictive properties.

    It is reported that patients lost consciousness at mean plasma levels of fentanyl of 34 ng/mL when infused with 75 mcg/Kg over a 15 min period; peak plasma levels averaged 50 ng/mL.

Reference Comments:

After application of a fentanyl transdermal preparation (patch), serum fentanyl concentrations are reported to be in the following ranges within 24 hours:
25 mcg/hour patch: 0.3 - 1.2 ng/mL
50 mcg/hour patch: 0.6 - 1.8 ng/mL
75 mcg/hour patch: 1.1 - 2.6 ng/mL
100 mcg/hour patch: 1.9 - 3.8 ng/mL

Following removal of the patch, serum fentanyl concentrations are reported to decrease with a mean elimination half-life of 17 hours (range, 13 to 22 hours).

The mean peak plasma serum fentanyl concentration in adults given an 800 mcg oral transmucosal fentanyl preparation over 15 minutes is reported at 2.1 ng/mL (range, 1.4 - 3.0 ng/mL) at approximately 0.4 hours.

Signs associated with fentanyl toxicity include severe respiratory depression, seizures, hypotension, coma and death. In fatalities from fentanyl, blood concentrations are variable and have been reported as low as 3 ng/mL.

Substance(s) known to interfere with the identity and/or quantity of the reported result: 4-methylphenethyl acetyl fentanyl

16. Flurazepam (Dalmane®) - Blood:

    Flurazepam is a benzodiazepine derivative used for the short-term treatment of insomnia. The usual adult dose is 30 mg in adults and 15 mg in geriatric and debilitated patients. Flurazepam is metabolized to the active metabolites N-desalkylflurazepam and hydroxyethylflurazepam. After a 30 mg oral dose it has been reported that average peak plasma levels and times are: Flurazepam, 2.1 ng/mL at 1 hour; hydroxyethylflurazepam, 18 ng/mL at 1 hour; and desalkylflurazepam, 23 ng/mL at 12 hours. It has been reported that blood concentrations greater than 200 ng/mL of flurazepam or 500 ng/mL of N-desalkylflurazepam may be toxic. In a fatality due to flurazepam ingestion, the following blood levels were reported: Flurazepam, 3200 ng/mL; hydroxyethylflurazepam, 2500 ng/mL; and desalkylflurazepam, 1800 ng/mL.

17. Hydroxyethylflurazepam (Flurazepam Metabolite) - Blood:

    The mean peak plasma concentration following a 30 mg oral dose of Flurazepam was 18 ng Hydroxyethylflurazepam/mL at 1 hour post dose.

18. Hydroxytriazolam (Triazolam Metabolite) - Blood:

    Triazolam is a low-dose, short acting benzodiazepine used in the treatment of insomnia. It is metabolized to hydroxytriazolam. It shares the actions and adverse reactions of other CNS-depressants. Its adverse effects can include sedation, dizziness, weakness, unsteadiness and disorientation. It is available in 0.125 and 0.25 mg dosage units. The normal adult dose is 0.25 mg at bedtime. Subjects assessed for effects on their driving following administration of 0.25 mg of triazolam showed severe effects between 4 and 8 hours after use, and residual but minor effects at 8 to 12 hours. The literature indicates that triazolam is capable of causing significant impairment to driving and psychomotor abilities up to 12 hours after use. Tolerance reduces the likelihood of impairment with chronic administration.

19. Lorazepam (Ativan®) - Blood:

    Lorazepam is a benzodiazepine used for sedation and for short-term relief of anxiety associated with depressive symptoms. It shares the actions and adverse reactions of other CNS-depressants. Lorazepam can be administered by oral, IV and IM routes. Daily divided oral doses of up to 10 mg are generally prescribed for anxiety. Its adverse effects can include sedation, dizziness, weakness, unsteadiness and disorientation. Following a single oral dose of 2 mg, lorazepam concentrations in plasma averaged 20 ng/mL, declining to 10 ng/mL by 12 hours. Chronic oral administration of a 10 mg dose resulted in an average steady-state plasma lorazepam level of 200 ng/mL (range, 140 - 240 ng/mL). In blood, the maximum therapeutic effect with lorazepam is reported to be within the range of 30 - 50 ng/mL. In one study, 86% of 170 drivers tested positive for other drugs in addition to lorazepam. The study reported 23 cases in which lorazepam was the only drug detected. The mean concentration found in the blood of these drivers was 51 ng/mL (median = 30 ng/mL, range < 10 - 380 ng/mL). The literature indicates that lorazepam is capable of causing significant impairment to driving and psychomotor abilities, across a wide range of concentrations. In a population of 133 drivers arrested for driving under the influence, Lorazepam concentrations ranged from 2.5 -1200 ng/mL, with a mean of 85 ng/mL.

Reference Comments:

20. Midazolam (Versed®) - Blood:

    Midazolam is a short acting benzodiazepine with sedative/hypnotic properties and is a strong central nervous system depressant. It is used for preoperative sedation, as a sedative hypnotic and as an agent for the induction of anesthesia. Alcohol greatly enhances the activity of benzodiazepines, and they have significant abuse potential. Common adverse effects of midazolam include drowsiness, fatigue, double vision, sedation, dizziness, weakness, unsteadiness and disorientation. Signs of CNS depression can include horizontal gaze nystagmus, lack of convergence of the eyes, normal pupil size with slow reaction to light, and reduced pulse and blood pressure. Oral doses of 10 mg midazolam given to 20 subjects produced average peak plasma concentrations (at 1 hr. post dose) for midazolam of 69 ng/mL in males and 53 ng/mL in females. Laboratory studies have indicated that midazolam can cause significant psychomotor impairment for up to eight hours following use. In 56 drivers arrested for driving under the influence, midazolam concentrations ranged from 5 - 1190 ng/mL, with a mean of 60 ng/mL. Other drugs may also have been present. Studies confirm that midazolam is capable of causing significant impairment in driving and psychomotor abilities.

21. Nordiazepam (Chlordiazepoxide Metabolite) - Blood:

    Nordiazepam is a pharmacologically active metabolite of several benzodiazepine anxiolytic/sedative/hypnotic agents, e.g., diazepam (Valium), and has CNS-depressant properties. Nordiazepam is also the major active entity in clorazepate (Tranxene), a benzodiazepine agent used to treat agitation, seizures and anxiety. Alcohol greatly enhances the activity of this and other benzodiazepines. Reported peak blood concentrations of nordiazepam following a single 15 mg oral dose of clorazepate were approximately 200 ng/mL at 2 hr. Chronic therapy with a daily oral dose of 22.5 mg clorazepate produced reported steady-state plasma concentrations of nordiazepam of 600 ng/mL whereas 50 mg produced average concentrations of 1600 ng/mL. Signs of CNS depression can include horizontal gaze nystagmus, lack of convergence of the eyes, normal pupil size with slow reaction to light, and reduced pulse and blood pressure. Studies confirm that several benzodiazepines which are metabolized to nordiazepam are capable of causing significant impairment to driving and psychomotor abilities, across a wide range of concentrations. In a population of 737 drivers arrested for driving under the influence, Nordiazepam concentrations ranged from 10 - 3670 ng/mL, with a mean of 270 ng/mL.

22. Oxazepam (Serax®) - Blood:

    Oxazepam is a benzodiazepine used infrequently for the treatment of anxiety and insomnia and in the control of symptoms of alcohol withdrawal. It is also a metabolite of diazepam, prazepam and temazepam, and most commonly found as a result of metabolism of those drugs. Like other benzodiazepines it is a central nervous system depressant, and is subject to abuse. Alcohol greatly enhances the activity of benzodiazepines. Common adverse effects of benzodiazepines include drowsiness, fatigue, sedation, dizziness, weakness, unsteadiness and disorientation. Signs of CNS depression can include horizontal gaze nystagmus, lack of convergence of the eyes, normal pupil size with slow reaction to light, and reduced pulse and blood pressure. In a population of 49 drivers arrested for driving under the influence, testing positive for oxazepam, concentrations ranged from 100 - 5700 ng/mL, with a median of 800 ng/mL. Other drugs may also have been present. Studies confirm that oxazepam is capable of causing significant impairment to driving and psychomotor abilities.

23. Temazepam (Normison®; Restoril®) - Blood:

    Temazepam is a benzodiazepine hypnotic agent used in the short-term relief of insomnia. Its major metabolite, oxazepam, is also a pharmacologically active central nervous system depressant. Temazepam itself is a minor metabolite of diazepam (Valium). Temazepam is subject to abuse and its activity is enhanced by alcohol. Common adverse effects of temazepam include drowsiness, fatigue, slurred speech, sedation, dizziness, weakness, unsteadiness and disorientation. Signs of CNS depression can include horizontal gaze nystagmus, lack of convergence of the eyes, normal pupil size with slow reaction to light, and reduced pulse and blood pressure. The usual adult dosage of temazepam is 30 mg, however, 15 mg may be adequate. Following a single 30 mg oral dose of temazepam, reported peak plasma concentrations averaged 900 ng/mL (range, 500 - 1100 ng/mL). In a population of 84 drivers arrested for driving under the influence, temazepam concentrations ranged from 5 - 3500 ng/mL, with a mean of 380 ng/mL. Other drugs may also have been present. Laboratory studies have shown short-term effects on psychomotor skills, which are largely gone eight hours after normal use.

Reference Comments:

24. Triazolam (Halcion®) - Blood:

Triazolam is a low-dose, short acting benzodiazepine used in the treatment of insomnia. It shares the actions and adverse reactions of other CNS-depressants. Its adverse effects can include sedation, dizziness, weakness, unsteadiness, and disorientation. It is available in 0.125 and 0.25 mg dosage units. The normal adult dose is 0.25 mg at bedtime. The mean peak plasma concentration following a 0.25 mg single dose is 3.0 ng/mL, achieved at 0.75 - 1.5 hours after use. Subjects assessed for effects on their driving following administration of 0.25 mg of triazolam showed severe effects between 4 and 8 hours after use, and residual but minor effects at 8 to 12 hours. The literature indicates that triazolam is capable of causing significant impairment to driving and psychomotor abilities up to 12 hours after use. Tolerance reduces the likelihood of impairment with chronic administration.

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 54002B - Benzodiazepines Confirmation (DUID/DRE), Blood

-Analysis by High Performance Liquid Chromatography/ Tandem Mass 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 54003B - Cannabinoids Confirmation (DUID/DRE), Blood

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

Compound	Rpt. Limit	Compound	Rpt. Limit
11-Hydroxy Delta-9 THC	1.0 ng/mL	Delta-9 THC	0.50 ng/mL
Delta-9 Carboxy THC	5.0 ng/mL		

Acode 54004B - Cocaine and Metabolites Confirmation (DUID/DRE), Blood

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

Compound	Rpt. Limit	Compound	Rpt. Limit
Benzoylecgonine	50 ng/mL	Cocaine	20 ng/mL
Cocaethylene	20 ng/mL		

Acode 54006B - Opiates - Free (Unconjugated) Confirmation (DUID/DRE), Blood

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

Compound	Rpt. Limit	Compound	Rpt. Limit
6-Monoacetylmorphine - Free	1.0 ng/mL	Dihydrocodeine / Hydrocodol - Free	5.0 ng/mL
Codeine - Free	5.0 ng/mL	Hydrocodone - Free	5.0 ng/mL

Analysis Summary and Reporting Limits:

Compound	Rpt. Limit	Compound	Rpt. Limit
Hydromorphone - Free	1.0 ng/mL	Oxycodone - Free	5.0 ng/mL
Morphine - Free	5.0 ng/mL	Oxymorphone - Free	1.0 ng/mL

Acode 54459B - DUID/DRE Fentanyl and Acetyl Fentanyl Confirmation, Blood

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

Compound	Rpt. Limit	Compound	Rpt. Limit
Acetyl Fentanyl	0.10 ng/mL	Norfentanyl	0.20 ng/mL
Fentanyl	0.10 ng/mL		

Acode 8151B - DUID/DRE Panel (w/Alcohol) ProofPOSITIVE®, Blood (Forensic)

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

Compound	Rpt. Limit	Compound	Rpt. Limit
Amphetamines	20 ng/mL	Methadone / Metabolite	25 ng/mL
Barbiturates	0.040 mcg/mL	Methamphetamine / MDMA	20 ng/mL
Benzodiazepines	20 ng/mL	Opiates	20 ng/mL
Buprenorphine / Metabolite	0.50 ng/mL	Oxycodone / Oxymorphone	10 ng/mL
Cannabinoids	10 ng/mL	Phencyclidine	10 ng/mL
Carisoprodol / Metabolite	500 ng/mL	Tramadol / Metabolite	50 ng/mL
Cocaine / Metabolites	20 ng/mL	Zolpidem	5.0 ng/mL
Fentanyl / Acetyl Fentanyl	0.50 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 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