MEDTOX®
DIAGNOSTICS, INC.

EZ-SCREEN® CUP Package Insert-I

The EZ-SCREEN® Cup products are rapid qualitative screening assays for the detection of any combination of the following drugs or their metabolites in human urine: Amphetamine, Barbiturates, Benzodiazepines, Buprenorphine, Cocaine, Methamphetamine, Methadone, Opiates, Oxycodone, Phencyclidine, Propoxyphene, and TH (Cannabinoids). **Configurations of EZ-SCREEN® Cup products can consist of any combination of the tests listed in this insert. Refer to product labeling for the drugs assayed by the kit configuration.**

Many of the cutoff concentrations for these tests are below those recommended by SAMHSA.

The adulterant strip is a rapid qualitative screening assay for the detection of Oxidants, Nitrites, and the determination of Specific Gravity and pH values in human urine. It is used to evaluate specimens for adulteration and dilution prior to Drugs of Abuse urine (DAU) testing. The adulterant strip is only for forensic/toxicology use and not for *in vitro* diagnostic applications.

1. INTENDED USE

The EZ-SCREEN® Cup Drugs of Abuse Test is a one-step immunochromatographic test for the rapid, qualitative detection of one or more of the following: Amphetamine, Barbiturates, Benzodiazepines, Buprenorphine, Cocaine, Methamphetamine, Methadone, Opiates, Oxycodone, Phencyclidine, Propoxyphene, and TH (Cannabinoids) in human urine. It is intended for prescription use. EZ-SCREEN® Cup is not for over-the-counter sale.

Operators that may use this device are defined as individuals with at least a high school education, with no formal laboratory testing education or laboratory experience, and who have some experience running other tests similar to EZ-SCREEN®. Additionally, individuals are to satisfy the following training and certification guidelines:

(1)Training should be conducted by a qualified professional and include a demonstration of the EZ-SCREEN® Cup test system and (2) the use of quality assurance samples for monitoring and confirming the performance of the test system. Trainers should observe and confirm that the operator (3) uses proper technique when running a test sample and quality assurance samples, (4) has a basic understanding of test results, including the potential for false positive and false negative results, (5) knows how to prepare a sample for shipment to the laboratory for confirmation testing, (6) has reviewed the information contained in the MEDTOX EZ-SCREEN® Cup Training and Certification Program (available at www.medtox.com) and that the operator (7) minimally achieves a score of 80% on the written exam provided by MEDTOX.

Operators achieving a score of 80% will be provided with a certificate of training participation. Quality assurance samples appropriate for training are available from MEDTOX Laboratories Inc. Additionally, MEDTOX Technical Support will provide access to assistance from individuals who are experienced in the interpretation of drug testing results.

The test detects drug classes at the following cutoff concentrations:

AM	Amphetamine (d-Amphetamine)	300 ng/mL
BA	Barbiturates (Butalbital)	200 ng/mL
BZ	Benzodiazepines (Nordiazepam)	200 ng/mL
BU	Buprenorphine (Buprenorphine)	10 ng/mL
CO	Cocaine (Benzoylecgonine)	100 ng/mL
mA	Methamphetamine (d-Methamphetamine)	1000 ng/mL
MT	Methadone (Methadone)	200 ng/mL
OP	Opiates (Morphine)	100 ng/mL
OX	Oxycodone (Oxycodone)	100 ng/mL
PC	Phencyclidine (Phencyclidine)	25 ng/mL
PP	Propoxyphene (Norpropoxyphene)	300 ng/mL
TH	Cannabinoids (11-nor-9-carboxy-Δ^9-THC)	40 ng/mL

Many of the cutoff concentrations for these tests are below those recommended by SAMHSA. Additionally, many of these tests are positive at levels significantly below the claimed cutoff concentration. The rate of false positive results with tests having sensitivities this low has not been studied. However, the rate of false positives generally increases as the cutoff concentration of the test is lowered. See the Precision/Sensitivity section for more information.

THE EZ-SCREEN® CUP DRUGS OF ABUSE TEST PROVIDES ONLY A PRELIMINARY ANALYTICAL TEST RESULT. A MORE SPECIFIC ALTERNATE CHEMICAL METHOD MUST BE USED IN ORDER TO OBTAIN A CONFIRMED ANALYTICAL RESULT. GAS CHROMATOGRAPHY / MASS SPECTROMETRY (GC/MS), HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC) OR LIQUID CHROMATOGRAPHY / TANDEM MASS SPECTROMETRY (LC/MS/MS) ARE THE PREFERRED CONFIRMATORY METHODS. CLINICAL CONSIDERATION AND PROFESSIONAL JUDGMENT SHOULD BE APPLIED TO ANY DRUG OF ABUSE TEST RESULT, PARTICULARLY WHEN PRESUMPTIVE POSITIVE RESULTS ARE OBTAINED.

It is the responsibility of those organizations required to follow Department of Transportation (DOT) or Substance Abuse Mental Health Services Administration (SAMHSA) Workplace Drug Testing Guidelines to determine that use of this product satisfies the criteria for workplace testing established under DOT and SAMHSA authority.

2. SUMMARY AND EXPLANATION OF THE TEST

Qualitative EZ-SCREEN® Cup Drugs of Abuse Test screens utilize a one-step, solid-phase immunoassay technology to provide a very rapid test requiring no instrumentation. This test may be used to screen urine samples for one or more of the following drug classes prior to confirmatory testing:

The “Amphetamines” are a group of drugs that are central nervous system stimulants. This group includes ‘amphetamine’ and ‘methamphetamine’, and related designer drugs like ‘3,4 Methylenedioxymethamphetamine’, (better known as Ecstasy or MDMA, a psychoactive drug with hallucinogenic effects).

The drug ‘Amphetamine’ (d-amphetamine) is detected on the device only at the (AM) position. Both the designer drug Ecstasy (mA) ‘Methylenedioxymethamphetamine’ and methamphetamine (d-methamphetamine) are detected on the device at the (mA) position. The (mA) antibody does not differentiate between methamphetamine and ecstasy.

Barbiturates (BA) are a group of structurally related prescription drugs that are used to reduce restlessness and emotional tension, induce sleep and to treat certain convulsive disorders.

Benzodiazepines (BZ), a group of structurally related central nervous system depressants, are primarily used to reduce anxiety and induce sleep.

Buprenorphine (BU) is a potent analgesic often used in the treatment of opiate abusers.

Cocaine (CO) is a central nervous system stimulant. Its primary metabolite is benzoylecgonine.

Methadone (MT) is a synthetic opioid used clinically as a maintenance drug for opiate abusers and for pain management.

Opiates (OP) are a class of natural and semi-synthetic sedative narcotic drugs that include morphine, codeine and heroin.

Oxycodone (OX) (Oxycontin®, Percodan, Percocet) is a semi synthetic narcotic analgesic that is prescribed for moderately severe pain. It is available in both standard and sustained release oral formulations. Oxycodone is metabolized to Oxymorphone and Noroxycodone.

Phencyclidine (PC) is a hallucinogenic drug.

Propoxyphene (PP) is a narcotic analgesic. Its primary metabolite is norpropoxyphene.

Marijuana (TH) is a hallucinogenic drug derived from the hemp plant. Marijuana contains a number of active ingredients collectively known as Cannabinoids.

Many factors influence the length of time required for drugs to be metabolized and excreted in the urine. A variety of factors influence the time period during which drugs are detected; the rate of urine production, the volume of fluid consumption, the amount of drug taken, the urine pH, and the length of time over which drug was consumed. Drinking large volumes of liquid or using diuretics to increase urine volume will lower the drug concentration in the urine and may decrease the detection period. Although the detection period for these drugs varies widely depending upon the compound taken, dose and route of administration and individual rates of metabolism, some general times have been established and are listed below.[1-5]

Drug	Detection Period
Amphetamine	
Acid Conditions	1-3 days
Alkaline Condition	3-10 days
Barbiturates	
Short-Acting	Up to 6 days
Long-Acting	Up to 16 days
Benzodiazepines	1-12 days
Buprenorphine	Up to 3 days
Cocaine metabolite	Up to 5 days 1 to 3 days typical
Methadone	1-3 days
Methamphetamine	
Acid Conditions	1-3 days
Alkaline Conditions	3-10 days

Drug	Detection Period
Opiates	
Heroin	1 day
Morphine	1-3 days
Codeine	1-3 days
Oxycodone	1-3 days
Phencyclidine	
Single Use	1-8 days
Chronic Use	Up to 4 weeks
Propoxyphene	Up to 1 week
TH (Cannabinoids)	
Single Use	1-7 days
Chronic Use	Less than 30 days typical

The adulterant strip has impregnated reagent test pads that detect specific analytes in human urine. The analytes detected are Oxidants and Nitrites. The strip also approximates the pH and specific gravity values. Urine samples with 'abnormal' values should be submitted to a reference laboratory for additional testing.

Oxidants The detection is based on the oxidative activity of compounds (e.g. chromate salts and/or bleach) that catalyze the oxidation of an indicator by an organic hydroperoxide producing a blue/orange color. The color intensity is directly proportional to the concentration of oxidants present in the sample and is observed visually and compared to the color comparator chart to obtain a result.

Nitrites The test is based on the principles of the Griess reaction for the detection of Nitrites. The test pad contains an amine and a coupling component. A red/orange colored azo compound is obtained by diazotization and subsequent coupling. The color intensity is directly proportional to the concentration of nitrites present in the sample and is observed visually and compared to the color comparator chart to obtain a result.

pH The test pad contains indicators that change colors between pH 2 and pH 11. The color scale gives an approximate indication for pH values between those levels.

Specific Gravity The test pad reacts with ions in urine to indicate concentrations from 1.000 to 1.020. The color changes range from dark green with low ionic concentrations through green to yellow/orange in urines with high ionic concentrations. The color is observed visually and compared to the color comparator chart to obtain an approximate result.

3. PRINCIPLES OF THE PROCEDURE

The EZ-SCREEN® Cup Drugs of Abuse Test is a rapid, competitive, membrane-based immunochromatographic assay. A single urine sample can be evaluated for the presence of each of the specified classes of drugs in a single device. The device consists of a control line, drug-conjugates and antibody-colloidal gold.

1. CONTROL LINE -- Each test strip has anti-mouse immunoglobulin antibody immobilized as a line on the membrane at the Control (C) location on the device window. The anti-mouse immunoglobulin antibody can bind to any of the mouse antibodies coated on the colloidal gold.

2. DRUG-CONJUGATES -- Drug from the class tested was individually conjugated to a protein that binds to the membrane. Each drug conjugate was immobilized as a line at a labeled location on the membrane strip.

3. ANTIBODY-COLLOIDAL GOLD – Each test uses a monoclonal antibody developed to bind to its drug class. Antibody-colloidal gold solutions were prepared by absorbing each of the individual monoclonal antibodies to colloidal gold. The colloidal gold solutions were applied to the sample well pad in the drugs of abuse test.

The device can be used to detect specific classes of drugs in urine because drug(s) in the urine and the drug(s) conjugated to the protein compete to bind to the antibody-colloidal gold in a highly specific reaction. When the urine flows into the sample pads of the device, the dried antibody-colloidal gold on the sample pad(s) dissolves and the urine wicks up the white strips carrying the reddish-purple antibody-colloidal gold as a solution with it.

For specifics on crossreactivity in a drug class see the Related and Reactive Compounds section for that test.

Control Line
Each test strip has an internal procedural control. A line must form at the Control "C" location on the device to indicate that the proper sample volume was used and that the reagents are migrating properly. If a Control line does not form, the test is considered invalid. A Control line forms when the antibody-colloidal gold binds to the anti-mouse immunoglobulin antibody immobilized on the membrane at the "C" location on the device.

Negative Samples
When no drug(s) is present in the urine sample, the reddish purple antibody-colloidal gold solutions migrate along the strip then binds to the appropriate drug conjugate immobilized on the membrane. The binding of the antibody-colloidal gold to the drug conjugate generates an easily visible reddish-purple line at the appropriate test location on the device. Negative results can be reported as soon as a test line and control line are visible.

Presumptive Positive Samples
When drug(s) is present in the urine sample the antibody-colloidal gold binds to the drug(s) before it migrates along the strip. However, when the antibody-colloidal gold binds to the drug(s) in the urine, the antibody colloidal gold cannot bind to the drug conjugate immobilized on the membrane. When the drug concentration is at or above the cutoff concentration, the majority of the antibody-colloidal gold is bound to the drug from the urine. Therefore, as the drug bound antibody-colloidal gold migrates along the strip(s), it is unable to bind to the appropriate drug conjugate immobilized on the membrane. Therefore no line is generated at the drug-specific test location on the device for a positive sample. Read non-negative results at 5 minutes. The control line should be present for the test to be valid. The test result for Oxycodone (OX) after 5 minutes may not be consistent with the original reading. For all other tests, read results at 5 minutes or within 15 minutes of the sample application. The test result after 15 minutes may not be consistent with the original reading.

4. MATERIALS PROVIDED/STORAGE CONDITIONS

Each EZ-SCREEN® Cup Drugs of Abuse Test contains all the reagents necessary to test one urine sample simultaneously for multiple drugs. Test devices are available in Cup format as described below.

Kit Contents – Cup Test format
Each Cup Test Kit contains twenty-five (25) test system foil pouches, and one reference guide. Products with adulterant strips contain five (5) Color Comparator Charts.

Each Cup Test system foil pouch contains:

1. One (1) test cup with temperature strip attached, and test cassette(s) inside.
    1. Each test cassette has test strips with drug specific reagents.
    2. The test cup may contain a membrane strip laminated with adulterant pads for testing the presence of Oxidants and Nitrites, as well as determining approximate values of Specific Gravity and pH in human urine. (Products with adulterant strips only; the adulterant strip is not contained in every EZ-SCREEN® Cup product.)
2. One (1) lid.

Materials Required but not provided
External controls
Timer
Specimen containers, external controls, disposable gloves and urine temperature strips are available from MEDTOX Diagnostics, Inc.

Storage Conditions
The kit, in its original packaging, should be stored at 2-25°C (36-77°F) until the expiration date on the label.

5. PRECAUTIONS

1. Urine specimens and all materials coming in contact with them should be handled and disposed of as if infectious and capable of transmitting infection. Avoid contact with broken skin.
2. Avoid cross-contamination of urine samples by using a new urine specimen container for each urine sample.
3. The device should remain in its original sealed foil pouch until ready to use. If the pouch is damaged, do not use the test.
4. Do not store the test kit at temperatures above 25°C (77°F).
5. If devices have been stored refrigerated, bring to ambient temperature (18-25°C/ 64-77°F) prior to opening foil pouch.
6. Do not use tests after the expiration date printed on the package label.
7. The drug screen portion of the device is for *in vitro* diagnostic use only. The adulterant strip is for forensic/toxicology use only.

6. SAMPLE COLLECTION AND PREPARATION

Collect the urine sample in the EZ-SCREEN® Cup. The urine volume should be above the minimum volume fill line.
This volume of urine is more than sufficient for testing. No preservatives should be added. Tests will begin developing immediately following collection of urine. If sample needs to be confirmed it can be shipped directly to the confirmation lab in the EZ-SCREEN® Cup.

7. TEST PROCEDURE

Cup Test

1. Bring pouched cup device to room temperature before opening it.
2. Open pouch and label the device with the patient or sample identification.
3. Remove desiccant from cup.
4. Fill urine sample cup to at least the Fill Line.
5. Tighten lid onto the cup.
6. Keep cup in upright position and minimize handling before reading.
7. If adulterant strip is present, read pH, Specific Gravity, and Nitrites in vertical position as soon as color changes. Read oxidant at 60 seconds.
8. Allow the test cup to sit for 5 minutes after voiding into the cup.
9. Remove the privacy tab and read the results. Control line (C) must be present to read results.
10. If remove privacy tab before 5 minutes, negative results can be read as soon as a test line and control (C) is visible, and presumptive positive at 5 minutes after voiding into the cup.

NOTE: Read results at 5 minutes or within 15 minutes of voiding into the cup. Oxycodone should be read at 5 minutes. Test results interpreted after 15 minutes (for Oxycodone after 5 minutes) may not be consistent with the original results obtained at 5 minutes.

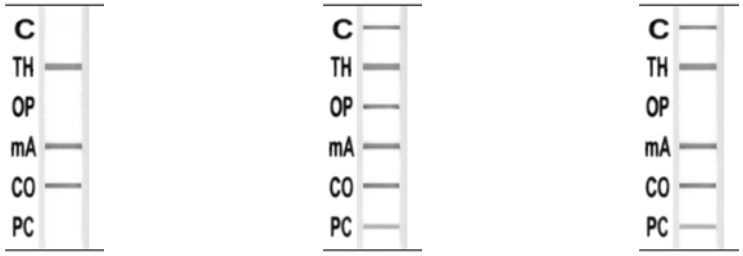
8. READING THE TEST RESULTS

Invalid: The absence of a reddish-purple Control (C) line at 5 minutes indicates the test is invalid. The urine sample should be retested on a new device. If the second test is also invalid, send the urine sample to a reference laboratory for additional testing.

Negative: The appearance of both a reddish-purple Control (C) line and a specific drug line (AM, BA, BZ, BU, CO, mA, MT, OP, OX, PC, PP or TH) indicates a negative test result. The color intensities of the Control line (C) and a specific drug line may not be equal; any reddish-purple line visible at 5 minutes indicates a negative test result for that drug. Line intensity will vary from test to test.

Presumptive Positive: The appearance of both a reddish-purple Control (C) line and the absence of a line next to a specific drug name (AM, BA, BZ, BU, CO, mA, MT, OP, OX, PC, PP or TH) at 5 minutes indicates a presumptive positive test result for that drug. Occasionally a white line (line lighter than the background of the strip) may appear next to a specific drug name. This indicates a presumptive positive test result for that drug.

Examples of Negative, Presumptive Positive and Invalid results:



INVALID
(C line is missing)

NEGATIVE

PRESUMPTIVE POSITIVE
(OP Test)

There are other possible results depending on the drug or combination of drugs present in the urine sample.

9. INTERPRETATION OF TEST RESULTS

A NEGATIVE test result for a specific drug indicates that the sample does not contain the drug/drug metabolite above the cutoff level.

A PRESUMPTIVE POSITIVE test result for a specific drug indicates that the sample may contain drug/drug metabolite near or above the cutoff level. It does not indicate the level of intoxication or the specific concentration of drug in the urine sample. Presumptive Positive samples or those with abnormal adulterant strip results should be sent to a reference laboratory for more definitive testing. Confirmatory testing should be done to Limit of Detection or low Limit of Quantification (LOD or LOQ) using expanded panels that encompass a wider range of cross reactant drugs—see individual section of product insert for related cross reactants.

Understanding the Test Results:
A non-negative test result does not always mean a person took illegal drugs and a negative test result does not always mean a person did not take illegal drugs. There are a number of factors that influence the reliability of drug tests. Certain drugs of abuse tests are more accurate than others.

In general, the Substance Abuse and Mental Health Services Administration (SAMHSA) reports the accuracy of drug tests as the following for Preliminary Positive Tests[a]:

60 out of 100 times a "preliminary positive" result from an opiate test is a "false preliminary positive" result. This means that the result of the first test was "preliminary positive" even though the person did not take an illegal drug.
50 out of 100 times a "preliminary positive" test result from an amphetamine or methamphetamine test is a "false preliminary positive" result.
50 out of 100 times a "preliminary positive" result from a PCP (phencyclidine) test is a "false preliminary positive" result.
10 out of 100 times a "preliminary positive" result from a marijuana test is a "false preliminary positive" result.
2 out of 100 times a "preliminary positive" result from a cocaine test is a "false preliminary positive" result.

[a] Data was generated from laboratory tests that have the following cutoff concentrations: Marijuana, 50 ng/mL; Cocaine, 300 ng/mL; Phencyclidine, 25 ng/mL; Opiates, 2000 ng/mL; Amphetamine, 1000 ng/mL.

Many of the cutoff concentrations for EZ-SCREEN are below those recommended by SAMHSA. Additionally, many of these tests are positive at levels significantly below the claimed cutoff concentration. The rate of false positive results with tests having sensitivities this low has not been studied. However, the rate of false positives generally increases as the cutoff concentration of the test is lowered. See the Precision/Sensitivity section for more information.

For Negative Tests: A negative result does not always mean a person did not take illegal drugs. For example, you will get a negative result if the test is for cocaine when the person tested has only smoked marijuana. There are a number of reasons why you can get a "false negative" test result. A false negative test result means the test result is negative when the person has actually taken the drug that this test is designed to detect. This might happen under the following circumstances:

1. *The drug may not have been in the sample at the time the sample was collected. It takes a while after taking a drug for it to appear in a specimen, and it only stays in the specimen for a limited amount of time. If the sample was taken too early or too late you can get a "false negative" result.*
2. *The person, knowing that they were going to be tested, added something to the specimen to keep it from reacting with the test chemicals. This could cause a false negative result. There are products sold for this purpose.*
3. *The drug may be in the specimen because the person took the drug, but it is there at such a low concentration that the drug cannot be detected by the test.*
4. *The test may not be working properly. There are a number of things that could be wrong with any testing product. It might have been damaged during shipment or kept at the wrong temperature, either before or after you received it. Storing a product at temperatures that are too high or too low can damage the chemicals in the test.*

If you get a negative test result but you still suspect someone is taking drugs you should test again at another time, or test for different drugs.

10. QUALITY CONTROL

An internal procedural control is included on each test strip. A line must form at the control (C) position on the test strip to indicate that adequate sample volume has been added, the reagents migrated properly, and the test strip is intact. If a control line does not form, the test is considered invalid. The control line consists of immobilized anti-mouse antibody that reacts with the antibody-colloidal gold as it passes this region of the membrane. Formation of a visible line verifies the control line antibody antigen reaction occurred. A visible control line should always be present regardless of whether drug is absent or present in the sample. Minimally, a QC program includes external negative and positive control material used to monitor the performance of each new lot of product, each new shipment of product and may be used to assess the competency of new operators.

For additional information concerning QC, forensic or workplace testing requirements, contact the appropriate regulatory authority. Users should follow federal, state, and local QC requirements.

11. LIMITATIONS OF THE PROCEDURE

1. The EZ-SCREEN® Cup Drugs of Abuse Test is only for use with unadulterated human urine samples collected in the EZ-SCREEN® Cup. Urine samples which are either extremely acidic (below pH 4.0) or basic (above pH 9.0) may produce erroneous results.
2. Urine samples which are collected in another cup and then poured into an EZ-SCREEN® Cup may produce erroneous results.
3. Keep the EZ-SCREEN® Cup upright while strips are developing. Turning the EZ-SCREEN® Cup upside down or on its side may produce erroneous or invalid results.
4. Shaking or excessive agitation of the EZ-SCREEN® Cup may produce erroneous or invalid results.
5. A positive result for any drug(s) does not indicate or measure intoxication. It only indicates the presence of reacting compound(s) in the urine specimen.
6. Test results interpreted after 15 minutes (5 minutes with OX) may not be consistent with the original result obtained at 5 minutes.
7. The Drugs of Abuse Test was not evaluated in point-of-care settings.
8. There is a possibility that other substances and/or factors, e.g. technical or procedural errors, may interfere with the test and cause false results.

Adulterant Strip limitations
The purpose of the adulterant strip is to screen for abnormal conditions in human urine samples, such as dilution or the addition of drug-test interfering substances. Occasionally medications may discolor the urine, and make it difficult to read the result. When in doubt send the urine sample to a reference laboratory for additional testing.

Oxidant
Nitrites, acting as oxidizing agents in solution, will produce a blue/green color change on the Oxidant pad.

Nitrite
Abnormal results can be caused by the presence of diagnostic or therapeutic dyes in the urine. Very high concentrations of oxidant such as 80% bleach will produce a brown color change on the Nitrite pad.

12. EXPECTED VALUES

The Drugs of Abuse Test qualitatively detects amphetamine, barbiturates, benzodiazepines, buprenorphine, cocaine, methadone, methamphetamine, opiates, oxycodone, phencyclidine, propoxyphene and TH (Cannabinoids) and/or their metabolites in human urine at or above their specified cutoff level. Illicit drugs should never be found in urine, and legal drugs (such as amphetamine, barbiturates, benzodiazepines, buprenorphine, methamphetamine, methadone, opiates, oxycodone or propoxyphene) may appear in the urine for legitimate reasons. Confirmatory test results should be reviewed by a Medical Review Officer for interpretation.

Adulterant Strip
Urines that produce an abnormal result on the adulterant strip should be sent to a reference laboratory for more definitive testing to determine if the urine may be dilute, substituted, invalid and/or adulterated.

13. PERFORMANCE CHARACTERISTICS

13A. Sensitivity, Accuracy, and Precision

Accuracy

The accuracy was evaluated by assaying a panel of blind coded clinical urine samples containing varying concentrations of drugs and comparing to GC/MS or LC/MS/MS results. The samples were obtained from MEDTOX Laboratories. Samples were screened at traditional laboratory cutoff concentrations by a commercial immunoassay system. Samples with negative results by both the commercial immunoassay system and the MEDTOX test were not confirmed by GC/MS or LC/MS/MS. Samples with positive results by either the commercial immunoassay system or the test were confirmed by GC/MS or LC/MS/MS. Most samples were unaltered clinical samples. In order to have samples with concentrations close to the cutoff, some samples were diluted with negative urine. The five minute results are shown in the following tables. The testing was performed by MEDTOX personnel.

ACCURACY COMPARED TO GC/MS OR LC/MS/MS
(Amphetamine (AM), Barbiturates (BA), Benzodiazepines (BZ), Cocaine (CO), Methadone (MT), Opiates (OP), Phencyclidine (PC), Propoxyphene (PP), and Cannabinoids (TH))

5 Minute	Negative by immunoassay; if positive, no drug was detected above the limit of detection of the confirmatory method	Concentration range of up to 50% below the cutoff (ng/mL)	Concentration range between the -50% of the cutoff and the cutoff (ng/mL)	Concentration range between the cutoff and 50% above the cutoff (ng/mL)	Concentration range of greater than 50% above the cutoff (ng/mL)
AM			180 – 255	334 – 402	474 – 11845
Positive	0	Not performed	4	4	32
Negative	55	Not performed	1	1	1
Samples are categorized according to d-amphetamine concentrations.					
BA			109 -194	201 - 298	326 - 27776
Positive	0	Not performed	3	12	52
Negative	58	Not performed	5	0	0
Samples contained one of the following barbiturates: Phenobarbital, Butalbital or Pentobarbital. Ten samples were diluted with negative urine to obtain concentrations around cutoff.					
BZ			113 - 151	220 - 281	428 - 12491
Positive	0	Not performed	4	5	33
Negative	54	Not performed	0	0	0
Nordiazepam, oxazepam, temazepam, alprazolam and α-hydroxy-alprazolam were added together to determine the total benzodiazepine concentration reported in the table. Six samples were diluted with negative urine to obtain concentrations around the cutoff.					
CO			55 - 91	110 - 140	153 - 96924
Positive	0	Not performed	6	5	36
Negative	54	Not performed	0	0	0
Samples are categorized by benzoylecgonine concentrations (cocaine metabolite).					
MT			112 - 114	249 - 283	307 - 9411
Positive	0	Not performed	2	6	44
Negative	98	Not performed	2	1	0
OP			76 – 90	111 – 147	251 – 136360
Positive	0	Not performed	4	4	36
Negative	54	Not performed	0	0	0
Morphine, codeine, hydrocodone and hydromorphone were added together to determine the total opiate concentrations reported in this table.					
PC			13 - 22	27 - 35	39 - 5439
Positive	0	Not performed	2	5	33
Negative	55	Not performed	3	0	0
PP			150-265	339-450	>472
Positive	0	Not performed	4	6	73
Negative	60	Not performed	4	1	1
Eight samples were diluted with negative urine to obtain concentrations around the cutoff.					
TH		3	21 - 37	42 - 54	62 - 761
Positive	0	0	5	8	34
Negative	55	1	1	0	0
11-nor-9-carboxy-Δ^9-THC concentrations are reported in this table.					

Accuracy (Methamphetamine)
A panel of naturally metabolized urine samples was analyzed using the MEDTOX® mA Test and the GC/MS assay for methamphetamine. The results obtained in the procedures are shown in the following tables.

GC/MS Methamphetamine **(limit of quantitation 50 ng/mL)**

		Positive	Negative	TOTAL
Methamphetamine (mA)	Positive	56	0	56
(1000 ng/mL cut-off)	Negative	2	56	58
	TOTAL	58	56	114

Overall agreement: >98% (112/114). Samples having discrepant results were analyzed by GC/MS. The false negative samples contained methamphetamine at 1056 ng/mL and at 1136 ng/mL.

Percent Agreement of Methamphetamine (mA) Compared to GC/MS

	POSITIVE	NEGATIVE
Methamphetamine (mA)	97% (56/58)	100% (56/56)

Sensitivity/Precision (Amphetamine, Barbiturates, Benzodiazepines, Cocaine, Methamphetamine, Methadone, Opiates, Phencyclidine, Propoxyphene, and Cannabinoids)
Performance around the specific cutoff for each drug was evaluated by testing standard drug solutions diluted in drug-free urine in triplicate on 5 different intervals by 3 in-house operators. Drug-free urine was also tested on each interval. The results were interpreted at five minutes.

Amphetamine (d-Amphetamine) Cutoff = 300 ng/mL			
Conc. (ng/mL)	Number Tested	Positive	Negative
0	540	0	540
75	45	0	45
150	45	13	32
225	45	38	7
300	45	44	1
375	45	44	1
450	45	44	1

Barbiturates (Butalbital) Cutoff = 200 ng/mL			
Conc. (ng/mL)	Number Tested	Positive	Negative
Negative	45	0	45
50	45	0	45
100	45	0	45
150	45	12	33
200	45	43	2
250	45	45	0
300	45	45	0

Benzodiazepines (Nordiazepam) Cutoff = 200 ng/mL			
Conc. (ng/mL)	Number Tested	Positive	Negative
Negative	540	0	540
50	45	30	15
100	45	40	5
150	45	45	0
200	45	45	0
250	45	44	1
300	45	45	0

Cocaine (Benzoylecgonine) Cutoff = 100 ng/mL			
Conc. (ng/mL)	Number Tested	Positive	Negative
Negative	540	0	540
25	45	0	45
50	45	19	26
75	45	25	20
100	45	35	10
125	45	44	1
150	45	41	4

Methamphetamine (d-Methamphetamine) Cutoff = 1000 ng/mL			
Conc. (ng/mL)	Number Tested	Positive	Negative
0	30	0	30
100	30	0	30
250	30	0	30
500	30	26	4
750	30	27	3
1000	30	28	2
1250	30	29	1
1500	30	30	0
2000	30	30	0

Methadone (Methadone) Cutoff = 200 ng/mL			
Conc. (ng/mL)	Number Tested	Positive	Negative
Negative	405	0	405
50	45	4	41
100	45	37	8
150	45	44	1
200	45	45	0
250	45	44	1
300	45	45	0

Opiate (Morphine) Cutoff = 100 ng/mL			
Conc. (ng/mL)	Number Tested	Positive	Negative
Negative	540	0	540
25	45	20	25
50	45	38	7
75	45	44	1
100	45	45	0
125	45	44	1
150	45	43	2

Phencyclidine (Phencyclidine) Cutoff = 25 ng/mL			
Conc. (ng/mL)	Number Tested	Positive	Negative
Negative	540	0	540
6.25	45	1	44
12.50	45	0	45
18.75	45	17	28
25.00	45	43	2
31.25	45	43	2
37.50	45	44	1

Propoxyphene (Norpropoxyphene) Cutoff = 300 ng/mL			
Conc. (ng/mL)	Number Tested	Positive	Negative
Negative	45	0	45
30	45	0	45
75	45	1	44
150	45	9	36
225	45	16	29
300	45	37	8
375	45	42	3
450	45	44	1
600	45	45	0

Cannabinoids (11-nor-9-carboxy-Δ^9-THC) Cutoff = 40 ng/mL			
Conc. (ng/mL)	Number Tested	Positive	Negative
Negative	105	0	105
10	45	0	45
20	45	0	45
30	45	1	44
40	45	45	0
50	45	40	5
60	45	45	0

Accuracy (Oxycodone)

The accuracy was evaluated by assaying a panel of blind coded clinical urine samples containing varying concentrations of drugs and comparing to GC/MS results. The samples were obtained from MEDTOX Laboratories. Samples that screened negative by the predicate device were not confirmed by GC/MS. Positive samples were confirmed by GC/MS. The GC/MS determination included Oxycodone and oxymorphone and a weighted concentration using 100% cross-reactivity for Oxycodone and a 50% cross-reactivity for oxymorphone was calculated. Clinical urine samples containing Oxycodone and oxymorphone at higher concentrations were diluted with negative urine to obtain the desired number of samples with concentrations below and above the cutoff. The testing was performed by nine MEDTOX personnel at one site.

MEDTOX® OXYCODONE Results vs. stratified GC/MS Values

MEDTOX® OXYCODONE Results	Negative by Immunoassay (Predicate Device)	Concentration up to 50% below the cutoff	Near Cutoff Negative (Between 50% below the cutoff and the cutoff concentration)	Near Cutoff Positive (Between the cutoff and 50% above the cutoff concentration)	High Positive (Greater than 50% above the cutoff concentration)
Positive	0	2	2	6	38
Negative	103	5	4	1	0

GC/MS values used to categorize samples in this table are determined by adding together the concentration of Oxycodone plus 50% of the concentration of oxymorphone, based on the MEDTOX® OXYCODONE cross-reactivity studies.

% Agreement among positives is 98%. % Agreement among negatives is 97%

Sensitivity/Precision (Oxycodone)
Performance around the specific cutoff for Oxycodone was evaluated by testing standard drug solutions diluted in drug-free urine in triplicate on 6 different intervals by 3 in-house operators. Drug free urine was also tested on each interval. The results were interpreted at five minutes and are summarized below:

MEDTOX® OXYCODONE Precision Study Results

Concentration of sample (ng/mL)	Number of determinations	Results #Neg / #Pos
0	54	54 / 0
25	54	54 / 0
50	54	50 / 4
75	54	14 / 40
100	54	4 / 50
125	54	1 / 53
150	54	0 / 54

13B. Non Crossreactive Endogenous Compounds
Listed compounds were initially dissolved in appropriate solvents and then added to drug-free urine for evaluation with all tests. Most of the compounds were evaluated for reactivity at 100 µg/mL (albumin was evaluated at 20 mg/mL and bilirubin was evaluated at 200 µg/mL). Samples were evaluated in triplicate by in-house operators. None of these compounds showed cross-reactivity at the listed concentrations.

Acetaldehyde	Creatinine	Hemoglobin, Human
Acetone	Epinephrine	Sodium Chloride
Albumin, Human	β-Estradiol	Tetrahydrocortisone
Bilirubin	Estriol	d,1-Thyroxine
Cholesterol	Glucose Std. Solution	Uric Acid

13C. Unrelated Compounds, Prescription and Over-the-Counter Medications

The following compounds were tested for reactivity. Listed compounds were dissolved in appropriate solvents and then added to drug-free urine for testing. Samples were evaluated in triplicate by in-house operators. Unless otherwise noted by a drug name abbreviation such as "AM" or "BA" etc., all of the listed compounds were negative in each of the tests at 100 µg/mL or the highest level tested (Alprazolam, 1-hydroxy; Buprenorphine, Fentanyl, Lorazepam glucuronide, 11-Nor-9-carboxy-Δ^9-THC, Olanzapine, and Oxazepam glucuronide were evaluated at 10µg/mL. 11-Nor-9-carboxy-Δ^8-THC was evaluated at 5 µg/mL). If a drug name is followed by an abbreviation such as "AM" or "BA" etc., check the "Related Compounds and Cross Reactants" listing for the drug in question under the appropriate heading (AM, BA, etc.) to find its level of cross-reactivity to that test.

Acecainide (N-Acetylprocainamide)	Acetaminophen	Acetylsalicylic Acid	Allobarbital-**BA**	Alphenal-**BA**	Alprazolam-**BZ**
Alprazolam, 1-Hydroxy-**BZ**	p-Aminobenzoic Acid	7-Amino-clonazepam	7-Amino-flunitrazepam	Aminoglutethimide	l-Aminopyrine (4-(dimethylamino) antipyrine)
Amitriptyline	Amobarbital-**BA**	Amoxapine	Amoxicillin	d-Amphetamine-**AM**	l- Amphetamine-**AM**
Ampicillin	Apomorphine	l-Ascorbic Acid	Aspartame	Atenolol	Atropine Sulfate
Barbital-**BA**	Barbituric Acid	Benzilic Acid	Benzoic Acid	Benzocaine (ethyl - 4-aminobenzoate)	Benzoylecgonine-**CO**
Benzphetamine	Benztropine	Brompheniramine	Buprenorphine	Bupropion	Butabarbital-**BA**
Butalbital-**BA**	Caffeine	Cannabidiol	Cannabinol	Captopril	Carbamazepine
Carbamazepine-10,11 epoxide	Carisoprodol (Meprobamate)	Cephalexin	Chloral Hydrate	Chloramphenicol	Chlordiazepoxide-**BZ**
Chloroquine	Chlorothiazide	Chlorpheniramine	Chlorpromazine	Chlorprothixene	Clobazam-**BZ**
Clomipramine	Clonazepam-**BZ**	Clonidine	Clorazepate-**BZ**	Clozapine	Cocaine-**CO**
Codeine-**OP, OX**	Cortisone	Cotinine	Cyclobenzaprine	Cyclopentobarbital-**BA**	Deoxycorticosterone
Desalkylflurazepam-**BZ**	Desipramine	Desmethylchlordiazepoxide (Norchlordiazepoxide)-**BZ**	Desmethylflunitrazepam-**BZ**	Desmethylvenlaflaxine	Dexamethasone
Dextromethorphan	Diacetylmorphine-**OP**	Diazepam-**BZ**	Diclofenac	Diethylpropion	Diflunisal
Digoxin	Dihydrocodeine-**OP, OX**	Dimenhydrinate (Dramamine)	1,3-Dimethylbarbituric acid	Diphenhydramine	Domperidone
Dopamine	Doxepin	Doxylamine	Ecgonine	Ecgonine Methyl Ester	EDDP (Primary metabolite of methadone)
Efavirenz (Sustiva)	EMDP (Secondary metabolite of methadone)-	Ephedrine-**mA**	Equilin	Erythromycin	Estrone
Ethanol	Ethylmorphine-**OP, OX**	Fenfluramine-**mA**	Fenoprofen	Fentanyl (Synthetic opiate)	Flunitrazepam-**BZ**
Fluoxetine (Prozac)	Flurazepam	Furosemide	Fluvoxamine	Gentisic Acid (2,5-Dihydroxybenzoic acid)	Glutethimide
Guaiacol Glyceryl Ether	Haloperidol	Hexobarbital	Hippuric acid	Hydralazine	Hydrochlorothiazide
Hydrocodone-**OP, OX**	Hydrocortisone	Hydromorphone-**OP, OX**	Hydroxybupropion	Hydroxyhippuric acid	l-11-Hydroxy-Δ^9-THC-**TH**
p-Hydroxyphenobarbital-**BA**	4-Hydroxyphencyclidine-**PC**	3-Hydroxytyramine	Hydroxyzine	Ibuprofen	Imipramine
Iproniazid	(R)-Isoproterenol	Isoxsuprine	Ketamine	Ketoprofen	Labetalol
Levorphanol-**OP**	Lidocaine	Lithium carbonate	Loperamide	Lorazepam-**BZ**	Lorazepam glucuronide-**BZ**
Loxapine	Lysergic Acid-**BZ**	Lysergic Acid Diethylamide (LSD)	Maprotiline	MDA-**AM**	MDE (MDEA)-**mA**
MDMA-**mA**	Melanin	Meperidine	Mephobarbital	Mepivacaine	Mesoridazine
Methadone-**MT**	d-Methamphetamine-**mA**	l-Methamphetamine- **mA**	Methaqualone	Methcathinone	Methocarbamol
Methoxyphenamine	Methylphenidate	Methylprylon	Metoprolol	Midazolam-**BZ**	Mirtazapine
6-Monoacetylmorphine-**OP**	Morphine-**OP, OX**	Morphine 3-β-D-Glucuronide-**OP**	Morphine 6-β-D-Glucuronide	Nalidixic Acid	Naltrexone- **OX**
Nalorphine-**OP**	Naloxone-**OP, OX**	Naproxen	Niacinamide	Nicotine	Nifedipine
Nitrazepam-**BZ**	Nitrofurantoin	Norclomipramine	Norcodeine- **OX**	Nordiazepam--**BZ**	Nordoxepin
Norethindrone	Norlysergic Acid	Normeperidine	Norpropoxyphene-**PP**	l-Norpseudoephedrine	11-Nor-9-carboxy-Δ^9-THC -**TH**
11-Nor-9-carboxy-Δ^8-THC-**TH**	Nortriptyline	Noscapine	Nylidrin	Octopamine	Ofloxacin- **OP**
Olanzapine (Zyprexa)	Omeprazole	Orphenadrine	Oxalic Acid	Oxaprosin	Oxazepam-**BZ**
Oxazepam glucuronide-**BZ**	Oxolinic Acid	Oxycodone-**OP, OX**	Oxymetazoline	Oxymorphone-**OP, OX**	Papaverine hydrochloride
Pentazocine	Pentobarbital-**BA**	Perphenazine	Phenacetin (Acetophenetidin)	Phencyclidine-**PC**	
Phendimetrazine	Phenelzine	Phenethylamine- **mA**	Pheniramine	Phenmetrazine	Phenobarbital-**BA**
Phenothiazine	Phentermine- **AM**	Phenytoin (Diphenylhydantoin)-**BA**	Phenylbutazone	Phenylephrine-**mA**	Phenylpropanolamine
Piroxicam	Prazosin	Prednisolone	Prednisone	Procaine- **mA**	Procainamide
Prochlorperazine	Promazine	Promethazine	Propoxyphene-**PP**	Propranolol	Protriptyline
Pseudoephedrine	Pyrilamine	Quetiapine (Seroquel)	Quinidine	Ranitidine	Riboflavin
Rifampin	Salicylic Acid	Secobarbital-**BA**	Selegiline (Deprenyl)	Serotonin (5-Hydroxytryptamine)	Sertraline (Zoloft)

Sildenafil (Viagra)	Sulfamethazine	Sulindac	Talbutal-**BA**	Temazepam-**BZ**	Temazepam glucuronide-**BZ**
Tetracycline	Δ^9-Tetrahydrocannabinol-**TH**	Δ^8-Tetrahydrocannabinol-(Δ^6-Tetrahydrocannabinol) **TH**	Tetrahydrozoline	Thebaine-**OP**	
Theophyline	Thiamine	Thiopental	Thioridazine	Thiothixene	Tolbutamide
Tolmetin (Tolectin)	Trazodone	Triamterene	Triazolam-**BZ**	Triazolam, 1-hydroxy	Trifluoperazine
Trimethoprim	Trimipramine	Tripelennamine	Tryptamine	Tryptophan	Tyramine
Tyrosine	Valproic Acid	Venlafaxine	Verapamil	Zomepirac	

13D. Related and Reactive Compounds

The following metabolites and compounds were tested. Reference standards for the various metabolites and compounds were prepared in negative urine samples. None of the compounds reacted with the remaining tests in the panel. Results are expressed as the minimum concentration required to produce a positive result in the indicated assay. Compounds that reacted with the test are listed first, and related compounds that did not react with the highest concentration tested are listed second as Negative at 100,000 ng/mL (or highest level tested).

Amphetamine- (AM)	**Result**	**% Cross-Reactive**
(d-Amphetamine) 300 ng/mL	Positive at 300 ng/mL	100%
l-Amphetamine	Positive at 100,000 ng/mL	<1%
MDA	Positive at 750ng/mL	40%
Phentermine	Positive at 1,000 ng/mL	30%
Ephedrine	Negative at 100,000 ng/mL	None Detected
MDE (MDEA)	Negative at 100,000 ng/mL	None Detected
MDMA	Negative at 100,000 ng/mL	None Detected
l-Methamphetamine	Negative at 100,000 ng/mL	None Detected
d-Methamphetamine	Negative at 100,000 ng/mL	None Detected
Phenethylamine	Negative at 100,000 ng/mL	None Detected
Tyramine	Negative at 100,000 ng/mL	None Detected

Barbiturate-(BA)	**Result**	**% Cross-Reactive**
(Butalbital) 200 ng/mL	Positive at 200 ng/mL	100%
Allobarbital	Positive at 500 ng/mL	40%
Alphenal	Positive at 100 ng/mL	200%
Amobarbital	Positive at 2,500 ng/mL	8%
Barbital	Positive at 2,500 ng/mL	8%
Butabarbital	Positive at 750 ng/mL	27%
Cyclopentobarbital	Positive at 250 ng/mL	80%
p-Hydroxyphenobarbital	Positive at 500 ng/mL	40%
Pentobarbital	Positive at 500 ng/mL	40%
Phenobarbital	Positive at 800 ng/mL	25%
Phenytoin (Diphenylhydantoin)	Positive at 2,500 ng/mL	8%
Secobarbital	Positive at 75 ng/mL	267%
Talbutal	Positive at 50 ng/mL	400%
Amino glutethimide	Negative at 100,000 ng/mL	None Detected
Barbituric Acid	Negative at 100,000 ng/mL	None Detected
1,3 Dimethylbarbituric Acid	Negative at 100,000 ng/mL	None Detected
Glutethimide	Negative at 100,000 ng/mL	None Detected
Hexobarbital	Negative at 100,000 ng/mL	None Detected
Mephobarbital	Negative at 100,000 ng/mL	None Detected

Benzodiazepines-(BZ)	**Result**	**% Cross-Reactive**
(Nordiazepam) 200 ng/mL	Positive at 200 ng/mL	100%
Alprazolam	Positive at 100 ng/mL	200%
Alprazolam, 1-OH	Positive at 1000 ng/mL	20%
Chlordiazepoxide	Positive at 25,000 ng/mL	<1%
Clobazam	Positive at 75 ng/mL	267%
Clonazepam	Positive at 500 ng/mL	40%
Clorazepate	Positive at 250 ng/mL	80%
Desalkylflurazepam	Positive at 250 ng/mL	80%
Desmethylchlordiazepoxide	Positive at 2500 ng/mL	8%
Desmethylflunitrazepam	Positive at 250 ng/mL	80%
Diazepam	Positive at 250 ng/mL	80%
Flunitrazepam	Positive at 250 ng/mL	80%
Lorazepam	Positive at 2,500 ng/mL	8%
Lorazepam glucuronide	Positive at 500 ng/mL	40%
Lysergic acid	Positive at 25,000 ng/mL	<1%
Midazolam	Positive at 1,000 ng/mL	20%
Nitrazepam	Positive at 100 ng/mL	200%
Oxazepam	Positive at 250 ng/mL	80%
Oxazepam glucuronide	Positive at 100 ng/mL	200%
Temazepam	Positive at 250 ng/mL	80%
Temazepam glucuronide	Positive at 250 ng/mL	80%
Triazolam	Positive at 500 ng/mL	40%
7-Aminoclonazepam	Negative at 100,000 ng/mL	None Detected
7-Aminoflunitrazepam	Negative at 100,000 ng/mL	None Detected
Flurazepam	Negative at 100,000 ng/mL	None Detected
Pyrilamine	Negative at 100,000 ng/mL	None Detected
Sildenafil	Negative at 100,000 ng/mL	None Detected
Sulindac	Negative at 100,000 ng/mlL	None Detected
Triazolam, 1-OH	Negative at 100,000 ng/mL	None Detected

Cocaine-(CO)	**Result**	**% Cross-Reactive**
(Benzoylecgonine) 100 ng/mL	Positive at 100 ng/mL	100%
Cocaine	Positive at 300 ng/mL	33%
Ecgonine	Negative at 100,000 ng/mL	None Detected
Ecgonine Methyl Ester	Negative at 100,000 ng/mL	None Detected

Methamphetamine-(mA)	**Result**	**% Cross-Reactive**
(d-Methamphetamine) 1000 ng/mL	Positive at 1000 ng/mL	100%
Ephedrine	Positive at 2,500 ng/mL	40%
Fenfluramine	Positive at 25,000 ng/mL	4%
MDE (MDEA)	Positive at 5,000 ng/mL	20%
MDMA	Positive at 1,500 ng/mL	67%
l-Methamphetamine	Positive at 7,500 ng/mL	13%
Phenethylamine	Positive at 5,000 ng/mL	20%
Phenylephrine	Positive at 50,000 ng/mL	<1%
Procaine	Positive at 10,000 ng/mL	1%
d-Amphetamine	Negative at 100,000 ng/mL	None Detected
l-Amphetamine	Negative at 100,000 ng/mL	None Detected
MDA	Negative at 100,000 ng/mL	None Detected
Phentermine	Negative at 100,000 ng/mL	None Detected
Pseudoephedrine	Negative at 100,000 ng/mL	None Detected
Tyramine	Negative at 100,000 ng/mL	None Detected

Methadone-(MT)	**Result**	**% Cross-Reactive**
(Methadone) 200 ng/mL	Positive at 200 ng/mL	100%
EDDP (Primary metabolite)	Negative at 100,000 ng/mL	None Detected
EMDP (Secondary metabolite)	Negative at 100,000 ng/mL	None Detected

Opiates-(OP)	**Result**	**% Cross-Reactive**
(Morphine) 100 ng/mL	Positive at 100 ng/mL	100%
Codeine	Positive at 300 ng/mL	33%
Diacetylmorphine	Positive at 300 ng/mL	33%
Dihydrocodeine	Positive at 100 ng/mL	100%
Ethylmorphine	Positive at 50 ng/mL	200%
Hydrocodone	Positive at 300 ng/mL	33%
Hydromorphone	Positive at 100 ng/mL	100%
Levorphanol	Positive at 50,000 ng/mL	<1%
6-Monoacetylmorphine	Positive at 100,000 ng/mL	<1%
Morphine 3-β-D-Glucuronide	Positive at 100,000 ng/mL	<1%
Nalorphine	Positive at 150 ng/mL	67%
Naloxone	Positive at 25,000 ng/mL	<1%
Ofloxacin	Positive at 5,000 ng/mL	2%
Oxycodone	Positive at 50,000 ng/mL	<1%
Oxymorphone	Positive at 75,000 ng/mL	<1%
Thebaine	Positive at 1,000 ng/mL	10%
Apomorphine	Negative at 100,000 ng/mL	None Detected
Morphine 6-β-D-Glucuronide	Negative at 100,000 ng/mL	None Detected
Naltrexone	Negative at 100,000 ng/mL	None Detected
Norcodeine	Negative at 100,000 ng/mL	None Detected

Oxycodone-(OX)	**Result**	**% Cross-Reactive**
(Oxycodone) 100 ng/mL	Positive at 100 ng/mL	100%
Codeine	Positive at 2,500 ng/mL	4%
Dihydrocodeine	Positive at 2,500 ng/mL	4%
Ethylmorphine	Positive at 2,500 ng/mL	4%
Hydrocodone	Positive at 10,000 ng/mL	1%
Hydromorphone	Positive at 10,000 ng/mL	1%
Morphine	Positive at 5,000 ng/mL	2%
Naloxone	Positive at 10,000 ng/mL	<1%
Naltrexone	Positive at 25,000 ng/mL	<1%
Norcodeine	Positive at 50,000 ng/mL	<1%
Oxymorphone	Positive at 200 ng/mL	50%
Apomorphine	Negative at 100,000 ng/mL	None Detected
Diacetylmorphine	Negative at 100,000 ng/mL	None Detected
Levorphanol	Negative at 50,000 ng/mL	None Detected
6-Monoacetylmorphine	Negative at 100,000 ng/mL	None Detected
Morphine 3-β-D-Glucuronide	Negative at 100,000 ng/mL	None Detected
Morphine 6-β-D-Glucuronide	Negative at 100,000 ng/mL	None Detected
Nalorphine	Negative at 100,000 ng/mL	None Detected
Thebaine	Negative at 100,000 ng/mL	None Detected

Phencyclidine-(PC)	**Result**	**% Cross-Reactive**
(Phencyclidine) 25 ng/mL	Positive at 25 ng/mL	100%
4-Hydroxyphencyclidine	Positive at 5,000 ng/mL	<1%

Propoxyphene-(PP)	**Result**	**% Cross-Reactive**
(Norpropoxyphene) 300 ng/mL	Positive at 300 ng/mL	100%
Propoxyphene	Positive at 50 ng/mL	600%

Cannabinoids-(TH)	Result	% Cross-Reactive
(11-Nor-9-carboxy-Δ^9-THC) 40 ng/mL	Positive at 40 ng/mL	100%
L-11-Hydroxy-Δ^9-THC	Positive at 250 ng/mL	16%
11-Nor-9-carboxy-Δ^8-THC	Positive at 1,000 ng/mL	4%
Δ^9 –Tetrahydrocannabinol	Positive at 10,000 ng/mL	<1%
Δ^8 –Tetrahydrocannabinol (Δ^6-Tetrahydrocannabinol)	Positive at 25,000 ng/mL	<1%
Cannabidiol	Negative at 100,000 ng/mL	None Detected
Cannabinol	Negative at 100,000 ng/mL	None Detected

13E. Interference

pH and Specific Gravity:

Each listed test (Amphetamine**,** Benzodiazepine, Cocaine, Methadone, Opiates, Phencyclidine, and Cannabinoids) was evaluated with six negative clinical samples with pH values of 4.0, 5.0, 6.0, 7.0, 8.0 and 9.0 ± 0.1. Each sample was assayed in triplicate. Clearly visible test lines formed with these tests within five minutes of the sample contacting the test strip. The effects of these conditions on samples containing drug is not known.

Each listed test (Amphetamine**,** Benzodiazepine, Cocaine, Methadone, Opiates, Phencyclidine, and Cannabinoids) was evaluated with seven samples with specific gravity values of 1.003, 1.005, 1.011, 1.016, 1.019, 1.025 and 1.033. Each sample was assayed in triplicate. Clearly visible test lines formed with these tests within five minutes of sample contacting the test strip. The effects of these conditions on samples containing drug is not known.

The MEDTOX OXYCODONE test was assayed with six negative clinical samples with pH values of 4.0, 5.0, 6.0, 7.0, 8.0 and 9.0 ± 0.1. Each sample was assayed in triplicate. The pH samples were fortified with Oxycodone to the concentrations of 25 ng/mL and 150 ng/mL. All the pH levels gave negative results when fortified to 25 ng/mL, and all pH levels gave positive results when fortified to 150 ng/mL.

The MEDTOX OXYCODONE test was assayed with eight samples with specific gravity values of 1.003, 1.005, 1.010, 1.015, 1.020, 1.025, 1.030 and 1.035 ± 0.001. Each sample was assayed in triplicate. The specific gravity samples were fortified with Oxycodone to the concentrations of 25 ng/mL and 150 ng/mL. All the specific gravity levels gave negative results when fortified to 25 ng/mL, and all specific gravity levels gave positive results when fortified to 150 ng/mL.

Common Drugs:

Following the study of M.L. Smith, et. al.[6] drug free urine samples were spiked with the targeted drugs to the concentrations of 25% and 150% of the cutoff concentrations. 100 µg/mL of the common drugs were then added to the preparation and assayed by the MEDTOX test. Samples were evaluated in triplicate by in-house operators. None of the common drugs listed in the following table affected the expected results.

COMMON DRUGS EVALUATED WITH ALL EZ-SCREEN TESTS

Acetylsalicylic Acid	Chlorpheniramine	Ibuprofen
Acetaminophen	Cocaine-**CO**	Morphine-**OP, OX**
Brompheniramine maleate	Dextromethorphan	Phenobarbital-**BA**
Caffeine	Diphenylhydantoin	d-Pseudoephedrine
Carbamazepine	Doxylamine	Salicylic Acid

13F. Buprenorphine Performance Characteristics

Buprenorphine Accuracy

The accuracy was evaluated by assaying a panel of blind coded clinical urine samples containing varying concentrations of buprenorphine and/or norbuprenorphine and comparing to LC/MS/MS results. The samples were obtained from MEDTOX Laboratories. Samples were screened with the CEDIA immunoassay system. Ten percent of samples with negative results by both the commercial immunoassay system and MEDTOX Buprenorphine were confirmed by LC/MS/MS. Samples with positive results by either the commercial immunoassay system or MEDTOX Buprenorphine were confirmed by LC/MS/MS. The five minute results are shown in the following tables, but identical results were obtained at fifteen minutes. The testing was performed by MEDTOX personnel.

ACCURACY COMPARED TO LC/MS/MS

5 Minute Test Result	Negative by immunoassay; if positive, no drug was detected above the limit of detection of the confirmatory method	Concentration range between -50% of the cutoff and the cutoff	Concentration range between the cutoff and 50% above the cutoff	Concentration range of greater than 50% above the cutoff
BUP Level		5 – 10 ng/mL	11 – 15 ng/mL	15 – 50042 ng/mL
Positive	0	3	8	72
Negative	70	4	0	0
Buprenorphine and norbuprenorphine were added together to determine the total buprenorphine concentration reported in the table.				
Overall agreement 98.1% (154/157). The three discrepant results had concentrations of total buprenorphine of 5, 7, and 9 ng/mL.				

Buprenorphine Sensitivity/Precision

Performance around the cutoff for MEDTOX Buprenorphine was evaluated by testing standard drug solutions diluted in drug-free urine in triplicate on 5 different intervals by 3 in-house operators. Drug-free urine was also tested on each interval. The results were interpreted at five minutes.

Buprenorphine (Buprenorphine) Cutoff = 10 ng/mL			
Conc. (ng/mL)	Number Tested	Positive	Negative
0	45	0	45
2.5	45	0	45
5	45	0	45
7.5	45	17	28
12.5	45	41	4
15	45	45	0

Buprenorphine Non-Crossreactive Endogenous Compounds
The endogenous compounds were tested following the study of M.L. Smith, et. al.[6] Drug free urine samples were spiked with buprenorphine to the targeted concentrations of 5 ng/mL (50% of the cutoff) and 15 ng/mL (150% of the cutoff). Most of the compounds were evaluated for interference of the MEDTOX Buprenorphine Test at 100 µg/mL (albumin was evaluated at 20 mg/mL and bilirubin was evaluated at 200 µg/mL). Samples were evaluated in triplicate by in-house operators. None of the endogenous compounds listed below affected the expected results.

Acetaldehyde	Creatinine	Sodium Chloride
Acetone	Epinephrine	Tetrahydrocortisone
Albumin, Human	β-Estradiol	d,1-Thyroxine
Ascorbic acid	Estriol	Uric Acid
Bilirubin	Glucose Std. Solution	
Cholesterol	Hemoglobin, Human	

Buprenorphine Related and Reactive Compounds
The following metabolites and reacting compounds were evaluated in the MEDTOX Buprenorphine Test. Reference standards for the various metabolites and compounds were prepared in negative urine samples. Results are expressed as the minimum concentration expected to produce a positive result in the indicated assay. Compounds that reacted with the test are listed first, and related compounds that did not react with the highest concentration tested are listed second as Negative at 100,000 ng/mL (or highest level tested). The non-reacting opiate compounds were also tested following the study of M.L. Smith, et. al.[6] Drug free urine samples were spiked with buprenorphine to the targeted concentrations of 5 ng/mL (50% of the cutoff) and 15 ng/mL (150% of the cutoff). 100 µg/mL of the non-reactive opiate compounds were then added to the preparation and assayed by MEDTOX Buprenorphine Test. Samples were evaluated in triplicate by in-house operators. None of the non-reactive opiate listed in the following table affected the expected results.

Buprenorphine-(BUP)	**Result**	**% Cross-Reactive**
(Buprenorphine) 10ng/mL	Positive at 10 ng/mL	100%
Buprenorphine-glucuronide	Positive at 7.5 ng/mL	133%
Norbuprenorphine	Positive at 50 ng/mL	20%
Norbuprenorphine-glucuronide	Positive at 75 ng/mL	13%
Codeine	Negative at 100,000 ng/mL	None Detected
Diacetylmorphine	Negative at 100,000 ng/mL	None Detected
Hydrocodone	Negative at 100,000 ng/mL	None Detected
Hydromorphone	Negative at 100,000 ng/mL	None Detected
Levorphanol	Negative at 50,000 ng/mL	None Detected
6-Monoacetylmorphine	Negative at 100,000 ng/mL	None Detected
Morphine	Negative at 100,000 ng/mL	None Detected
Nalbuphine	Negative at 100,000 ng/mL	None Detected
Naloxone	Negative at 100,000 ng/mL	None Detected
Naltrexone	Negative at 100,000 ng/mL	None Detected
Norcodeine	Negative at 100,000 ng/mL	None Detected
Noroxycodone	Negative at 100,000 ng/mL	None Detected
Noroxymorphone	Negative at 100,000 ng/mL	None Detected
Oxycodone	Negative at 100,000 ng/mL	None Detected
Oxymorphone	Negative at 100,000 ng/mL	None Detected
Thebaine	Negative at 100,000 ng/mL	None Detected

Buprenorphine Interference

pH and Specific Gravity:
The MEDTOX Buprenorphine Test was assayed with four negative clinical samples with pH values of 5.0, 6.0, 7.0, and 8.0 ± 0.1. Each sample was assayed in triplicate. The pH samples were fortified with buprenorphine to the concentrations of 5 ng/mL and 15 ng/mL. All the pH levels gave negative results when fortified to 5 ng/mL, and all pH levels gave positive results when fortified to 15 ng/mL.

The MEDTOX Buprenorphine Test was assayed with three samples with specific gravity values of 1.003, 1.015, and 1.030 ± 0.001. Each sample was assayed in triplicate. The specific gravity samples were fortified with buprenorphine to the concentrations of 5 ng/mL and 15 ng/mL. All the specific gravity levels gave negative results when fortified to 5 ng/mL, and all specific gravity levels gave positive results when fortified to 15 ng/mL.

Common Drugs:
The common drugs were tested following the study of M.L. Smith, et. al.[6] Drug free urine samples were spiked with buprenorphine to the targeted concentrations of 5 ng/mL (50% of the cutoff) and 15 ng/mL (150% of the cutoff). 100 µg/mL of the common drugs were then added to the preparation and assayed by the MEDTOX Buprenorphine Test. Samples were evaluated in triplicate by in-house operators. None of the common drugs listed in the following table affected the expected results.

COMMON DRUGS EVALUATED WITH MEDTOX BUPRENORPHINE TEST

Acetylsalicylic Acid	Cocaine	Phenobarbital
Acetaminophen	Dextromethorphan	d-Pseudoephedrine
Amitriptyline	Diphenylhydantoin	Rifampin
Brompheniramine maleate	Doxylamine	Salicylic Acid
Caffeine	Fluoxetine	Vancomycin
Carbamazepine	Ibuprofen	
Chlorpheniramine	Morphine	

14. BIBLIOGRAPHY

1. Blum, K. Handbook of Abusable Drugs. Gardener Press, Inc. New York, New York, 1984. pp. 305-349.
2. DeCresce, R.P., Lifshitz, M.S., Mazura, A.C. and Tilson, J.E. Drug Testing in the Workplace. ASCP Press. American Society of Clinical Pathologists. Chicago, Illinois. 1989. pp. 105-109.
3. Baselt, R.C. Disposition of Toxic Drugs and Chemicals in Man. Eighth Edition. Biomedical Publications. Foster City, California, 2008.
4. White, R.M. and Black, M.L. Pain Management Testing Reference. AACC Press. Washington, DC. 2007.
5. Cary, P.L. The Marijuana Detection Window: Determining the Length of Time Cannabinoids will Remain Detectable in Urine Following Smoking: A Critical Review of Relevant Research and Cannabinoid Detection Guidance for Drug Courts, Drug Court Review. Volume V:1. 2005, pp. 23 – 58.
6. Smith, M.L., Shimomura, E.T., Summers, J., Paul, B.D., Nichols, D., Shippee, R., Jenkins, A.J., Darwin, W.D., and Cone, E.J. Detection Times and Analytical Performance of Commercial Urine Opiate Immunoassays Following Heroin Administration, Journal of Analytical Toxicology. Volume 24:7. October 2000, pages 522-529.

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Covered by one or more patents.
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