510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
ASSAY ONLY TEMPLATE

A. 510(k) Number:
k060527

B. Purpose for Submission:
Clearance of a new device.

C. Measurand:
Buprenorphine and Norbuprenorphine

D. Type of Test:
Qualitative, visually read, immunochromatographic test

E. Applicant:
Alfa Scientific Designs, Inc.

F. Proprietary and Established Names:
Instant-View, Instant-Confirmatory, or Instant-Confirmatory Buprenorphine/Norbuprenorphine Urine Test (Cassette and Dip-Strip)

G. Regulatory Information:
1. Regulation section:
   21 CFR §862.3650, Opiate Test System
2. Classification:
   Class II
3. Product code:
   DJG
4. Panel:
   Toxicology (91)

H. Intended Use:
1. Intended use(s):
   This device is a qualitative immunoassay intended to detect buprenorphine (BUP) and its metabolite, norbuprenorphine (NBUP) in human urine. Results are preliminary positive when the combination of the concentrations of BUP and NBUP is greater than 10 ng/ml. It is for health care professional use only.

   This test provides only a preliminary result. A more specific alternate chemical method must be used in order to obtain a confirmed analytical result. Gas Chromatography / Mass Spectrometry (GC/MS) or High Performance Liquid Chromatography (HPLC) is the preferred confirmatory method. Clinical consideration and professional judgment should be applied to any drug of abuse test result, particularly when preliminary positive results are obtained.

2. Indication(s) for use:
   See Intended Use above.

3. Special conditions for use statement(s):
   A positive test result does not always mean an individual has taken the drug illegally as the drug can be administered legally.

4. Special instrument requirements:
   Not applicable. The device is a visually read single-use device.

I. Device Description:

This assay is a one-step lateral flow chromatographic immunoassay. The test strip consists of 1) a burgundy-colored conjugate pad containing rabbit anti-buprenorphine antibodies and mouse IgG coupled to colloidal gold; and 2) a nitrocellulose membrane containing a Test (T) line and a Control (C) line. The T line is coated with buprenorphine-BSA, and the C line is coated with goat anti-mouse IgG antibody.

This test is a competitive binding immunoassay. The buprenorphine and norbuprenorphine in the urine specimen competes with the buprenorphine–BSA antigen coated on the nitrocellulose membrane for the limited binding sites of the conjugated anti-buprenorphine antibodies.

When an adequate amount of urine specimen is applied to the sample pad of the device, the urine specimen migrates by capillary action through the test strip. If the level of buprenorphine and / or norbuprenorphine in the urine specimen is below the cutoff concentration (10 ng/ml), the T line appears as a visible burgundy line. If the level of buprenorphine in the urine specimen is above the cutoff, no T line develops.

The C line will bind to the mouse IgG conjugate and form a burgundy color band regardless of the presence of buprenorphine. The C line serves as an internal qualitative control of the test system.

J. Substantial Equivalence Information:
   1. Predicate device name(s):
      OneStep Buprenorphine Test

   2. Predicate 510(k) number(s):
      k042988

3. Comparison with predicate:

Similarities		
Item	Device	Predicate
Sample Types	Urine	Urine
Test Method	Immunochromatographic	Immunochromatographic

Differences		
Item	Device	Predicate
Intended Use	Qualitative immunoassay intended to detect buprenorphine (BUP) and its metabolite, norbuprenorphine (NBUP) in human urine.	Qualitative immunoassay intended to detect buprenorphine (BUP) in human urine.
Cutoff	BUP+NBUP: 10 ng/mL	BUP: 10 ng/mL
Major Cross Reactors:	Detects BUP and NBUP equally	Detects BUP glucuronide metabolite at 2.5 ng/mL

K. Standard/Guidance Document Referenced (if applicable):

None were identified by the applicant.

L. Test Principle:

See Section I., Device Description, above.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

Reproducibility was evaluated at three POL locations. Eighty-pooled drug-free human urine specimens were spiked with buprenorphine or norbuprenorphine at different levels. All specimens were blind labeled and tested. Results are summarized in the table below.

Buprenorphine		Site I	Site II	Site III	Expected Result
Controls	0 ng/ml	10 -	10 -	10 -	10 -
	5 ng/ml	15-	15-	15-	15-
	7.5 ng/ml	14-, 1+	14-, 1+	14-, 1+	15-
	12.5 ng/ml	14+, 1-	13+, 2-	14+, 1-	15+
	15 ng/ml	15+	15+	15+	15+
	30 ng/ml	10+	10+	10+	10+
Agreement	Site	96.3%	96.3%	97.5%	
	Average	97.1%			

Norbuprenorphine		Site I	Site II	Site III	Expected Result
Controls	0 ng/ml	10 -	10 -	10 -	10 -
	5 ng/ml	15-	15-	15-	15-
	7.5 ng/ml	14-, 1+	13-, 2+	14-, 1+	15-
	12.5 ng/ml	15+	15+	15+	15+
	15 ng/ml	15+	15+	15+	15+
	30 ng/ml	10+	10+	10+	10+
Agreement	Site	98.8%	97.5%	98.8%	
	Average	98.4%			

b. Linearity/assay reportable range:
Not applicable. This is a semi-quantitative device; a 'positive' result only suggests that buprenorphine is present in quantities above the cutoff level.

c. Traceability, Stability, Expected values (controls, calibrators, or methods):

This test contains a built-in control feature, the C line. The appearance of the burgundy C line indicates an adequate volume of specimen has been absorbed and the capillary flow through the test strip has occurred. The C line should always appear. If the Control line does not develop within 5 minutes, the sponsor suggests reviewing the entire procedure and repeating the test with a new device.

The sponsor also recommends that users follow appropriate federal, state, and local guidelines concerning the running of external quality controls.

d. Detection limit:

Sensitivity of qualitative assays may be characterized by validating performance around the claimed cutoff concentration of the assay, and demonstrating the lowest concentration of drug that is capable of or consistently producing a positive result. This information appears the *Precision/Reproducibility* section above.

e. Analytical specificity:

Cross-Reactivity

To evaluate the cross-reactivity of the device, compounds structurally related to buprenorphine were studied. The lowest concentration of the drugs producing a positive response equivalent to the cutoff level of the device was listed in the table below.

Compounds Name	Concentration (ng/ml)
Buprenorphine	10
Norbuprenorphine	10
Buprenorphine-3-β-D-glucuronide	750
Norbuprenorphine-3-β-D-glucuronide	30,000
Nalorphine	100,000

Interfering Substances

The following substances, evaluated separately, were spiked with 100 µg/ml of the substance and evaluated in urine pools containing combined concentrations of buprenorphine and norbuprenorphine at 0 and 15 ng/ml. No interference was observed from those analytes at the concentration listed in the following tables.

Acetaminophen	Cortisone
Acetylsalicylic Acid	Dextromethorphan
Amikacin	Ethanol
Amitriptyline	Lidocaine
Ampicillin	Methadone
Arterenal	Methanol
Aspirin	Oxalic Acid
Benzoic Acid	Penicillin-G (Benzylpenicillin)
Benzoylecgonine	β-phenylthylamine
Caffeine	Phenylpropanalamine
(+)-Chlorpheniramine	Ranitidine
(+/-)-Chlorpheniramine	Salicyclic Acid
Cocaine	Thioridazine

The following endogenous substances, tested the same as the above substances, were tested and confirmed not to interfere with the BUP/NBUP test device at listed concentration.

Biological Analytes	Concentration
Albumin(serum)	2,000 µg/ml
Bilirubin	1,000 µg/ml
Creatine	1,000 µg/ml
Hemoglobin	1,000 µg/ml
Glucose	2,000 µg/ml
Vitamin C (L-Ascorbic Acid)	1,000 µg/ml
Uric Acid	1,000 µg/ml
pH	5.0-9.0

f. Assay cut-off:
The stated cutoff of this assay is 10 ng/mL. Characterization of how the device performs analytically around the claimed cutoff concentration appears in the *Detection limit* section, above. The Substance Abuse and Mental Health Services Administration (SAMHSA) has not recommended cutoff levels for buprenorphine tests.

2. Comparison studies:

a. Method comparison with predicate device:

The accuracy of this device was evaluated using 54 clinical urine specimens and 40 drug free urine samples with varying un-hydrolyzed concentrations of both buprenorphine and norbuprenorphine in different ratios, each blind-labeled. The results from this test device agreed 100% with the HPLC/MS and GC/MS on the non-hydrolyzed specimens at levels below 75% of the cutoff (negative) and above 125% of the cutoff (positive). Three (3) discrepancies were observed on the specimens of buprenorphine/norbuprenorphine at the level between 75% and 125% of the cutoff. The overall agreement was 96.8% (3 discrepancies/94 specimens).

Buprenorphine/ Norbuprenorphine		BUP and NBUP		Total	Agreement
		Positive	Negative		
HPLC/MS (ng/ml)	Negative (<75%)	0	49	49	100%
	75%-Cutoff	1*	5	6	83.3%
	Cutoff-125%	18	2*	20	90%
	Positive (>12.5)	19	0	19	100%
Total		38	56	94	

* indicates discrepancy.

b. Matrix comparison:
Not applicable.

3. Clinical studies:

   a. Clinical Sensitivity:
   Not applicable.

   b. Clinical specificity:
   Not applicable.

   c. Other clinical supportive data (when a. and b. are not applicable):
   Not applicable.

4. Clinical cut-off:
   Not applicable.

5. Expected values/Reference range:
   No elicit drugs should be present in urine.

N. Proposed Labeling:

The labeling is sufficient and it satisfies the requirements of 21 CFR Part 809.10.

O. Conclusion:

The submitted information in this premarket notification is complete and supports a substantial equivalence decision.