

# Workplace Drug Testing in Urine, Hair, and Oral Fluids

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Northwest Drug Testing

Salt Lake City, UT 84124

Phone: 801-293-2300

# Quality Assurance/Quality Control

- Certified by the SAMHSA/DHHS
- Participate in College of American Pathologists (CAP) and New York State Proficiency Programs for urine and blood assays for drugs
- Twelve inspections per year by outside agencies
- Proficiency samples from private clients
- Active Quality Assurance Program
- “Open” and “Blinded” specimens in screening and confirmation assays
- Internal double blind program
- Multiple levels of review for negative and positive results

# Records and Sample Retention Policies

- All analytical records for non-negative (e.g., positives, adulterated, substituted samples) are maintained for a minimum of two years
- Sample bottles in litigation are isolated in the long term freezer and are extended from 1 year storage to indefinite
- Litigation packages are prepared on request and normally shipped within ten days
- SOP's and other laboratory documents are stored indefinitely for discovery in arbitration/litigation

# Drug and Integrity Tests

- Drugs
  - Amphetamines
  - Cocaine
  - Opiates
  - Marijuana
  - PCP
  - Others with authorization
- Integrity Tests
  - Creatinine
  - pH (acidity)
  - Nitrites
  - Chromium
  - Specific Gravity
- Follow-up/suspicion tests
  - Bleach
  - Soap
  - Stealth (peroxidase)
  - Glutaraldehyde
  - Iodine, fluoride & others



**NWT**  
1141 EAST 3000 SOUTH  
SALT LAKE CITY, UT 84124-9906  
**URGENT**

**FEDERAL EXPRESS**  
**CENTER HOLD**  
EXPEDITE TO THIS CENTER  
400000

...LY and does not take the place of proper packaging for diagnostic specimen shipments.  
...ing proper packaging of diagnostic specimens consisting of the following:

...an overwrap only)  
...these packaging requirements will be refunded.

Questions? Call 1-800-Go-Fed

FedEx  
STANDARD OVERNIGHT THU  
8242 9042 3119

84124 -UT-US  
HLD  
SLC  
XA NPHA



**FedEx Standard Overnight®**  
Business Stamp By 3:00 P.M. NEXT BUSINESS DAY  
Next-Business-Day service not available in all locations.  
From: [Redacted]  
ORDER # 0000000000  
NAME [Redacted]  
CITY [Redacted]  
PH [Redacted]  
EXPIRATION DATE 12/30/00

To:  
N. M. T. INC  
HOLD AT FEDEX STYA  
1141 E. 3000 S. STE #1110  
SALT LAKE CITY, UT 84124  
(800) 362-3361

**DIAGNOSTIC SPECIMEN ENVELOPE**

**FedEx**

TARGET LINE

...no special handling requirements are required for this product until the item has been properly packaged and sealed in a leak-proof container and placed in a leak-proof outer container.

NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES



BOX  
SEAL

BOX  
SEAL

- HAND  
BIOLOGICAL SPECIMEN

1141 EAST 3900 SOUTH  
SALT LAKE CITY, UTAH 84124-96

To: NWT Inc.

POSTAGE WILL BE PAID BY ADDRESSEE

BUSINESS REPLY LABEL  
FIRST CLASS PERMIT NO. 5442 SALT LAKE CITY UT

FROM: (NAME OF PERSON RETURNING)  
COMPANY OR ORGANIZATION  
STREET ADDRESS  
CITY STATE ZIP CODE



**FEDERAL DRUG TESTING CUSTODY AND CONTROL FORM**  
FD-894A

1-22-210

1. EMPLOYER OR EMPLOYEE OR EMPLOYER REPRESENTATIVE  
 NAME: **KINGS BAY NAVAL SUB BASE**  
 ADDRESS: **KINGS BAY, GEORGIA 31547**  
 CITY: **KINGS BAY, GEORGIA 31547**

2. CONTROL NUMBER: **176-64-9087**

3. LABORATORY ALLOCATION NO.  
 NAME: **DR. CHRISTOPHER HELLAND**  
 OFFICE: **CREATED MEDICAL REVIEW OFFICER**  
 ADDRESS: **6710 FEDERAL OCCUPATIONAL HEALTH**  
**1150 GRAND AVENUE, SUITE 800**  
**SUNNYSIDE CITY, MD 21156**

4. DATE OF TEST: **07/02/01**

5. TESTED BY: **JOSEPH C. REED**

6. SPECIMEN COLLECTION:  Urine  Saliva  Blood

7. SPECIMEN CONTAINER:  Single  Split (Specify Container Remarks)  Observed (Other Remarks)

8. TEST RESULTS:  Negative  Positive (Specify Metabolite)  
 Metabolites: **MARIJUANA METABOLITE, COCAINE METABOLITE, AMPHETAMINE METABOLITE, METHAMPHETAMINE METABOLITE, ECSTASY METABOLITE**

9. SIGNATURE OF AUTHORITY: **JOSEPH C. REED** (Date: **07/02/01**)

10. RECEIVED AT LAB:  Primary Specimen Bottle Seal Intact  No, Enter Remark Below

11. SPECIMEN BOTTLE(S) RELEASED TO: **FED EX**

12. TEST LAB (if other than above): \_\_\_\_\_

13. TESTED BY: \_\_\_\_\_

14. SIGNATURE OF CERTIFYING AGENCY: \_\_\_\_\_

**PLACED OVER SEAL**

**COPY 1 - ORIGINAL - MUST ACCOMPANY SPECIMEN TO LABORATORY**

FEDERAL BUREAU OF INVESTIGATION U.S. DEPARTMENT OF JUSTICE





# Examples of Chain of Custody Discrepancies and Cancellations

- Dates missing or inconsistent
- Collector signature/shipment method missing
- Federal collection on non-federal form
- Donor's initials missing
- No donor employer ID or SSN
- Bottle and form ID numbers do not match
- No form with bottle
- Insufficient volume - bottle seal is broken/missing

FEDERAL DRUG TESTING CUSTODY AND CONTROL FORM

11032310

STEP 1. COMPLETED BY COLLECTOR OR EMPLOYER REPRESENTATIVE

A. Employer Name, Address, I.D. No.  
 84371 - US NAVY  
 11314

4 2 2 3 7

LABORATORY ACCESSION NO.

DR. CHRISTOPHER HELLAND  
 CERTIFIED MEDICAL REVIEW OFFICER  
 C/O FEDERAL OCCUPATIONAL HEALTH  
 1150 GRAND AVENUE, SUITE 800  
 KINGMAN CITY, ND 58106

C. Donor SSN or Employee I.D. No. 176-64-9027

D. Reason for Test:  Pre-employment  Reason to Doubt  Random Suspicion/Case  Post Accident

E. Drug Tests to be Performed:  MC, CDC, PCP, UA, AMP  Other Specify: \_\_\_\_\_

F. Collection Site Address: KINGS BAY NAVAL SUB BASE  
BLDG 1063  
KINGS BAY, GEORGIA 31547

G. Collection Site Phone No. 903-442-7450  
 H. Collection Site Fax No. 903-442-8299

STEP 2. COMPLETED BY COLLECTOR  
 I. Packed Specimens:  Yes  No, Error Number: \_\_\_\_\_

J. Remarks: ID BY WK ID

STEP 3. COLLECTOR AFFIXES BOTTLE TO BOTTLES. COLLECTOR STATES BOTTLE NUMBER, NUMBER OF BOTTLES, BOTTLE CAPTURED (STEP 4) AND DATE.

STEP 4. CHAIN OF CUSTODY INITIATED BY COLLECTOR AND COMPLETED BY LABORATORY

K. Signature of Collector: JOSEPH C. REED L. SPECIMEN BOTTLES RELEASED TO: FED EX

M. RECEIVED AT LAB: Andy Oliver N. Primary Specimen: 1003  
 O. Bottle Seal Intact:

STEP 5. PRIMARY SPECIMEN TEST RESULTS - COMPLETED

RESULTS:  NEGATIVE  POSITIVE  INVALID  SELECTED FOR TESTING

REMARKS: \_\_\_\_\_

TEST USE: If different from above, identify the specimen identified on this form and retest when appropriate.

STEP 6. SPL SPECIMEN TEST RESULTS - OF TESTING COMPLETED

RESULTS:  NEGATIVE  POSITIVE  INVALID  SELECTED FOR TESTING

REMARKS: \_\_\_\_\_

LABORATORY NAME: \_\_\_\_\_

LABORATORY ADDRESS: \_\_\_\_\_

LABORATORY PHONE NO.: \_\_\_\_\_

LABORATORY FAX NO.: \_\_\_\_\_

LABORATORY CONTACT PERSON: \_\_\_\_\_

LABORATORY CONTACT PHONE NO.: \_\_\_\_\_

LABORATORY CONTACT FAX NO.: \_\_\_\_\_

LABORATORY CONTACT EMAIL ADDRESS: \_\_\_\_\_

LABORATORY CONTACT WEBSITE: \_\_\_\_\_

LABORATORY CONTACT URL: \_\_\_\_\_

LABORATORY CONTACT URL: \_\_\_\_\_

LABORATORY CONTACT URL: \_\_\_\_\_

LABORATORY CONTACT URL: \_\_\_\_\_

OF NORMAL - MUST ACCOMPANY SPECIMENS TO LABORATORY



NORTHWEST DRUG TESTING  
 5000 UNIVERSITY AVENUE  
 1ST FLOOR SUITE 1000  
 9801 UNIVERSITY AVENUE  
 98108-3800



New Batch

## Flash Login

Folder 070501RK-02

Pos	Lab ID	Chain	Sample ID	SSN
1	1013507	11032310		

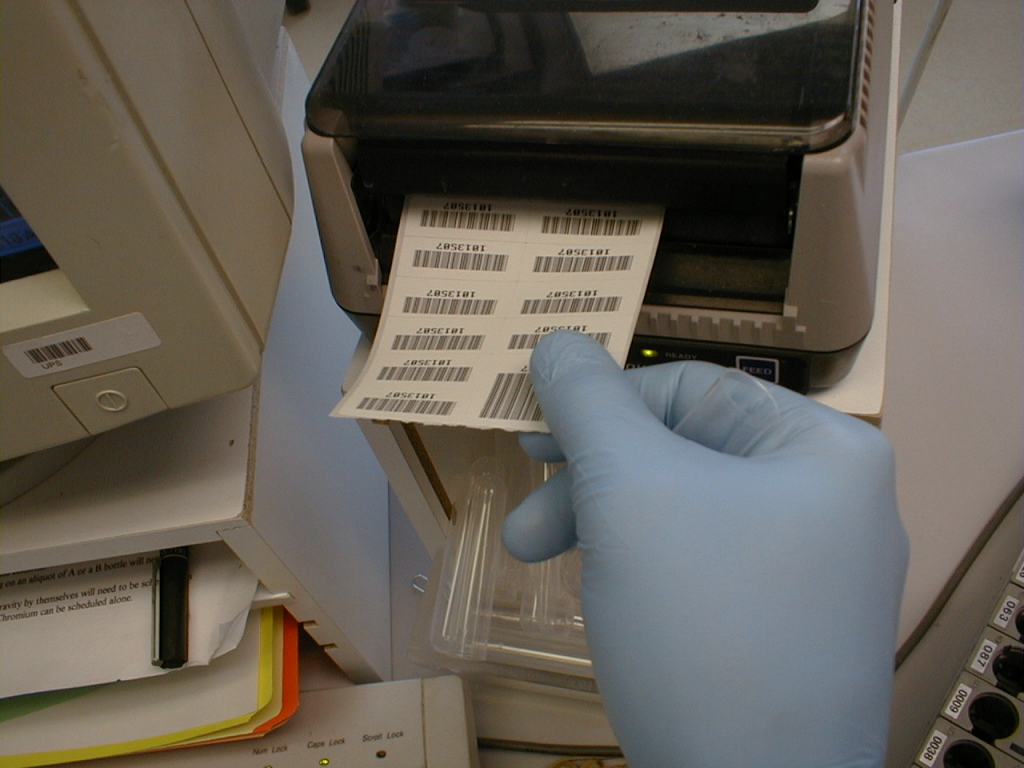
Client 203844 U.S. DEPARTMENT OF THE NAVY

Profile 31153 5 PANEL HHS 5 PANEL HHS

Line Item 1 Turn Code T Matrix U

Analysis Code	Description	Receiving Codes
5pHHS	5 Panel HHS	
ADUL RG	Adult pH, Creat, Nit, Chr	

Course ID

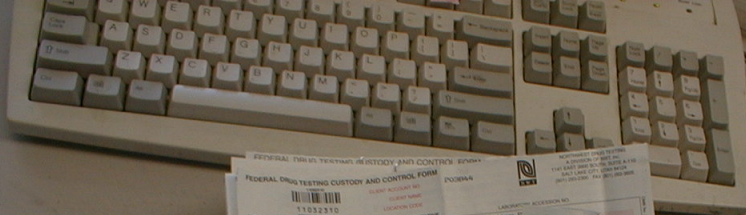


UPS

... on an aliquot of A or a B bottle will not  
... gravity by themselves will need to be set  
... Chromium can be scheduled alone

Num Lock    Caps Lock    Scroll Lock

083  
087  
0009  
0038



FEDERAL DRUG TESTING CUSTODY AND CONTROL FORM

11032310

STEP 1. COMPLETED BY COLLECTOR OR EMPLOYER REPRESENTATIVE

A. Employer Name, Address, I.D. No.  
 DEPT. OF PENNY  
 11111

B. MRO Name, Address, I.D. No.  
 LABORATORY  
 11111

C. Donor Name or Employee I.D. No.  
 07050

E. Drug Tests to be Performed  
 KING'S BLDG  
 KING

STEP 2. COMPLETED BY LABORATORY

Primary Specimen Bottle Seal Intact  Yes  No  
 No. Enter Remarks Below

COMPLETED BY PRIMARY LABORATORY

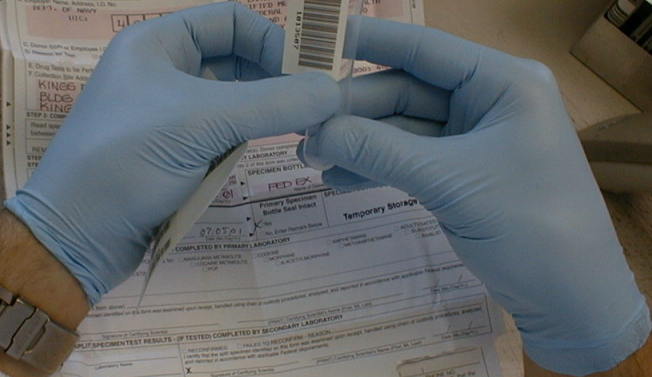
Signature of Collecting Source  
 Signature of Laboratory Source

STEP 3. COMPLETED BY SECONDARY LABORATORY

Signature of Collecting Source  
 Signature of Laboratory Source

11032310

CONFIDENTIAL - MUST ACCOMPANY SPECIMEN TO LABORATORY





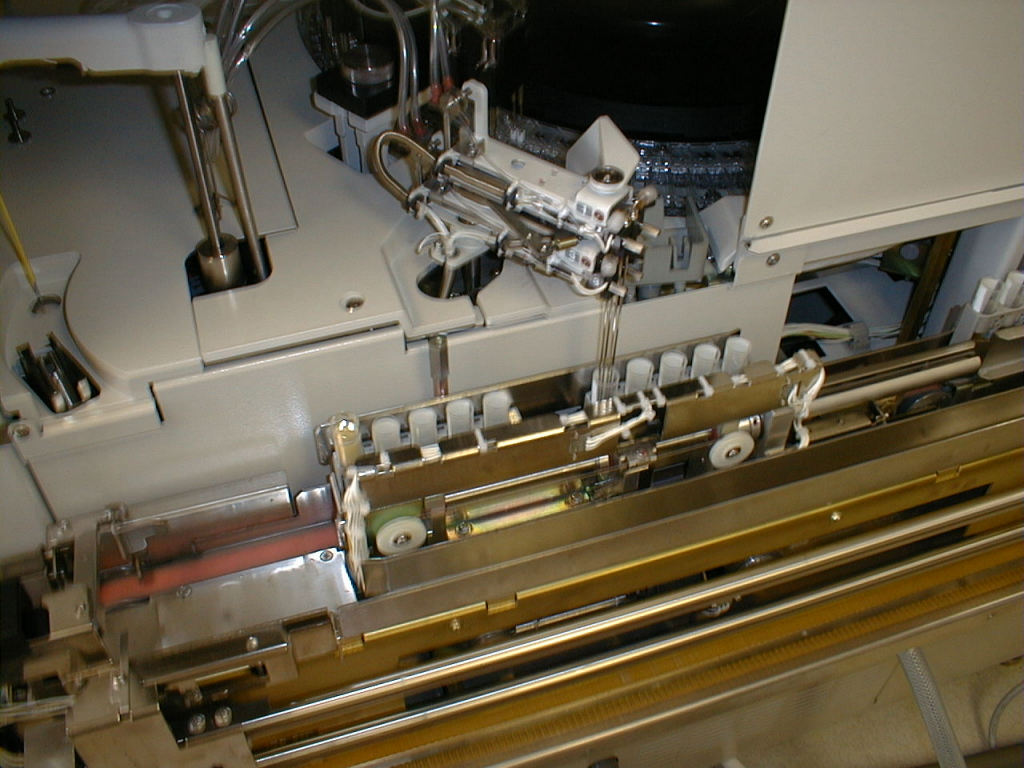


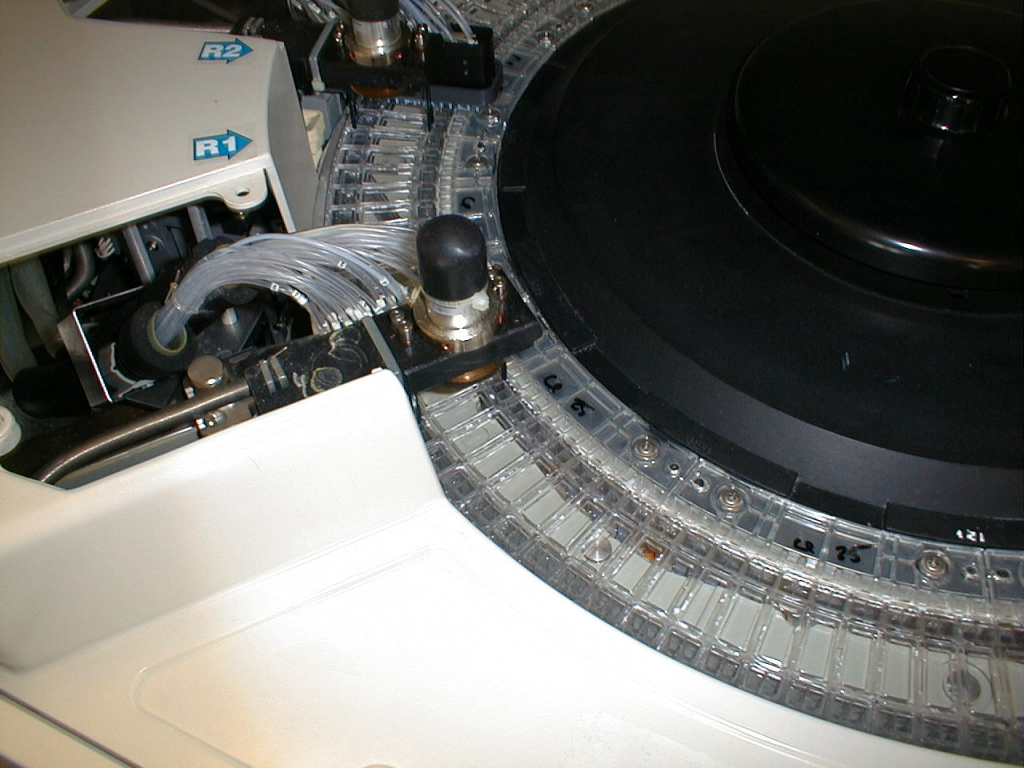
# Initial Screening

- Often called the initial or immunoassay test
- All specimens are subjected to this test. It provides a rapid cost effective system to identify “presumptive positive” specimens
- This process requires 1 mL of urine to complete and will provide results for up to ten tests within 30 seconds
- Adulterants often target this process to change a positive screen to a negative test









# Confirmation Testing

- The first step is to separate the drug from other components of the urine (2-4 hours)
- Completed by a technique known as gas chromatography/mass spectrometry (GC/MS)
- The GC further separates the remaining urine components
- The MS identifies each drug through a chemical fingerprint which is unique - the identification is conclusive







# Lab Intervention in Adulteration

- Lab conducts five chemical tests (pH, specific gravity, creatinine, nitrites, and chromium) for each sample in addition to appearance, smell, and color
- NWT identifies approximately 2 samples per thousand which are adulterated or do not qualify as a valid specimen
- Approximately 90% of adulterated specimens have drug identified
- If the adulterant can not be identified, it is reported as unsuitable



## Creatinine & Specific Gravity

- Specific Gravity is only performed when the urine creatinine is in the dilute or substituted categories
- Pure water is the reference standard with a value of 1.000 - water does not contain creatinine
- This test is performed using a refractometer which is a standard clinical chemistry test
- Most labs only perform specific gravity when creatinine values are abnormal

# pH

- Measure of the acidity of a urine sample
- pH values ranges from 1-14 with a pH value of 1 as “strong acid” to 14 as a “strong base”. Neutral is pH 7
- Normal urine pH values are from 5-7
- Abnormal values are  $\leq 3$  and  $\geq 11$
- Older urine samples turn basic due to ammonia producing bacteria
- The first Urine Luck product contain hydrochloric acid

## Nitrites

- One of the most popular adulterants two years ago and prevented the confirmation testing of marijuana
- Every sample is screened at 500 mcg/ml and confirmed with a second aliquot at 500 mcg/ml
- Nitrite is a normal constituent of urine, especially in urinary tract infections
- Normal urine contains less than 100 mcg/ml
- Samples exceeding 500 mcg/ml are reported as adulterated

Tommy Chong's

**URINE LUCK<sup>®</sup>**

9859-12-1

DEVELOPED BY  
SPECTRUM LABORATORIES

**URINE LUCK<sup>®</sup>**

DETOXIFYING AGENT



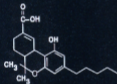
# Chromium

- There are two types:
  - Chromium (+6) is extremely toxic and corrosive
  - Chromium (+3) is the dietary form as chromium picolinate in vitamin supplements and does not interfere with testing nor is it identified in the testing
- NWT established 50,000 ng/ml as the screening limit and 20,000 ng/ml as the confirmation limit
- Normal human limits are less than 100 ng/ml
- Primarily effective against marijuana - works within minutes to destroy the presence of marijuana in the sample

# Chromium - Continued

- Sold as Urine Luck
- It is now in its fourth generation
  - Hydrochloric Acid
    - Detected through pH testing
  - Pyridinium chlorochromate
    - Detected through pyridine testing
  - Sodium Chromate
    - Detected through chromate testing
  - New formulation is composed of two vials containing iodine and hydrogen fluoride

**URINE LUCK™**  
**PROVEN THE**  
**#1 Additive in**  
**SALES AND RESULTS**  
**WITH OVER**  
**200,000**  
**Satisfied**  
**CUSTOMERS**



Tommy Chong  
of Cheech & Chong  
and Shelby

"Hey man...when you get  
caught with your  
pants down...  
**Urine Luck™!**"



**Call Toll Free 877-653-5592**

## **Why the BEST?**

Do you know what other name  
brand additives in this magazine  
have in common?

*They are all copies of past Urine  
Luck™ formulations. Why trust  
your future with an outdated  
inferior additive.*

***Insist on the best with  
Urine Luck™***

**URINE LUCK™ is  
UNDETECTABLE!**

**Contains NO Nitrites, NO Pyridine,  
NO Acids and NO Glutaraldehyde**

# Bleach

- Typically identified through odor at the time samples are aliquoted for the screening test
- Two aliquots are again tested using a dipstick-type test
- Only 1-2 samples are positive per month
- May be one of the few adulterants that can be detected by the collector through its odor
- Bleach turns the strip purple; concentrated bleach will “bleach-out” the color of the strip



# Soap

- As with bleach, it has been used for decades to interfere with screening and confirmation tests
- Usually identified through excessive, long lasting bubbles and a “flowery” smell upon opening of the bottle
- First commercial product was Mary Jane’s SuperClean 13 and was sold for \$30.00
- The type of soap is not identified. Normally about a 1/2 teaspoonful is added
- Based on methylene blue with blue color transferring to the chloroform layer. Negative samples are rose-colored.



# Glutaraldehyde

- Became popular in 1992 as the first commercial adulterant
- Solid originally as UrinAid and later Instant Clean ADD-IT-ive by Clear Choice
- NWT developed the first test and the first to defend adulterant reports of this agent
- It is used as a chemical sterilant and tissue fixative
- The presence of glutaraldehyde is indicative of intentional adulteration
- Screening tests provided “ultra-negative” immunoassay results; screening by Schiff’s test and full-scan GC/MS

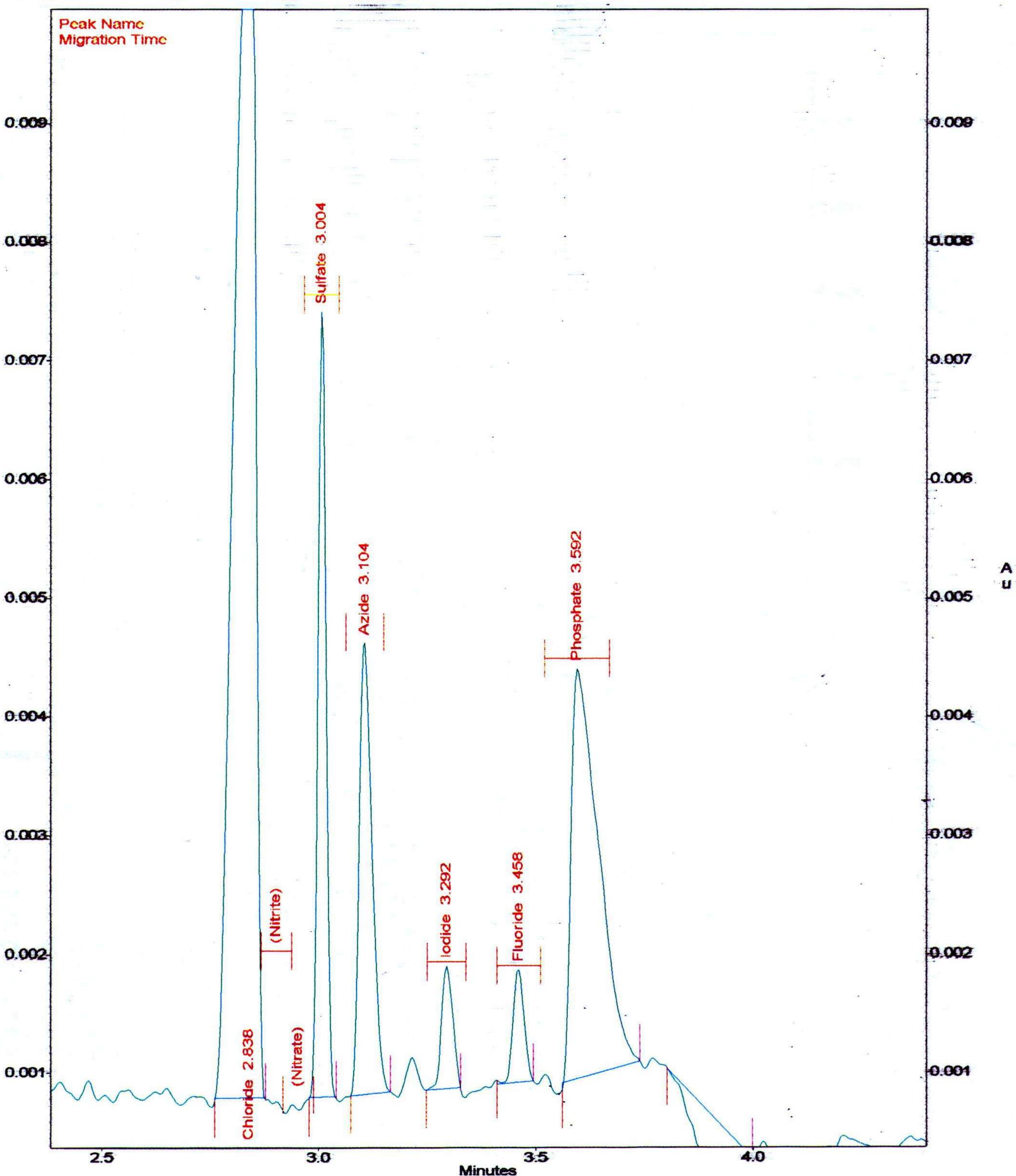
# Peroxidase

- Available as Stealth (two small vials - one is dark colored peroxidase and the second is hydrogen peroxide)
- Works within minutes to destroy marijuana and is less effective against other drugs
- Must test for this product directly - NWT has developed an assay for screening and confirmation
- No national standards - unknown amount in circulation

# Capillary Electrophoresis (CE)

- Uses electrophoretic mobility of ions to perform a separation of ions
- Common anions (negative charged) in urine include chlorine, bromine, nitrite, nitrate, sulfate, phosphate and fluoride
- Other ions of interest include hypochlorite, iodine, iodate, lithium, potassium, ammonium, chromium, and sodium
- Separation is through a uncoated capillary 1 meter column using voltage and electrolyte variations and detection by ultraviolet detection





# Adulteration Trends in 2001

	<u>Q1</u>	<u>Q2</u>	<u>Q3</u>	<u>Q4</u>
Substituted	38	40	35	23
Unsuitable	65	51	58	28
Nitrites	40	29	20	9
Chromium	123	83	22	13
Bleach	0	0	0	5
Soap	0	0	0	1
pH	12	11	19	6
Glutaraldehyde	0	0	0	0



# Legal Issues and Arbitration

- Most cases involve adulteration and substitution
- Testified in 17 cases in 2001 and 8 in Q1 2002
- Attorneys try to bring in proposed federal regulations regarding validity testing as they were the standard
- New novel medical conditions and products are used as a defense for an adulterated or substituted sample
- NWT will be ready for the new regulations with alternative testing procedures
- Hair, Oral Fluids, On-Site Testing approval is still two years away. NWT has alternative testing matrices already in testing.

# Hair Testing

- Drugs are primarily incorporated through the blood supply at the root end and are deposited during the hair shaft growth. Other drug incorporation mechanisms are sweat and scalp oils which soak into the hair shaft.
- Shampooing of the hair removes drug residue from the environment on a daily basis.
- Environmental contamination is also removed at the lab prior to testing for screening and confirmation with a methanol wash.

# Hair Collection Facts

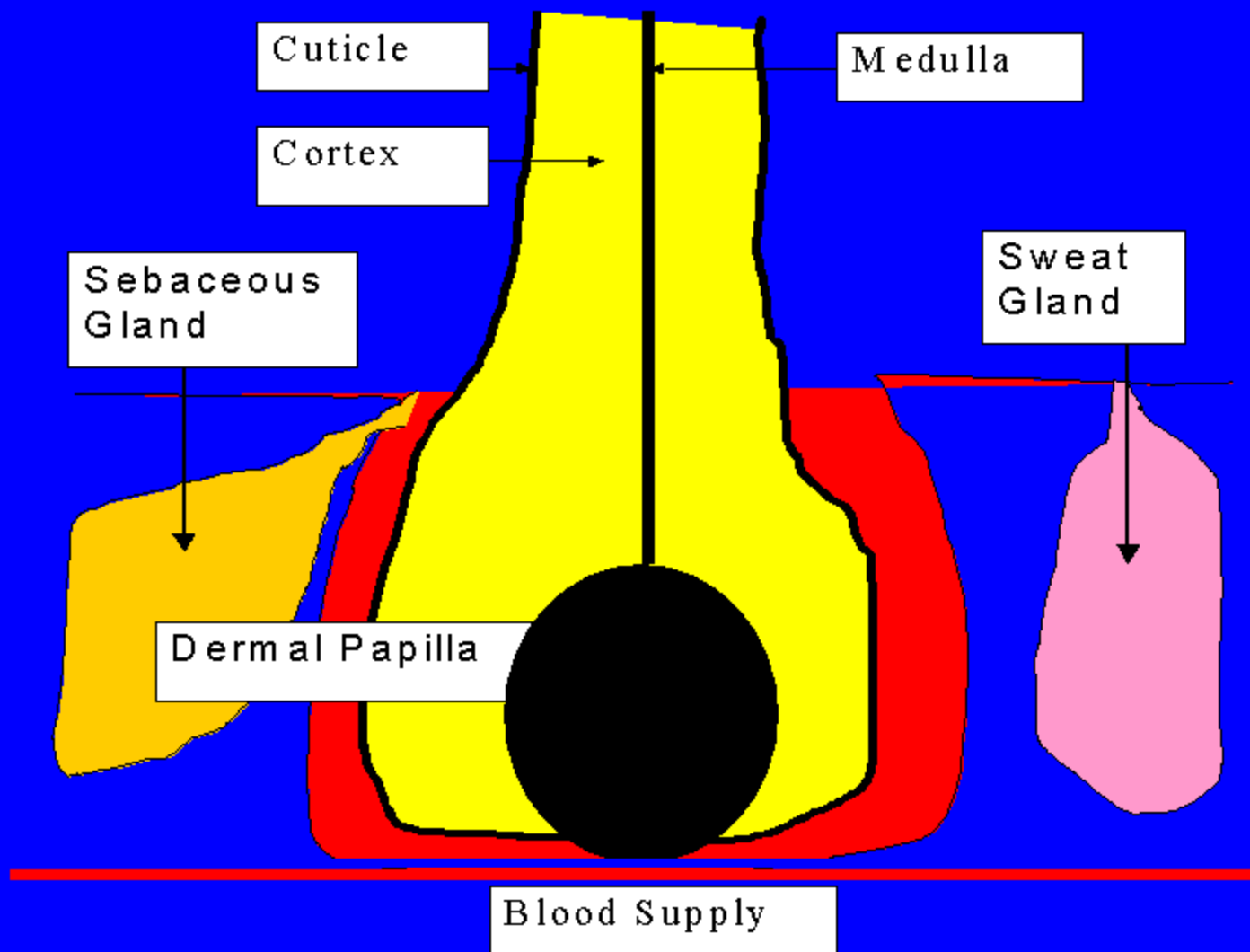
- Workplace testing only involves the first 1.5 inches from the scalp and represents 90 days of exposure
- Normally takes 7-10 days for incorporated drugs to grow above the scalp
- Segmental analysis can provide time frames of drug use
- A full sample requires up to 200 strands of 1.5 inch long hair - shorter hair requires more strands

# Hair Cutoffs (pg/mg)

<u>Drug</u>	<u>Screen</u>	<u>Confirmation</u>
Cannabinoids	1.0	0.1
Opiates	200	300
6-AM		300
Amphetamines*	300	300
MDA/MDMA		300
*Amphetamine must be $\geq 50$ pg/mg to report methamphetamine		
PCP	300	300
Cocaine**	500	500
Benzoylecgonine		50
Cocaethylene		50
Norcocaine		50

\*\*Metabolite must be  $\geq 50$  pg/mg present to report cocaine

# ROOT OF HAIR



SPECIMEN IDENTIFICATION NUMBER (FROM REQUISIT



1056942

DONOR SSN OR EMPLOYEE ID NO.:

745150

COLLECTION SITE:

Jobcare / selma

INITIALS OF DONOR:

XAL

By these initials, I certify that I consented to the collection of a hair sample from my body by the collector and that the hair sample was placed in the transfer envelope and sealed in my presence.

HAIR SAMPLE COLLECTOR:

*[Signature]*

DATE AND TIME:

7/24/02 3:45 pm

I certify that I collected the hair sample enclosed in this envelope, that it is from the body of the above donor, and that it was collected with the donor's knowledge and consent. I further certify that the information on the envelope is true and correct.

SOURCE OF SAMPLE:

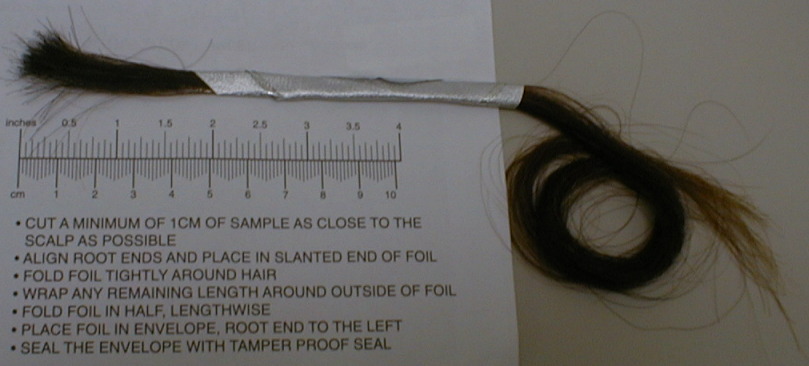
Head  Underarm  Chest  Other

Bottle Seal A



INTEGRITY SEA

15184608 - SPECIMEN ID NO.



- CUT A MINIMUM OF 1CM OF SAMPLE AS CLOSE TO THE SCALP AS POSSIBLE
- ALIGN ROOT ENDS AND PLACE IN SLANTED END OF FOIL
- FOLD FOIL TIGHTLY AROUND HAIR
- WRAP ANY REMAINING LENGTH AROUND OUTSIDE OF FOIL
- FOLD FOIL IN HALF, LENGTHWISE
- PLACE FOIL IN ENVELOPE, ROOT END TO THE LEFT
- SEAL THE ENVELOPE WITH TAMPER PROOF SEAL









①

Mode

Units

Setup

Stable

WEIGH

20.0 mg

Enter

Print

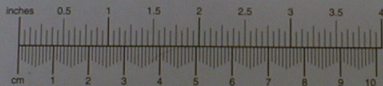
→0/T←

Explorer



→0/T←

Size: 1.3 x 100mm  
DISTRIBUITION # 11



- CUT A MINIMUM OF 1CM OF SAMPLE AS CLOSE TO THE SCALP AS POSSIBLE
- ALIGN ROOT ENDS AND PLACE IN SLANTED END OF FOIL
- FOLD FOIL TIGHTLY AROUND HAIR
- WRAP ANY REMAINING LENGTH AROUND OUTSIDE OF FOIL
- FOLD FOIL IN HALF, LENGTHWISE
- PLACE FOIL IN ENVELOPE, ROOT END TO THE LEFT
- SEAL THE ENVELOPE WITH TAMPER PROOF SEAL





HEAT BLOCK #1

HB05

THERMOLYNE  
DRI-BATH

TEMP

**WARNING**

DO NOT OPERATE THIS EQUIPMENT OR  
FLAMMABLE OR COMBUSTIBLE  
SUBSTANCES. CONSULT USER MANUAL  
FOR COMPLETE SAFETY INSTRUCTIONS.



HEAT BLOCK

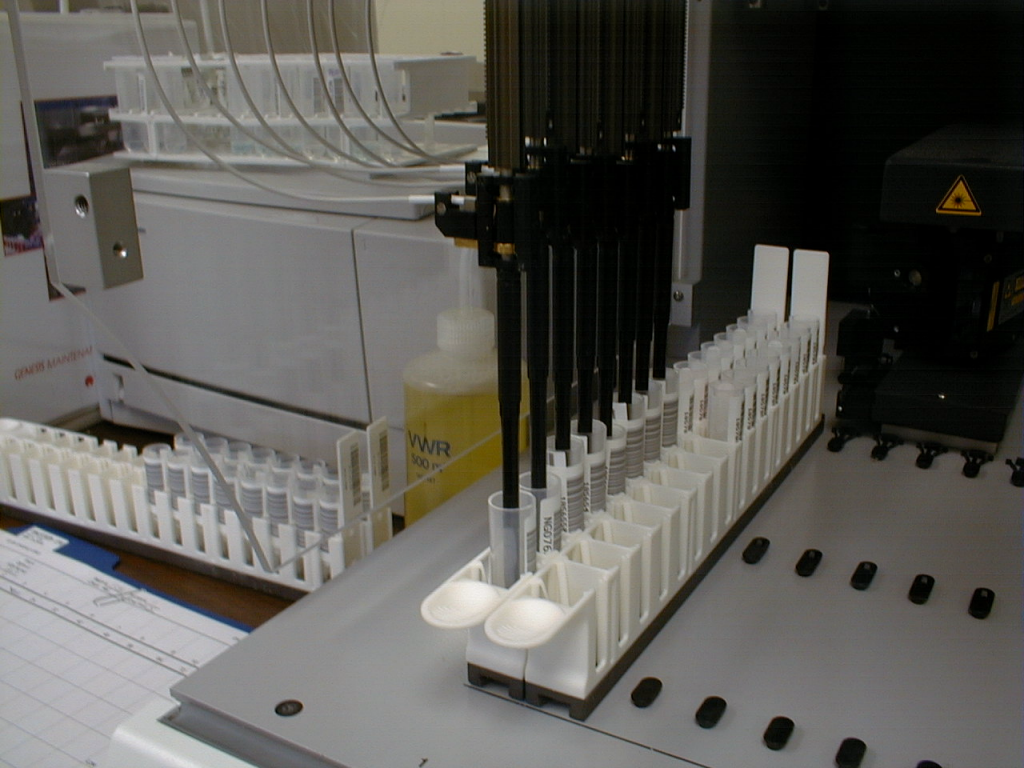
VWR

WARNING

1207

# Hair Screening

- ELISA screening technology is used for hair testing
- Uses 96 well technology with reagents and hair extract added
- Concentration is correlated to the color intensity in the well and is compared to calibrators
- All processes are computer controlled robotics - but is much slower and more expensive than urine screening - more sensitive than urine methods



GENOS MANTENIM

WVR  
300

SILESON  
1000000

SILESON  
1000000

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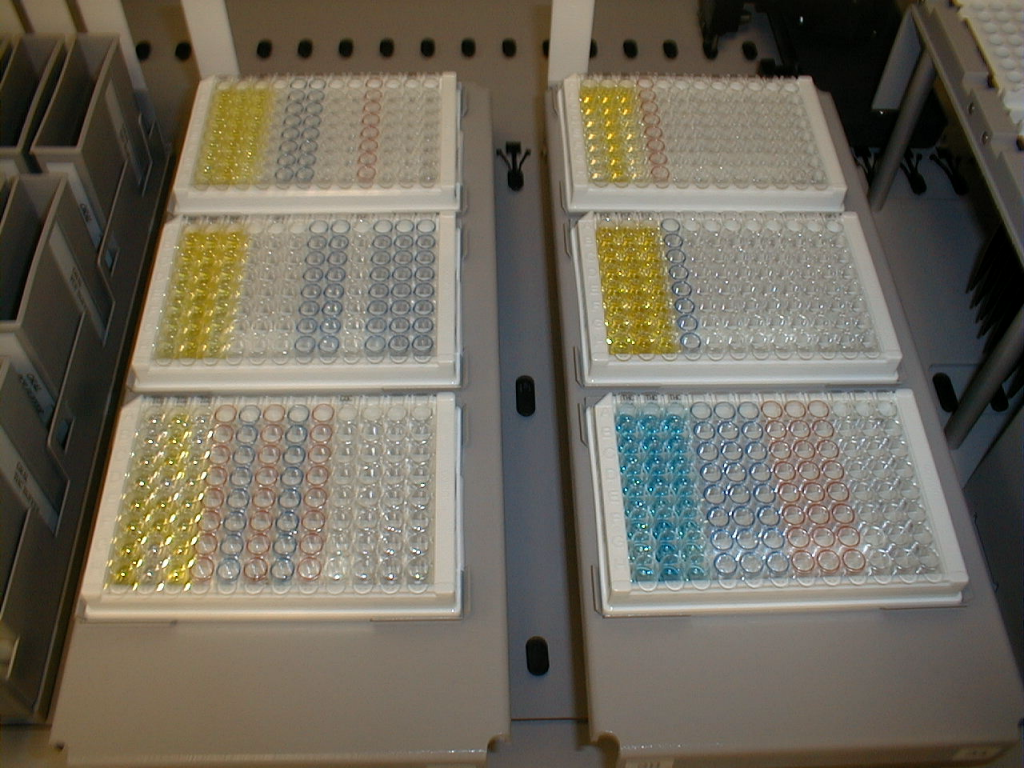
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# Hair Confirmation Techniques

- Confirmations for all drugs except marijuana can be completed on standard GC/MS's
- Marijuana must be confirmed by GC/MS/MS due to the low levels in the hair
- Extractions and confirmatory techniques are highly sophisticated to achieve the sensitivity and selectivity required for successful analysis

# Oral Fluid Testing

- No special collection facilities or fees
- Collection can occur anywhere
- Collection device requires only two minutes in the mouth and is witnessed by the collector
- Possibility of adulteration is drastically reduced
- Indicates recent drug usage and correlates with impairment of the donor by looking at parent drug rather than metabolites
- Screening and confirmation processes are similar to hair



NWT