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INTER-AMERICAN DRUG ABUSE
CONTROL COMMISSION
CICAD

Secretariat for Multidimensional Security

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DEA SPECIAL TESTING AND RESEARCH LABORATORY
AND
DEA INTELLIGENCE DIVISION BRIEFING
BY JEFFREY H. COMPARIN



DEA Special Testing and Research Laboratory
and
DEA Intelligence Division Briefing

OAS/CICAD
May 2010

Presenters
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Laboratory Director

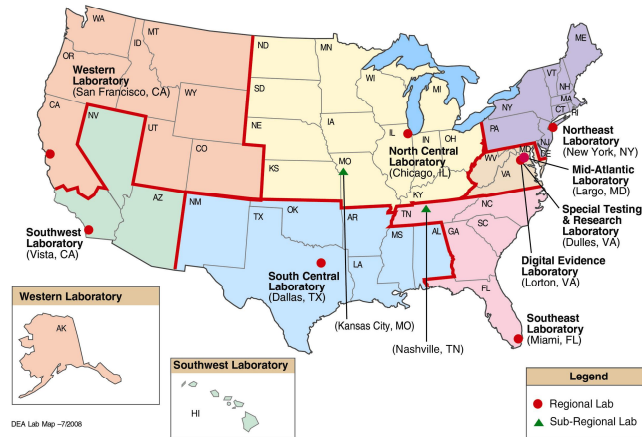
James Kinnison
Unit Chief



Drug Enforcement Administration Laboratory System

DEA Laboratories

U.S. Department of Justice
Drug Enforcement Administration



DEA Regional Laboratories

Provide Enforcement Support

- Evidence Analysis
 - Controlled Substances
 - Latent Prints
 - Digital Evidence
- Court Testimony
- Clandestine Drug Laboratory Seizures
- Trace Drug Evidence Collection



Special Testing and Research Laboratory

- Intelligence Oriented
- Overseas Support
 - Analysis
 - Field Work
- Training
 - Domestic
 - Foreign
- Research/Special Projects
- Publications and Reviews
- Unknowns/New Drugs
- Instrument Evaluations
- Reference Standards Program
- Methods Development



Special Programs

Strategic and Tactical Intelligence Support

- Cocaine Signature
- Heroin Signature
 - Heroin Domestic Monitor
- Methamphetamine Profiling



Cocaine Signature Program

Mission

- Origin Determination by Chemical Analyses

Laboratory's Customers

- DEA's Intelligence Division
- United States Drug Policymakers



Cocaine Signature Program

History

- Initiated in 1997

Authentic Samples

- From cocaine producing regions
 - Leaf
 - Cocaine Processing Laboratory Samples





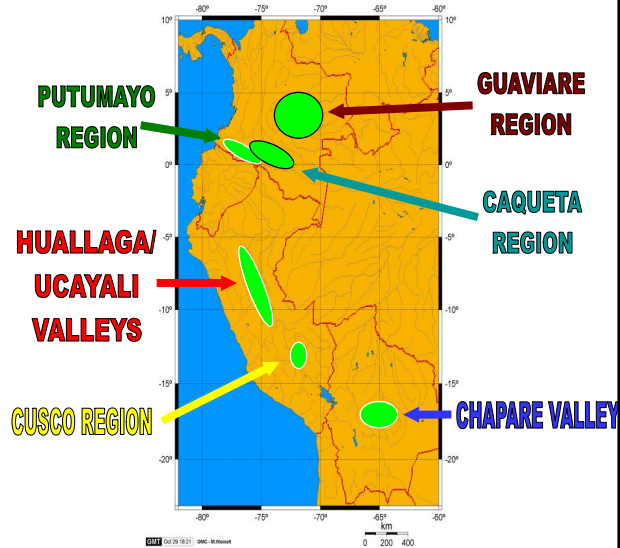
Cocaine Signature Program

Signatures – Origin
of Base

- Colombia
- Peru
- Bolivia

Processing
Methodology
For Base to HCI

- Colombia
- Peru
- Bolivia



Cocaine Signature Program

Sample Origins

- All International Offices
- Port of Entry Seizures
- DEA Field Laboratories
- Miscellaneous





Cocaine Signature Program

Determining the Origin of Cocaine Base

Four Methods Utilized

- CISPA – Multiple trace alkaloids including tropacocaine and trimethoxy alkaloids
Oxidation / Hydrolysis / Diluents / Base Origin
- Cinnamoyls – Cinnamoylcocaine alkaloids
Oxidation / Base Origin
- Trux – Truxilline alkaloids
Base Origin / Leaf Variety
- IRMS – Isotopes of carbon and nitrogen
13C to 12C and 15N to 14N – Leaf Variety



Cocaine Signature Program

Determining the HCl Processing Method

Static Headspace GC/MS

Quantifies Occluded Solvents Trapped in Crystalline Matrix of Powder

Determines

- Solvent used to dissolve cocaine base
- Solvent used for HCl conversion
 - Concentrated HCl or alcoholic HCl



Cocaine Signature Program Reporting Results

U.S. Department of Justice
Drug Enforcement Administration
Special Testing and Research Laboratory



January 2010

Cocaine Signature Program Report

INTRODUCTION

Each year, through the Cocaine Signature Program (CSP) in-depth chemical analyses are performed on approximately 3000 cocaine HCl exhibits obtained from bulk seizures made throughout the United States. The program also examines a smaller number of cocaine exhibits seized from around the world. Additionally, samples of solvents, reagents, and other materials seized from South American illicit cocaine laboratories are examined. Analytical methodologies developed at the Special Testing and Research Laboratory (STRL) give evidence of how and where coca leaf was processed to cocaine base (geographical origin), and how cocaine base was converted into cocaine hydrochloride (processing method). Correlated data from the seizures are reported on a quarterly basis. CSP data is not intended to reflect U.S. market share, but is rather a snapshot of current trends.

"Colombia." However, the major coca-growing regions within Peru and Bolivia are still reported by their respective names. A map of these regions is presented below.



During the fourth quarter of 2009, 708 cocaine and cocaine related exhibits were examined by the CSP. Of these exhibits, 508 were seized domestically, and the remaining 140 were from Argentina, Australia, Colombia, Costa Rica, Ecuador, Greece, Mexico, and Paraguay.

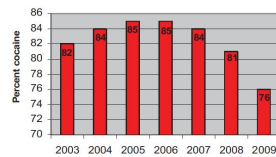
4th QUARTER OF CY 2009 CSP RESULTS

Origin of cocaine – where the coca leaf originated

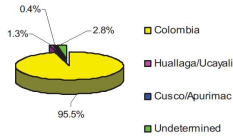
State-of-the-art scientific methods at STRL can determine the geographic origin (country) of the coca leaf used to produce a cocaine exhibit with a confidence level exceeding 95%. There are numerous coca-growing regions within South America. Because coca is now grown throughout Colombia, all Colombian coca-growing regions are now collectively reported as Per Official Use Only

Determination of the geographical and processing origin of illicit cocaine exhibits provides valuable information to the counter-drug intelligence community and U.S. policymakers. Intelligence information derived from the program assists the law enforcement community in determining cocaine distribution

Cocaine HCl brick purity



Origin of cocaine base CY 2009



Heroin Signature Program

Mission

- Origin Determination by Chemical Analyses

Laboratory's Customers

- DEA's Intelligence Division
- United States Drug Policymakers
- Other Nations





Heroin Signature Program



- History
 - Initiated in 1977
- Authentic Samples
 - From heroin producing regions world-wide
 - Backbone is the authentic database



Heroin Signature Program

- Authentic Samples
 - All International Offices
 - Port of Entry Seizures
 - Regional DEA Laboratories
- Domestic Monitor Program
 - Retail Level Heroin Purchases
 - Intelligence Program: 28 Cities



Heroin Signature Program

Classifications

- Southeast Asian
 - SEA/2
 - SEA/4
- Southwest Asian
 - SWA/A
 - SWA/B
 - SWA/C
- South American - SA
- Mexican - MEX



Heroin Signature Program

Regional processes



COLLECTION OF THE
OPIUM GUM/LATEX



EXTRACTION OF
MORPHINE FROM
OPIUM



PRODUCTION OF
HEROIN BASE



PRODUCTION OF HEROIN
HYDROCHLORIDE

*Basis for classification
of samples*

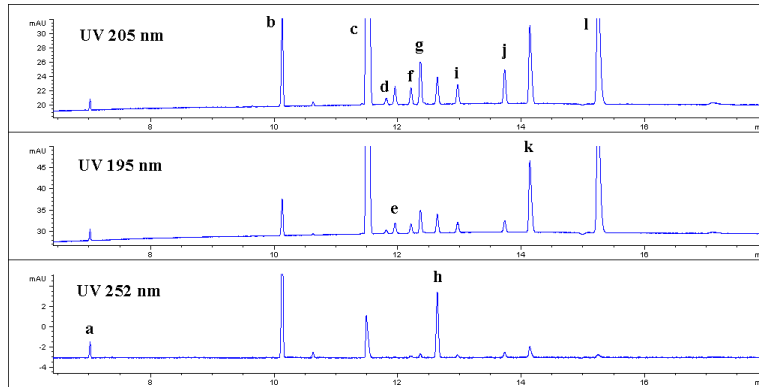




Heroin Signature I: Capillary Electrophoresis

Clandestine extraction of morphine from opium - never complete or consistent

Opium alkaloids and by-products remain in the final heroin product



(a) thiamine (b) quinine (c) heroin (d) O6-monoacetylmorphine (e) O3-monoacetylmorphine (f) morphine
 (g) acetylcodeine (h) papaverine (i) codeine (j) noscapine (k) procaine (l) diphenhydramine



Heroin Signature II: Quantitation Results

44 – 48 acidic and neutral impurities

SIG II GCQ Quantitation Report

Sample Name: 2-83835 Sample Type: Unknown Sample ID: 1 Comment: H. WJUNO
 Acquisition Date: 08/16/2004 3:40:31 PM Operator: Polaris Q Data Path: D:\Xcalibur\0816081304
 Run Time (min): 56.72 Scans: 2441 Low Mass (m/z): 43 High Mass (m/z): 575
 Vial: 1 Sample Vol: 0. Sample Wt: 54.4 ISD: 1.0 Dil: 1.0 Dil Factor: 0.33719
 Inlet Method: D:\Xcalibur\methods\SIG1_U\DEARMS45398.meth Proc Method: D:\Xcalibur\methods\cal-081304-GCQ3

Compound Name	Actual RT	% Relative to Morphine	Area Response
S194	10.81	2.81E-04	48317
Meth-Mocaine	11.28	N/A	3184313
CS-Methoxy-4-Acetylphenanthrene	15.68	N/A	348773
S252	15.79	8.38E-06	1535
S254	18.50	3.22E-06	1238
S256	20.19	9.71E-05	22331
S1_389	22.09	3.56E-02	886740
S1_425	28.36	1.17E-05	148
S2_389	28.28	3.94E-04	35625
S3_389	29.00	8.96E-05	18783
S1_427	30.02	2.22E-04	17424
95-1_359	30.32	N/A	667170
S1_359	30.45	2.28E-03	173372
99-TANM	30.82	N/A	2327
S1_397	31.07	2.88E-05	67884
UNC381	32.28	6.82E-04	22189
UNC2_423	32.35	7.96E-05	6140
S255	33.12	8.72E-05	16114
NPAL	34.35	N/A	424733
S1_413	35.79	8.68E-05	124343
S1_469	38.31	8.02E-06	7201
85_217	37.18	2.88E-05	8472
UNC260	37.30	2.92E-05	269
S1_487	37.91	8.77E-05	21841
S2_487	38.63	7.12E-05	26513
S_81	39.62	5.28E-05	4978
S3_455	39.97	2.84E-04	58763
S1_399	41.12	1.95E-05	1525
S1_463	41.21	2.25E-05	7192
S_81	41.37	8.46E-04	42042
S1_457	41.37	4.18E-06	659
S2_487	41.88	1.38E-05	2469
SX_515	42.14	3.48E-05	369
UNC2_423	42.19	4.42E-05	6811
S3_427	44.12	8.32E-05	3881
S1_441	43.83	2.38E-04	51689
S1_469	44.22	1.71E-05	863
NPAL	45.08	N/A	306568
84_455	48.89	3.71E-05	3513
S1_455	47.84	1.22E-04	15088
S1_810	50.18	1.03E-04	10288
SZ_455	50.87	1.24E-04	12379





Heroin Occluded Solvent Analysis: GC/MS

Heroin Base to Heroin HCl Conversion

Organic Solvents Become Trapped in the Crystalline Matrix



Heroin Signature Program Reporting

From Lab

From Intelligence Division

Profile Data
For Intelligence Purposes Only

Case Number: XXXXXX/XXXXX Exhibit Number: X
Lab Number: XXXXX Date Collected: 10/12/05

Net Weight Received (grams): 1.0
Reserve Weight (grams): 0.78

Signature 1 Classification	SA1	Authentic Classification:	S
Signature 2 Classification	SA3	Appearance	Beige
Solvent Classification	SA		
Final Classification	SA		

Substance	% Priority	Alkaloid Ratio
Heroin HCl	71.6	OIMAM/Total Morphine 0.014
Ox-Monoerythrophenyl as HCl	1.0	OIMAM/OIMAM 0.000
Ox-Monoerythrophenyl as HCl	..	OIMAM/Total Oxidative 0.296
Morphine as HCl	..	Total Codeine/Total Morphine 0.029
Acetylcodeine as HCl	1.9	Papaverine/Total Codeine 1.283
Papaverine as HCl	2.1	Papaverine/Total Morphine 0.037
Codeine as HCl	..	Noscapine/Total Morphine 0.062
Noscapine as Base	0.1	Noscapine/Total Codeine 0.086
		Papaverine/Noscapine 15.000

Other Substances Detected

Source: _____

Form 02/2004

Key: OIA: Unknown
NA: Not Analyzed
D: Insufficient Sample
N/C: Not Quantified

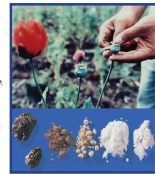
Case No: _____



Heroin Signature Program: 2007

Overview

Each year several hundred heroin samples are analyzed through the Drug Enforcement Administration's (DEA) Heroin Signature Program (HSP) to identify the geographic area - South America, Mexico, Southwest Asia, or Southeast Asia - in which they were manufactured. In 2007, heroin from South America (SA) accounted for 70 percent (by weight) of the heroin analyzed through the HSP. Heroin from Mexico (ME) and Southwest Asia (SWA) accounted for 25 and 5 percent, respectively. Only one Southeast Asian (SEA) heroin exhibit was submitted to the program in 2007. Since its inception, the HSP has proven to be a valuable indicator of changes in the supply of heroin and provides insight into the clandestine level of heroin trafficking to the United States.



Background

The HSP is an essential component of the Intelligence Division's ability to identify trends in heroin trafficking and distribution in the United States. The objective of the program is to identify and quantify the chemical constituents of heroin seized at U.S. ports of entry (POE), as well as randomly chosen samples and special requests for analysis.¹ Samples submitted to the HSP undergo in-depth chemical analysis at DEA's Special Testing and Research Laboratory. Once analyzed, the heroin samples are classified by the process by which they were manufactured, which, in turn, enables the association of the samples to specific geographic source regions.

Signature analysis is the only scientifically based source of information currently available on the origin of heroin encountered in the U.S. drug market. HSP chemical analysis data, combined with investigative and intelligence reporting, allows for the identification of possible changes in the geographic source and purity of heroin found in the United States, as well as changes in trafficking routes and methods. The program continually undergoes quality assurance by obtaining and analyzing authentic samples obtained from the primary heroin production regions.

2007 Heroin Signature Program Results

In 2007, heroin from SA accounted for 70 percent (by weight) of the heroin analyzed through the HSP. Heroin from ME and SWA accounted for 25 and 5 percent, respectively. Only one SEA

¹ The HSP provides a snapshot of wholesale heroin trafficking in the United States. In contrast to the HSP, DEA's Heroin Control Program (HCP) is a sampling program designed to identify the purity, price, and source of origin of heroin available.

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Methamphetamine Profiling Program

Mission

- Determine Synthetic Routes
- Monitor Precursor Chemicals
- Monitor Reagents and Solvents
- Track Manufacturing Trends

Synthetic vs. Natural Product



Methamphetamine Profiling Program

History

1997 – Started Developing Procedures

Late 1998 – Began Running Samples

- Data Collection

2000 – Inaugural Report

2003 – Formalized Program





Methamphetamine Profiling Program

Laboratory's Customers

DEA's Special Agents

DEA's Intelligence Division

United States Drug Policymakers



Methamphetamine Profiling Program

Authentic Samples/Sample Origins

- DEA Field Laboratories
- International DEA Offices
- State and Local Police
- Clandestine Laboratories

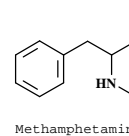
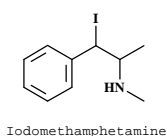
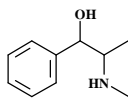




Methamphetamine Profiling Program

Analytical Methods

- NMR – Qualitative and quantitative analyses
- Capillary Electrophoresis – Isomer determination
- GC/MS – Organic impurity determination
- LC/Fluorescence – Trace naphthalene compounds
- FTIR – Qualitative analysis
- ICPMS – Trace metals analysis



Methamphetamine Profiling Program

Reporting Results

- Average Purity
 - Regional
 - National
- Isomer Determination
- Synthetic Routes
- Adulterants/Diluents
- Trends
- Special Features

U.S. Department of Justice
Drug Enforcement Administration
Special Testing and Research Laboratory
www.dea.gov

January 2010

Methamphetamine Profiling Program

Executive Summary for the Fourth Quarter of CY 2009

The information presented in this report is derived from samples analyzed as part of the Methamphetamine Profiling Program (MPP) during the 4th quarter of CY 2009 (10/1-12/31/09), and is not representative of all methamphetamine samples submitted to the DEA Laboratory System. Detailed information is contained in the body of this report. All prior MPP reports may be accessed at: http://www.dea.gov/pressroom/pressroom/pressroom_mpp.html

Methamphetamine Hydrochloride Purity (% by weight) Information

- Overall average purity for 4Q-2009 was 83.5% (245 samples), a 6.5% increase from the previous quarter.
- Overall average purity for samples obtained from small seizures (6 g to 100 g) was 74.5% (101 samples). This category attempts to represent the range of seizure amounts from small level (6 g) to amounts approaching distribution levels (100 g).
- Overall average purity for samples obtained from medium-sized seizures (101 g to 999 g) was 83.3% (88 samples). This represents the average purity for distribution level methamphetamines with a seizure weight ranging from approximately 1/4 pound up to 2.2 pounds (1000 g).
- Overall average purity for samples obtained from large seizures (1000 g) was 85.4% (74 samples). This represents the average purity for wholesale methamphetamine with a seizure weight greater than 2.2 pounds.
- The Mexico Region purity levels remain extremely high, with an overall average purity of 97.8% (see the featured Topic Section for recent Post-of-Origin (POE) trends representing the Mexico Region).
- POE samples represented 23% of the samples analyzed (27 total), all coming from the United States-Mexico border.
- The highly refined "CE" form of methamphetamine, legally defined as greater than or equal to 80% of methamphetamine hydrochloride, represented 34% of the samples submitted for analysis. This is a 2% decrease from the previous quarter.

Isomer Determination Information

- 53% of the samples analyzed were the more potent dextro (d) isomer of methamphetamine.
- 2% of the samples analyzed were the less potent levo (l) isomer of methamphetamine.
- 45% of the samples contained an unequal mixture of d- with l- or l- with d- isomers. Many of these samples were produced using phenylacetone (P2P) followed by an isomer enrichment step.
- 5% of the samples analyzed were the less potent racemic (r) isomer of methamphetamine. This is similar to the previous quarter.

Cutting Agents and Precursor Mixtures

- 53% of the submissions contained demethylpseudoephedrine (DMS), with an average DMS purity of 29.2%.
- 49% of all samples contained antihistamines, or by-products of antihistamines, that are used as co-precursors in ephedrine or pseudoephedrine-containing pharmaceuticals (indicating that these products were used as a source of precursor).

Synthetic Methamphetamine Production Routes

- The reductive amination production method, starting from P2P, was identified for 37% of the samples. The majority of MPP samples are now linked to the P2P method.
- The phosphorus-iodine method was identified in only 20% of the samples, with 88% of these samples containing antihistamine impurities that track back to labeled precursors.
- Samples placed in the mixed synthetic route category, a combination of methamphetamine produced by the P2P method and a phosphorus-iodine method, accounted for 23% of the submissions.
- The synthetic route was not declared for 13% of the samples due to the lack of sufficient amounts of key impurities necessary to assign a synthetic method used for production.
- There was one small seizure from Missouri that was produced using the Birch method.
- There were two samples seized in Taiwan and Seipan that were metal hydrogeneration samples. This is a common method used in Southeast Asia.

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Strategic Intelligence Value of Signature/Profiling Programs

DEA Signature and Profiling Programs:

- Heroin Signature Program (HSP)
- Cocaine Signature Program (CSP)
- Methamphetamine Profiling Program (MPP)

These programs are of intelligence value since they identify:

- Changes in the source of origin of seized cocaine and heroin
- Trafficking routes and methods for various drug types
- The use of new processing methods and/or precursor chemicals
- Changes in drug purity
- The presence of adulterants and diluents



Thank You for Your Attention

Jeffrey H. Comparin
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