DRUG ENFORCEMENT ADMINISTRATION

CY 2023

Annual Heroin Report

OFFICE OF FORENSIC SCIENCES

Special Testing and Research Laboratory

UNCLASSIFIED PRB-2024-34

This report was prepared by the DEA Special Testing and Research Laboratory (SFL1) of the Office of Forensic Sciences. Requests for copies and feedback are welcome and may be directed to SFL1Administration@dea.gov.

SUMMARY

The United States Drug Enforcement Administration (DEA) Office of Forensic Sciences laboratory system is comprised of eight regional laboratories distributed across the United States. Heroin seizures ranging in weight from residue to multiple kilograms are routinely analyzed in these laboratories. The analytical protocol typically requires the identification of heroin, other controlled substances, and non-controlled adulterants. Diluents are not identified in the regional laboratories. In addition, a quantitative analysis of heroin is conducted on most purchased exhibits. The information on the following pages summarizes the results of heroin seizures analyzed in the regional laboratories; all seized in CY 2023. Trends for the last five years are also reported.

A select number of heroin samples are submitted by the regional laboratories, under a specific sampling plan, to Special Testing and Research Laboratory's Heroin Signature Program (HSP). HSP samples are analyzed for purity, adulteration and dilution, and classified to a geographic regional origin – thus, HSP provides additional scientific data and intelligence information on illicit heroin. Findings from HSP also provide a snapshot of current heroin trafficking trends; it may not reflect the domestic or global illicit heroin supply in its entirety, nor is it representative of total federal heroin seizures.

The second part of this report summarizes the collective results of HSP analysis performed on samples seized or purchased in the United States (U.S.) in CY 2023. HSP analyzed 350 samples from CY 2023 seizures or purchases, representing 415 kg seized heroin. This is approximately 44% of heroin analyzed in the regional laboratories (by weight). Results from exemplars of overseas heroin seizures from CY 2023 are also reported. There were no Domestic Monitor Program (DMP) submissions in CY 2023; therefore, this report's DMP section is absent for the first time.

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Figure 1: Powder Heroin Brick

Figure 2: Tar Heroin Brick

Note: Results presented in this report are subject to change as they only account for the information available at the time of extraction from DEA laboratory databases. Databases were queried on 07/25/2024. Heroin exhibits are defined as exhibits in which heroin was identified as the primary drug or one of the top three reported drugs.

KEY FINDINGS – LABORATORY SYSTEM

- Regional laboratories analyzed approximately **2614 exhibits from CY 2023**, representing **947 kg** of seized heroin. In comparison, 3569 exhibits were analyzed from 2022 with 1319 kg seized heroin. While some CY 2023 case exhibits are still pending analysis, the data continue to indicate a downward trend in heroin in the U.S.
- Heroin exhibits ranged in forms from powder and rock-like substances to tar (gum/resin) to capsules, tablets, and liquids. Powder and rock-like forms represented approximately 61% of the exhibits. There were 872 tar/gum/resin exhibits (33%). Sixty-three exhibits were heroin tablet cases with or without fentanyl(s).
- Approximately 75% of the exhibits in the regional laboratories were obtained as DEA evidence. Evidence from other federal agencies, such as the FBI, DHS, ATF, etc., was also analyzed in 2023.
- The average purity of **powder heroin** samples analyzed by regional laboratories was **26%** for CY 2023. The average purity of **tar heroin** samples was **36%**. (Note: Only a limited set, approximately 15% of heroin exbibits in the laboratory system, was analyzed for purity).

KEY FINDINGS – HEROIN SIGNATURE PROGRAM

- **Mexico was identified as the primary source of heroin** analyzed through the HSP. Approximately 80% of HSP submissions by weight originated from Mexico.
- As in the past years, only two types of heroin were detected prominently in the HSP in 2023 – Mexican Black Tar (MEX/T) and Mexican White (MEX-SA; Mexican origin with South American processing). **The average purity was 43% for MEX/T heroin and 66% for MEX-SA heroin.**
- Heroin from South America (SA) and Southwest Asia (SWA) was minimally identified.
- There were no Southeast Asian (SEA) heroin samples submitted to the program in 2023.
- The percentage of tar heroin samples with fentanyl was 8% in 2023. This is a slight decrease from 11% in 2022.
- Samples with classifications such as INC-SA (Inconclusive origin with SA processing), IS (Insufficient), NA (Not Analyzed), and UNK (Unknown origin) were found to be 18% by weight. Fentanyl was prominent in most of these samples, not heroin.

Figure 3: Poppy Field in Mexico

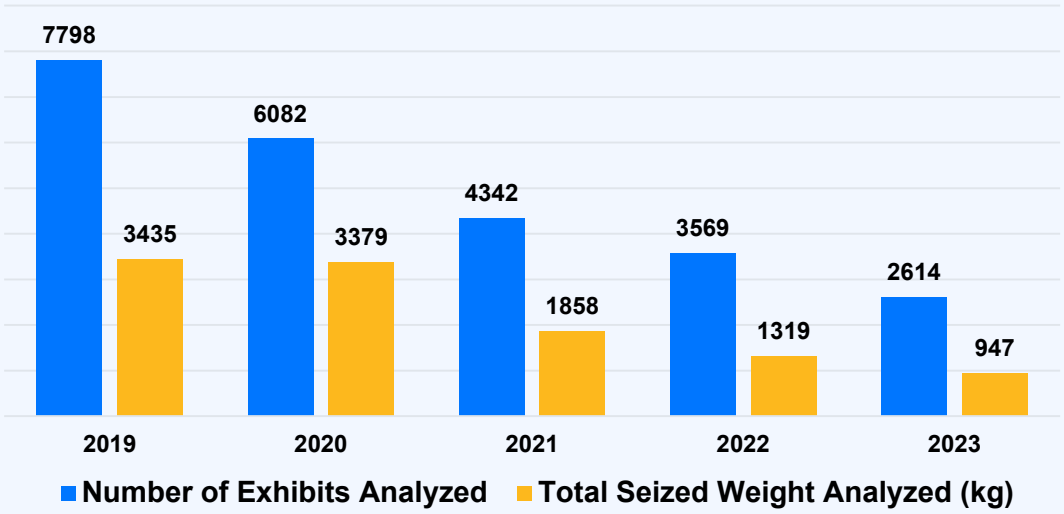
DOMESTIC SUBMISSIONS

LAB SYSTEM

LABORATORY SYSTEM - RESULTS AND TRENDS

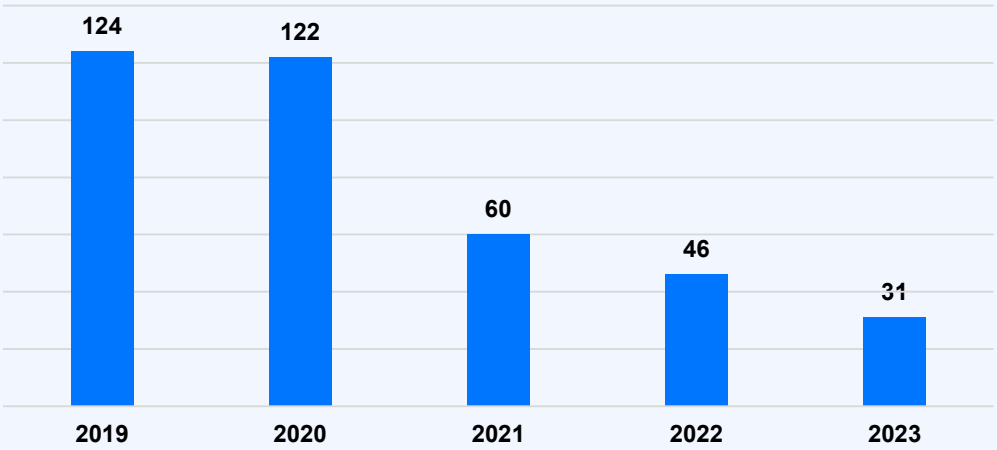
In CY 2023, 2614 heroin exhibits representing 947 kg of heroin were analyzed by the regional laboratories. The number of heroin exhibits analyzed over the years by the regional laboratories is shown below. A significant decline has observed in the number of heroin exhibits analyzed in the DEA laboratories.

Figure 4: **Number of Heroin Exhibits - Laboratory System**



The chart below shows heroin cases with seized weight of 5 kg and more from the last five years, with a similar decline in the same time frame.

Figure 5: **Number of Heroin Exhibits with a Seized Weight of 5 kg and More**



The decline in heroin seizures may have resulted from the reduction in poppy cultivation and heroin production in Mexico. However, seized heroin data from other federal and state agencies has not been reviewed for the report, and therefore, it is difficult to corroborate the decrease in overall heroin trafficking. The lack of Port of Entry (POE) submissions and pending heroin analysis at the DEA regional laboratories can be cited as additional reasons for the decrease in the number of exhibits and multi-kg heroin seizures.

DOMESTIC SUBMISSIONS

LAB SYSTEM

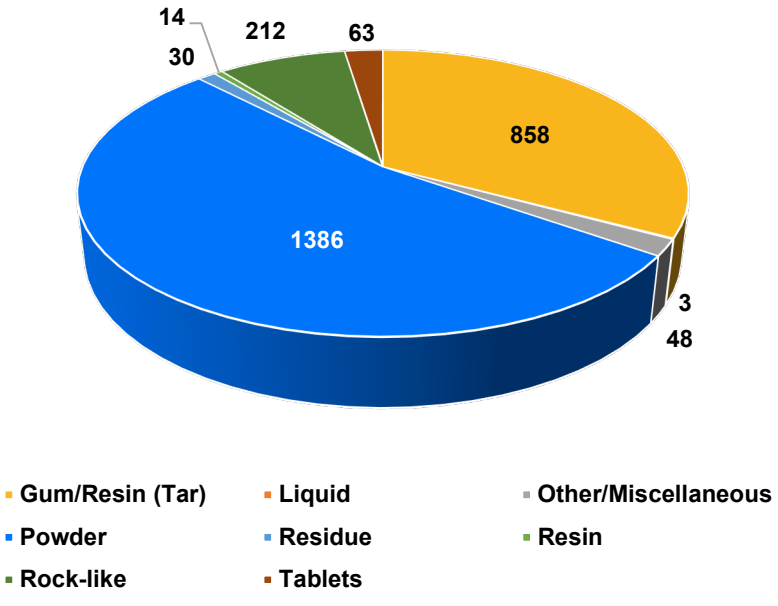
The seized weights of heroin from the laboratory system were reviewed in different categories. Approximately 85% of 2023 exhibits were found in the range from residue to 500 grams. The majority of these exhibits contained fentanyl and typical heroin adulterants. As observed in the past years, the percentage of samples cut (with fentanyl and other adulterants) was low for wholesale trafficked heroin with a kg and more. See the table below with summarized information for each weight category.

SEIZED WEIGHT RANGE (G)	NUMBER OF SAMPLES	SAMPLES CUT (%)	NUMBER OF TIMES FENTANYL(S) IDENTIFIED
0 - 3	673	72	529
3 - 50	1007	62	733
51-500	531	53	307
501-1000	150	47	48
1001-5000	222	33	76
5001 and more	31	26	7

Heroin continues to be distributed in various forms in the U.S. Gummy tar heroin is still the prevalent type to the west of the Mississippi River. In contrast, the East Coast heroin markets continue to be dominated by powder samples. Some Mid-West markets show both powder and tar heroin types. Heroin tablets are seized sporadically – these typically contain fentanyl too.

The chart below shows the different forms, such as tar, powder, liquid, and tablets, for CY 2023.

Figure 6: Different Forms of Heroin



DOMESTIC SUBMISSIONS

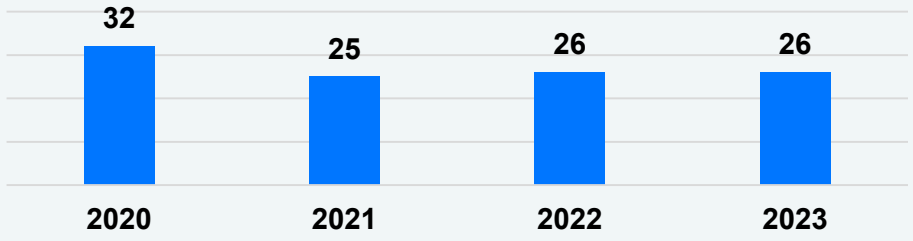
LAB SYSTEM

As the processing recipes and trafficking patterns are vastly different for different types of heroin, the laboratory system samples are separated into sections of tar, powder, tablet, and liquid to discuss the purity and cutting information.

PURITY AND ADULTERANTS – POWDER SAMPLES

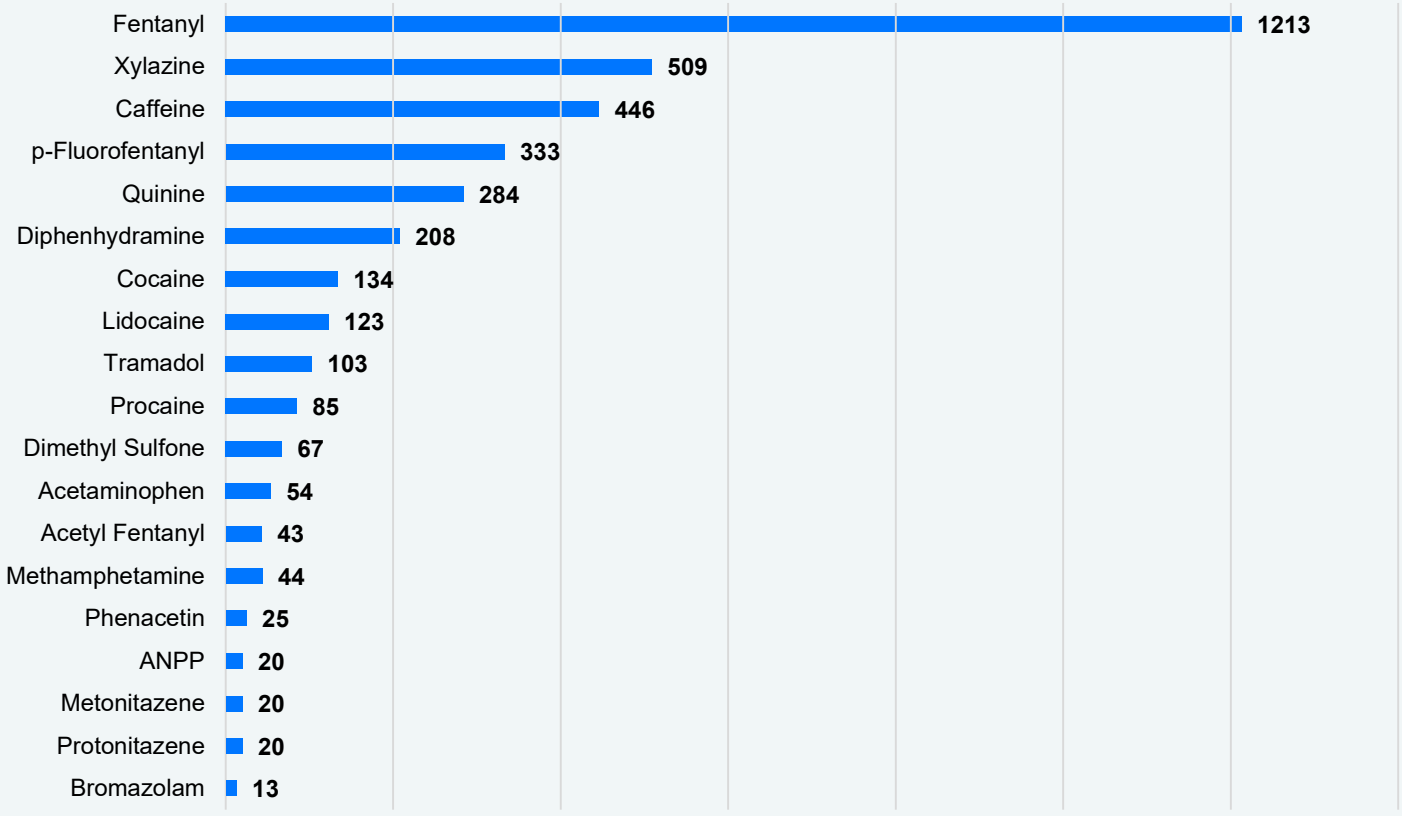
Results from 1598 powder and rock-like samples were reviewed for purity and adulterant information. Approximately 15% of these samples were analyzed for heroin purity; most of these were purchased exhibits. The average heroin purity was observed to be 26%, with a wide range of 1% to 96%. The average purities of powder heroin exhibits for the last four years are charted below. (Note: Heroin purity is reported as hydrochloride in this report).

Figure 7: Average Heroin Purities in Powder Exhibits



Approximately 1305 powder samples (82%) were found to be adulterated. Fentanyl was prominent in powders – it was identified 1213 times. Xylazine was identified 509 times and p-fluorofentanyl 333 times. The most prominent adulterants for powder heroin samples in CY 2023 are charted below.

Figure 8: Prominent Adulterants in Powder/Rock-like Exhibits



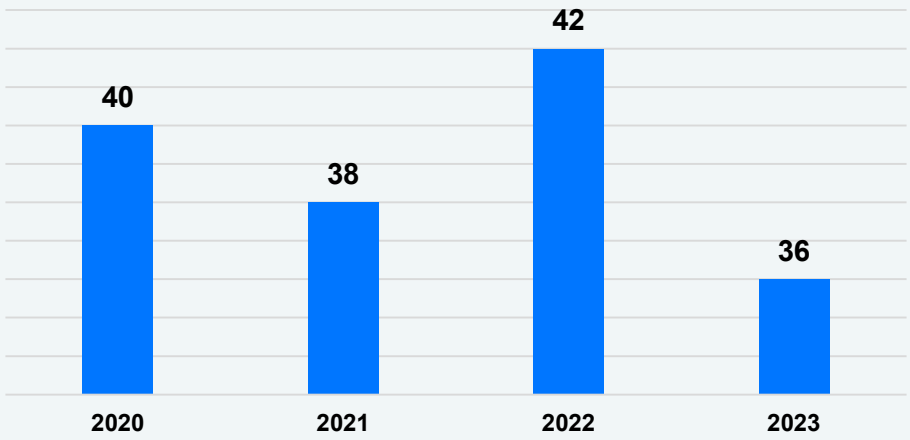
DOMESTIC SUBMISSIONS

LAB SYSTEM

PURITY AND ADULTERANTS – TAR SAMPLES

The laboratory system shows 872 samples as tar or gum/resin type. Approximately 10% of tar exhibits were analyzed for heroin purity—the purity range was 4% to 70%, with an average value of 36%. National tar heroin purity was, thus, 10% higher than that of powder samples in CY 2023.

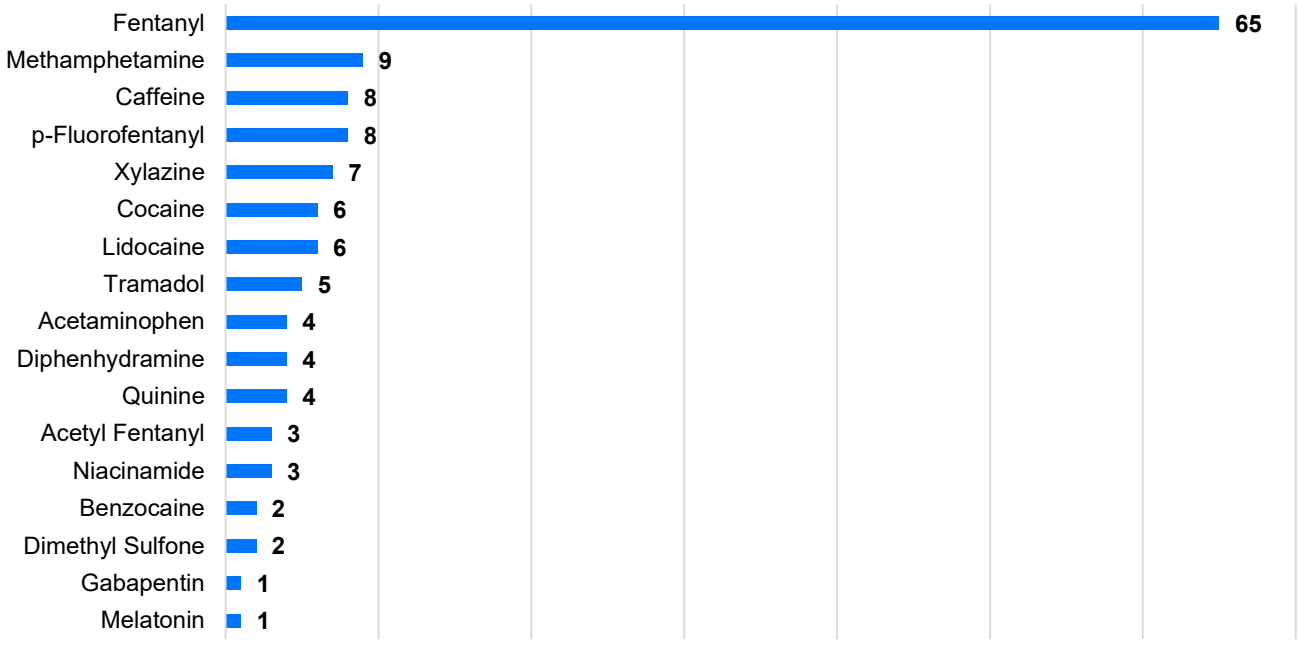
Figure 9: Average Heroin Purities in Tar Exhibits



As in the past years, tar exhibits are predominantly uncut compared to powder exhibits. Only 14% of the tar exhibits were found to be adulterated in 2023. Fentanyl was identified in 65 samples (about 7% of tar samples).

Prominently identified adulterants in tar exhibits are charted below.

Figure 10: Prominent Adulterants in Tar Exhibits



DOMESTIC SUBMISSIONS

LAB SYSTEM

PURITY AND ADULTERANTS – TABLETS AND LIQUIDS

At the time of reporting, 63 heroin tablet cases were analyzed by the regional laboratories - 51 exhibits contained both heroin and fentanyl. Purity information is not available for heroin and fentanyl. In addition to fentanyl and p-fluorofentanyl, typical adulterants like acetaminophen, caffeine, cocaine, methamphetamine, diphenhydramine, xylazine, quetiapine, etc., were identified in these tablets.

Three exhibits as liquids (of suspected fentanyl) were also analyzed in 2023; heroin and fentanyl were found in two exhibits. The Anchorage, AK, exhibit contained heroin, fentanyl, and methamphetamine (no purity information available). A second exhibit, from Los Angeles, CA, had heroin, fentanyl, and caffeine (no purity information available). The third exhibit, seized in Flagstaff, AZ, was analyzed under the HSP; the details are provided on page 19.

Figure 11: 200 Liters of Liquid with Trace Heroin Seized in Flagstaff, AZ

DOMESTIC SUBMISSIONS

HSP

HEROIN SIGNATURE PROGRAM

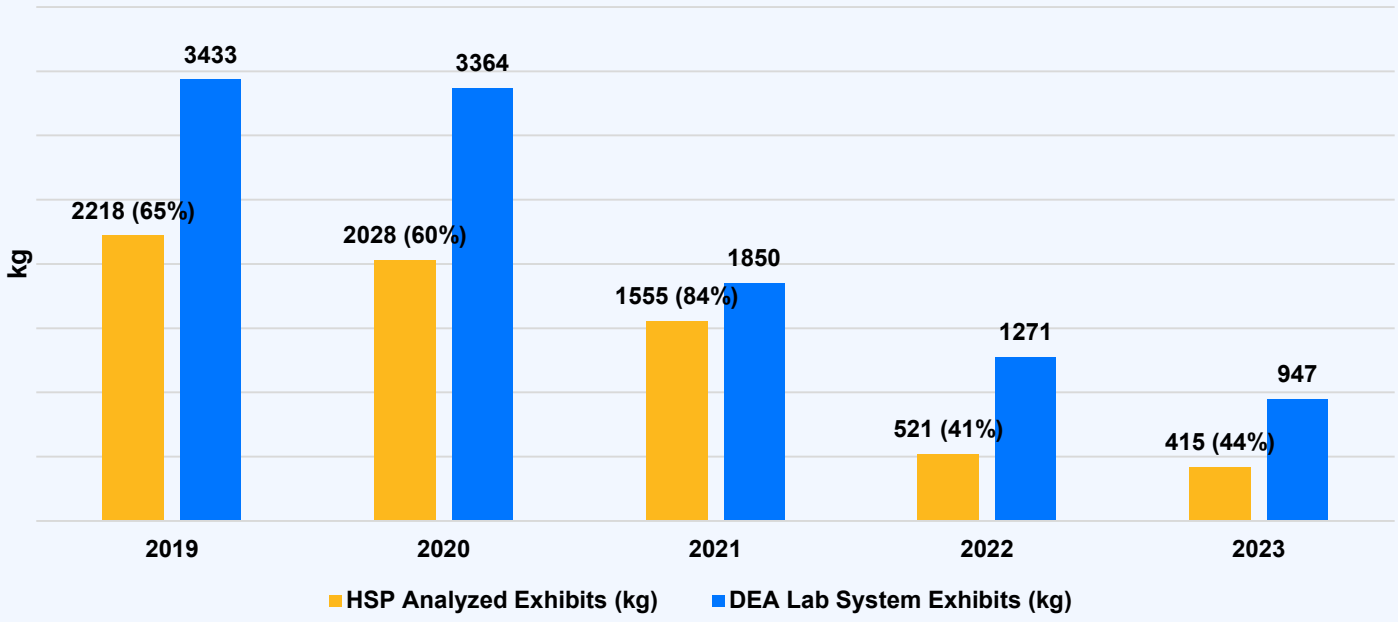
The 350 heroin samples analyzed in HSP represent 415 kg of heroin, all seized or purchased in CY 2023 in the U.S. The current sampling plan requires the regional laboratories to submit a specific number of exemplars monthly, from randomly selected heroin cases.

(Note: Heroin information presented in this report is subject to change as it only accounts for the data available at the time of extraction (07/25/2024) from DEA laboratory databases. Details on the HSP sampling plan, signature analyses, origin classifications, and a wave chart of U.S. heroin source regions identified by the HSP are found in the Background Information).

The 2023 submissions included 172 tar, 165 powder, 12 tablet, and one liquid heroin samples. As in CY 2022, the submissions from seizures at the POE stations, specifically at the Southwest Border, remain low for CY 2023 too. Only 16 POE seizures were received in 2023. Of these, 15 seizures occurred at the SWB; the remaining sample originated from a Los Angeles International Airport seizure.

The 2023 HSP samples represented a significant portion of heroin analyzed in the regional laboratories, at 44% by weight, as shown below.

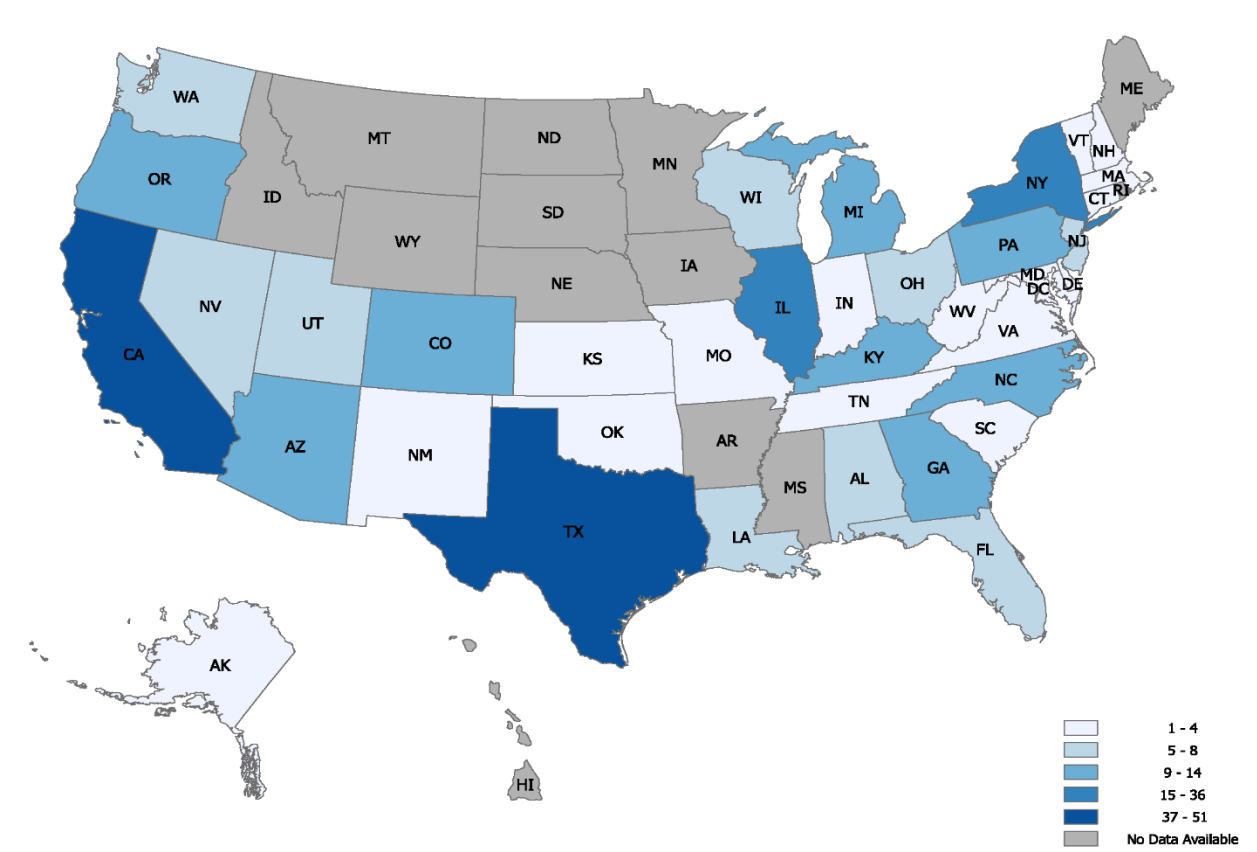
Figure 12: Analyzed in HSP vs. Laboratory System



DOMESTIC RESULTS AND TRENDS - HSP

The 2023 HSP submissions were plotted to 38 states and Washington, D.C. See the map on the next page. California, Texas, and New York were the most represented states, with 51, 47, and 36 samples, respectively. There were no submissions from northern states like Idaho, Montana, Wyoming, North Dakota, South Dakota, Nebraska, Minnesota, Iowa, Indiana, and Maine. In the south, Arkansas and Mississippi were not represented in the sampling for CY 2023.

Figure 13: **HSP Submissions – CY 2023**



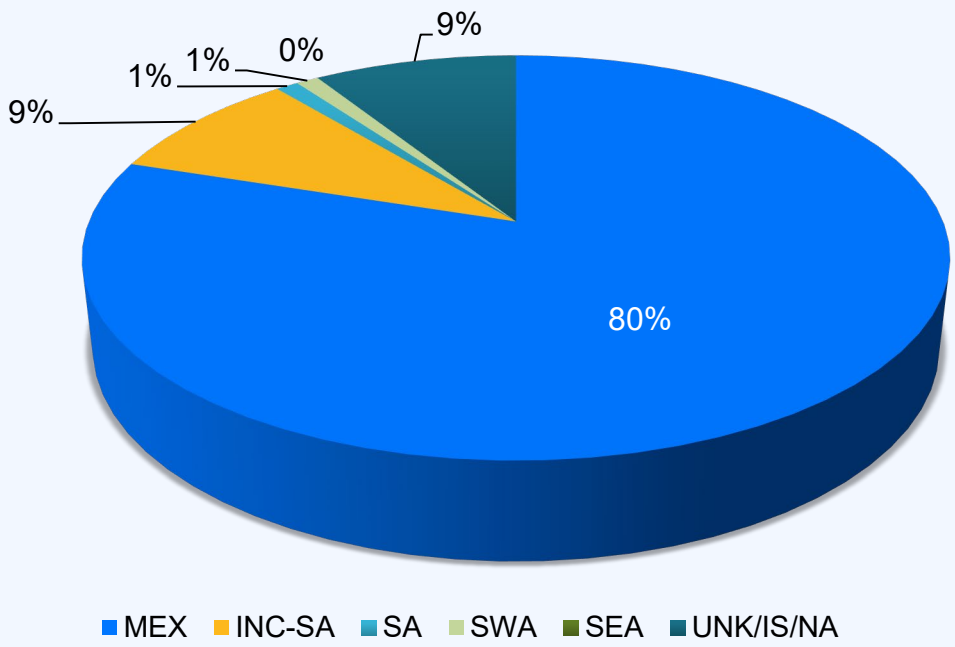
SOURCE CLASSIFICATION

Based on the 350 samples analyzed, 80% of the total weight was classified as having a Mexican (MEX) origin. The transition of the U.S. heroin market with multiple source regions (as in SA, SWA, MEX, and SEA) to a single source, Mexico, was first observed in the HSP in 2014. Mexico has remained the primary source of U.S. heroin since then. The trend continued in CY 2023 despite the reportedly reduced poppy cultivation and heroin production in Mexico.

Heroin from South America and Southwest Asia constituted a minor portion of heroin analyzed, at 1% each by weight. Samples classified as INC-SA, IS, NA, and UNK amounted to 18% by weight. SEA heroin types, as in the past years, were not detected.

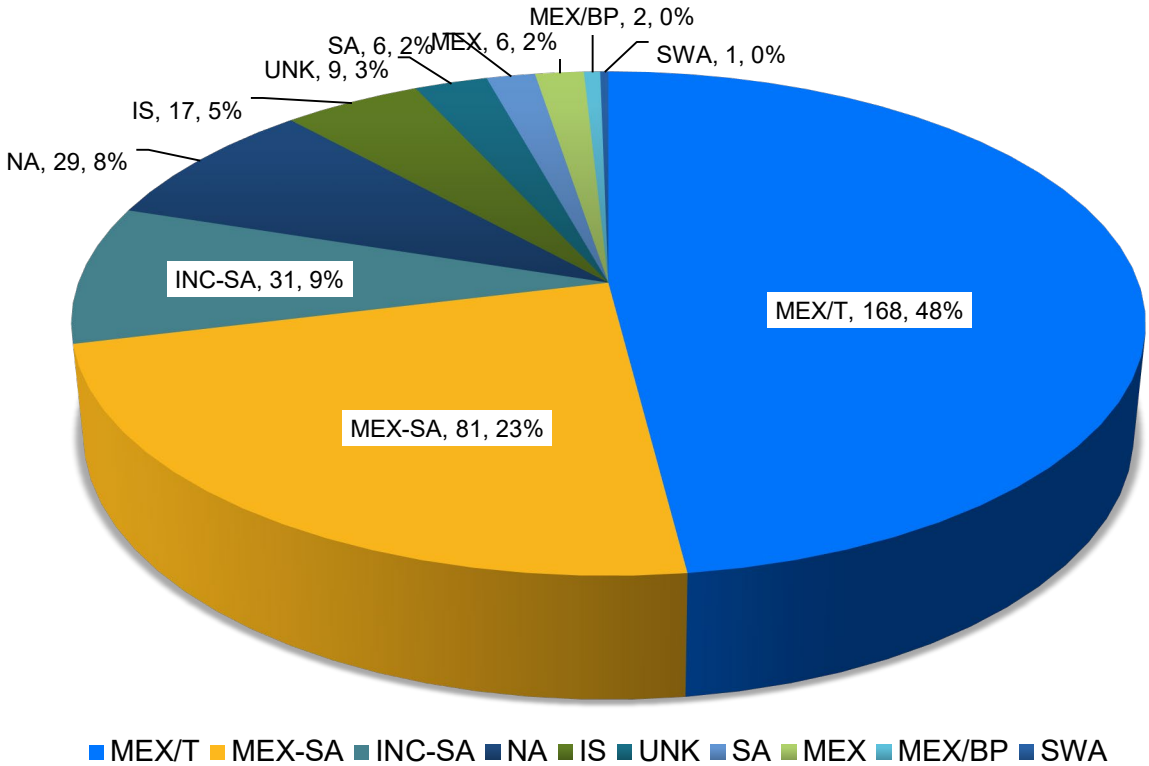
See the chart on the next page for CY 2023 source regions by weight.

Figure 14: CY 2023 HSP- Based on the Weight of Samples



Mexico remains the primary source of heroin (at 73%) when the number of samples was tabulated instead of weight, as demonstrated below, with 168 MEX/T, 81 MEX-SA, 6 MEX, and 2 MEX/BP samples.

Figure 15: CY 2023 HSP- Based on the Number of Samples

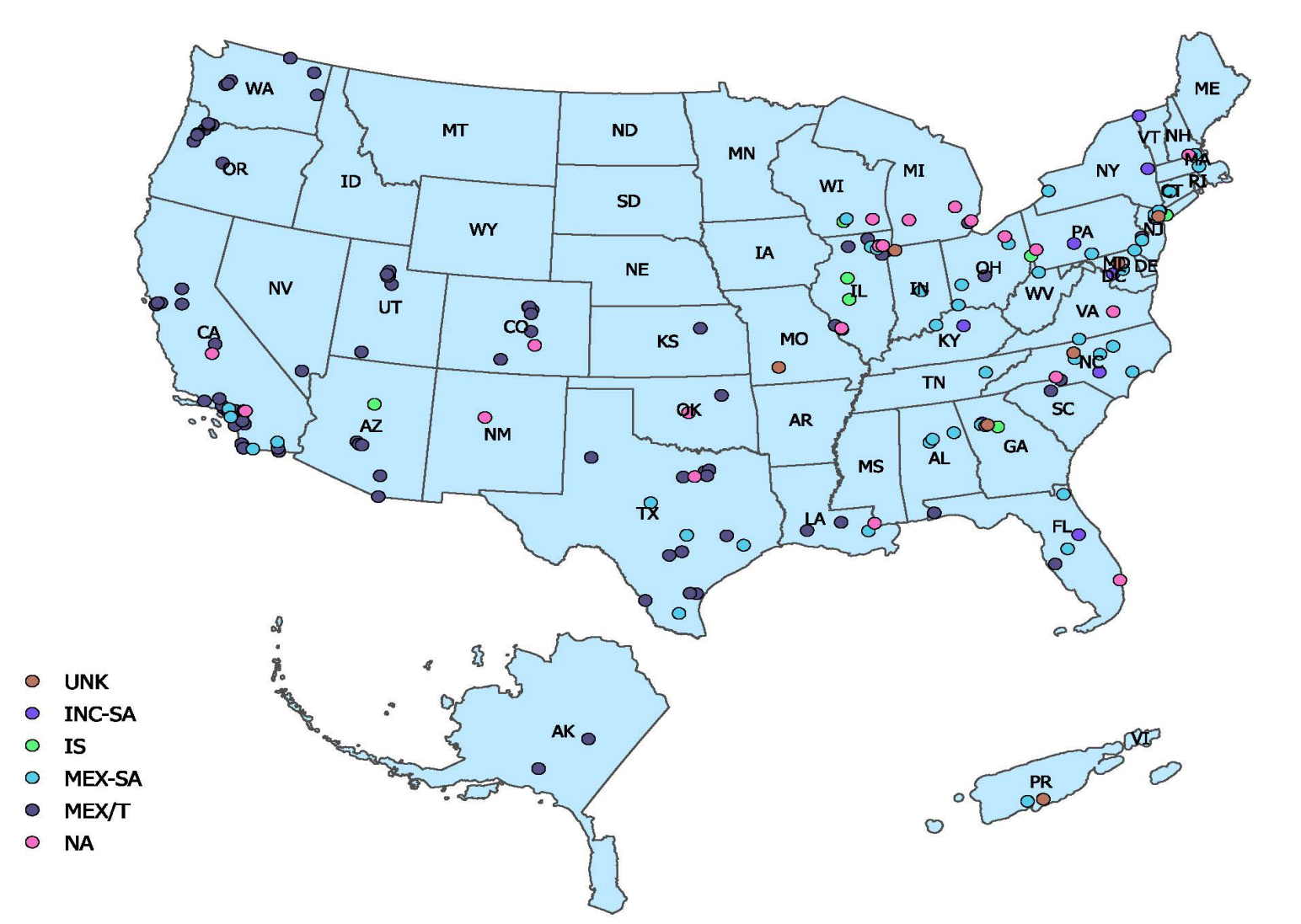


DOMESTIC SUBMISSIONS

HSP

Major HSP classifications are mapped below for CY 2023.

Figure 16: MEX/T, MEX-SA, INC-SA, NA, UNK, and IS Classifications in CY 2023



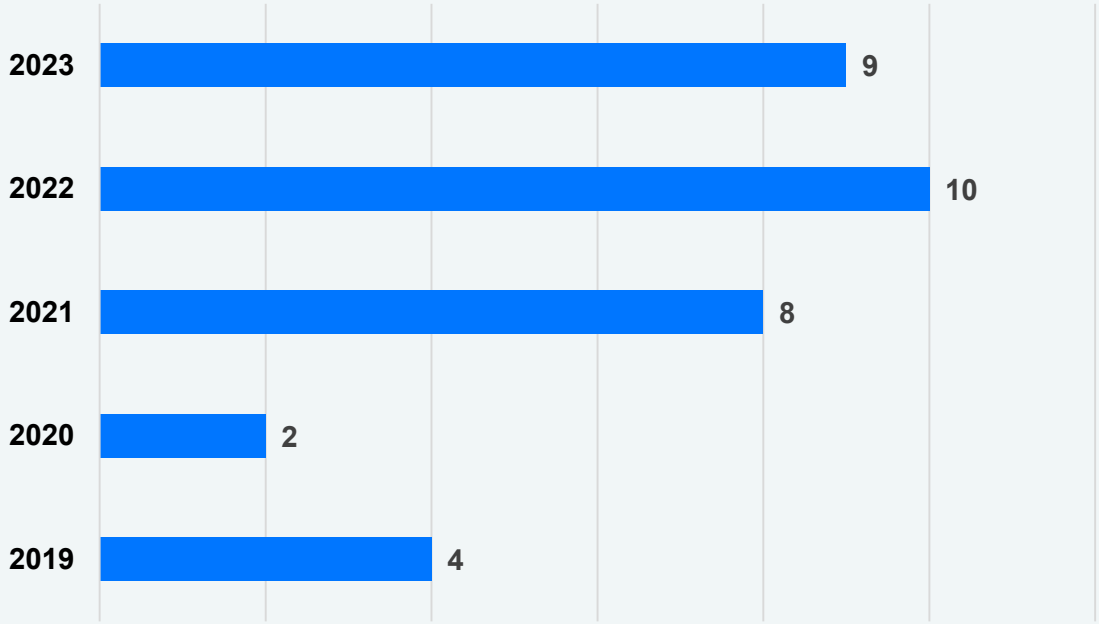
As in CY 2022, HSP did not receive enough POE samples in CY 2023 to gather pertinent information on purity and cutting patterns of heroin trafficked at the SWB. Only 16 samples were identified as POEs; 14 of these were classified as MEX/T with an average heroin purity of 45%. Twelve MEX/T samples were seized at the POEs in Texas and California (6 samples each), while the remaining two were from Arizona. One MEX-SA heroin sample was received from Tecate, CA; it contained 89% pure heroin with no cutting agents. In comparison, the 6 kg seizure of SWA/A (Southwest Asian, type A) heroin at the Los Angeles International Airport had a purity of 23%. It was cut with dextromethorphan and caffeine.

DOMESTIC SUBMISSIONS

HSP

The null classifications, such as the UNK, IS, and NA, amounted to 9% by total weight, as fentanyl was prominent in most of these samples. Sufficient heroin was not present in these samples to geo-source it properly. The trend in this category for the last five years is shown below.

Figure 17: IS, NA, and UNK Classifications (% by Weight)

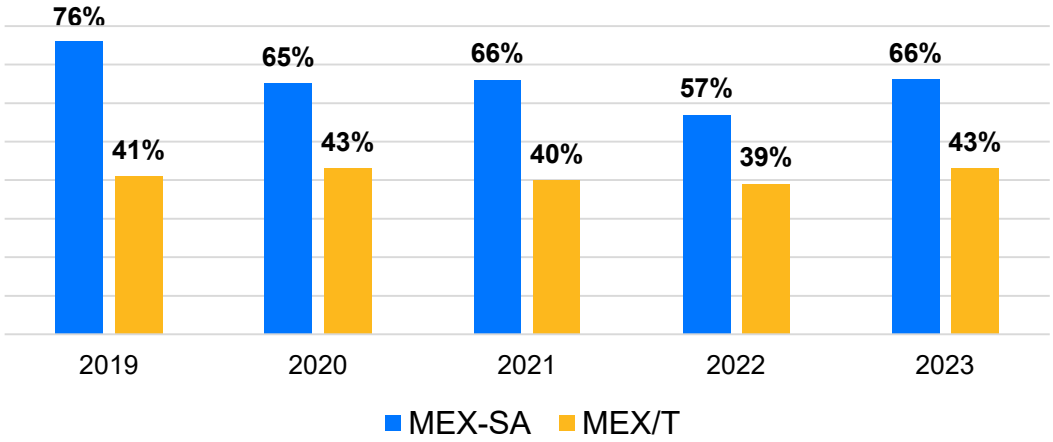


(Note: Fentanyl was not the reason for the 4% in 2019. A few significant heroin seizures (5 kg and more) were not geo-sourced because of sample matrix issues or method limitations).

PURITY AND ADULTERANTS/DILUENTS

As stated before, only two types of heroin were prominently detected in 2023 samples – MEX-SA and MEX/T. The average purities of these types of heroin from domestic submissions are charted below.

Figure 18: Heroin Purity Trends - Domestic



DOMESTIC SUBMISSIONS

HSP

The heroin purity data for CY 2023 is summarized below for all classifications. Despite the overwhelming presence of fentanyl and other opioids in the U.S. powder heroin market, CY 2023 data showed several seizures of highly refined, high-purity powder heroin. There were 49 MEX-SA samples with 70% or more heroin. Five INC-SA, three SA, and one UNK-classified samples also contained 70% or more heroin.

TYPE	NUMBER OF SAMPLES	AMOUNT SEIZED (KG)	HEROIN PURITY RANGE (AS HCL) %	AVERAGE HEROIN PURITY (AS HCL) %
MEX/T	168	209	3-73	43
MEX-SA	81	117	7-97	66
INC-SA	31	37	5-92	31
NA	29	10	Trace-5	2
IS	17	10	Trace-5	2
UNK	9	18	2-92	25
SA	6	4	32-93	65
MEX	6	1	5-42	12
MEX/BP	2	4	6-8	7
SWA	1	6	Not available	23
TOTAL	**350**	**415**		

The 350 HSP samples varied in seized amounts, from 3 grams to 26,500 grams. The table below shows the seized weights in varying ranges, with the number of samples and average heroin purities. In addition, the table includes the percentage of samples cut with adulterants and diluents in each weight range. The last column shows the number of times fentanyl and related substances were identified.

(Note: The average purities in the table below are around 50% for seizures even with a kilogram and more because they include all types of heroin like low-purity black tar/brown powder samples and samples with IS, NA, UNK, and INC-SA classifications. The black tar heroin samples also diminish the percentage of samples that are adulterated/diluted as they do not typically contain cuts).

SEIZED WEIGHT RANGE (G)	NUMBER OF SAMPLES	AVERAGE HEROIN PURITY (%)	SAMPLES CUT (%)	NUMBER OF TIMES FENTANYL(S) IDENTIFIED
3-50	68	32	43	36
51-500	128	33	45	75
501-1000	55	50	25	13
1001-5000	81	54	27	24
5000 and more	18	51	28	3

As the processing recipes and trafficking patterns are vastly different for different types of heroin such as tar, powder, tablet, and liquid, the samples are separated into these categories to discuss the purity and cutting information.

DOMESTIC SUBMISSIONS

HSP

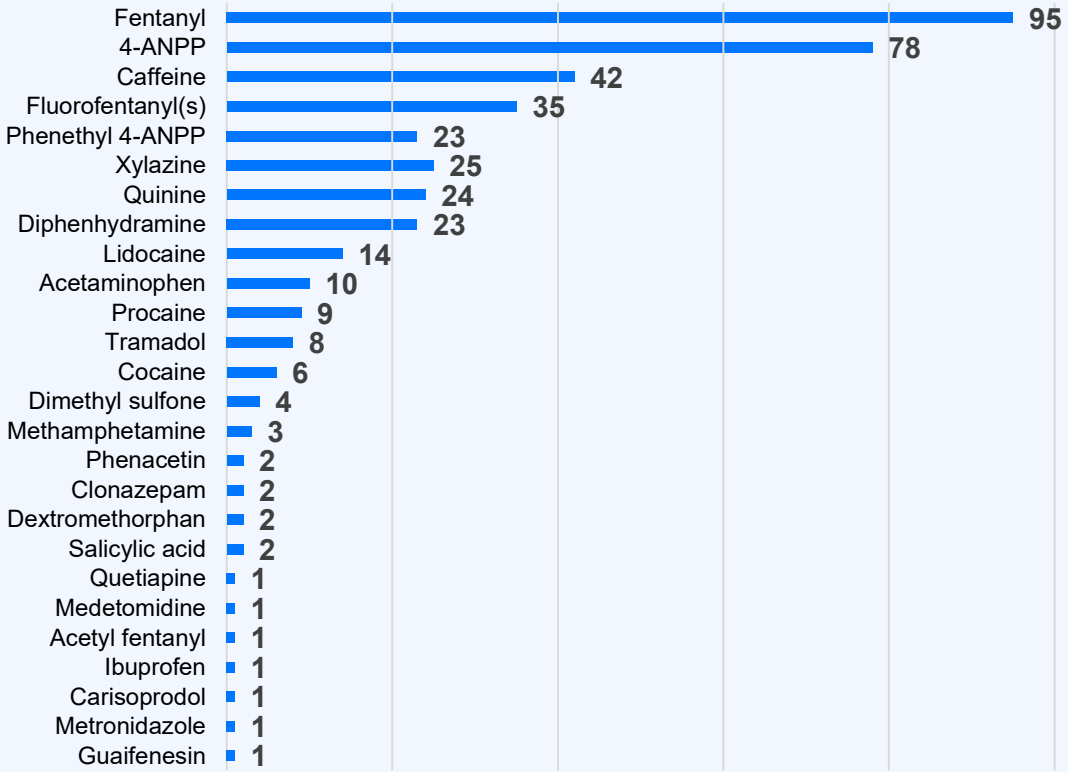
POWDER SAMPLES (HSP)

Approximately 47% of CY 2023 HSP submissions (165 samples) were in powder form that ranged in appearance from white, off-white, tan, beige, light brown, dark brown, light gray, dark gray, blue, black, pink, green, and purple, to speckled with varying textures as a fine powder, granular or even a chunky material. The seized weights of powder samples ranged from 6 grams to 17,300 grams. Heroin purity was also observed in a wide range – from trace to 97%. Fifty-eight samples showed high purity; these contained 70% or more heroin. Approximately 62% of powder samples were adulterated and/or diluted.

Eighty-one samples were classified as highly refined MEX-SA, with heroin purity ranging from 7% to 97%, with an average purity of 66%. Approximately 41% of MEX-SA samples were adulterated and/or diluted. There were 31 powder samples with INC-SA classification; the average heroin purity was 31%, with a range between 5% and 92%. Only two samples were classified as crudely manufactured brown powder from Mexico (MEX/BP). An additional six samples were classified with a simple MEX call. These samples were extremely adulterated and diluted (average heroin purity was 12%); SFL1 was not able to sub-classify these samples as MEX-SA or MEX/BP because of the low heroin purity. SA heroin was infrequently detected, with just six samples. As stated before, there was only one SWA-classified powder heroin sample in CY 2023, with 23% purity.

As in the past years, the presence of fentanyl was significant in powder samples. Samples with INC-SA, IS, NA, and UNK classifications showed substantial amounts of fentanyl(s) and typical heroin adulterants, with or without heroin. The most prominent adulterants in powder heroin samples are listed below. (Note: Fentanyl manufacturing by-products 4-ANPP and phenethyl 4-ANPP are also listed below to provide as much intelligence information as possible).

Figure 19: Adulterants in Powder HSP Samples

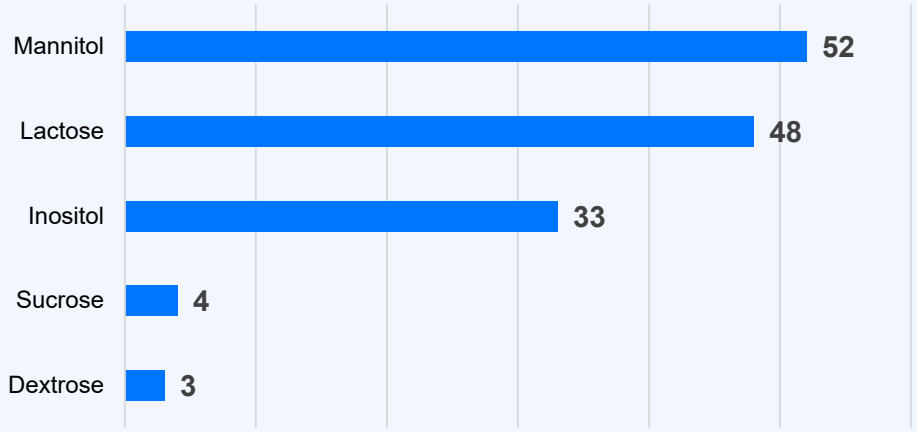


DOMESTIC SUBMISSIONS

HSP

The following diluents were also identified in powder samples.

Figure 20: Diluents in Powder HSP Samples

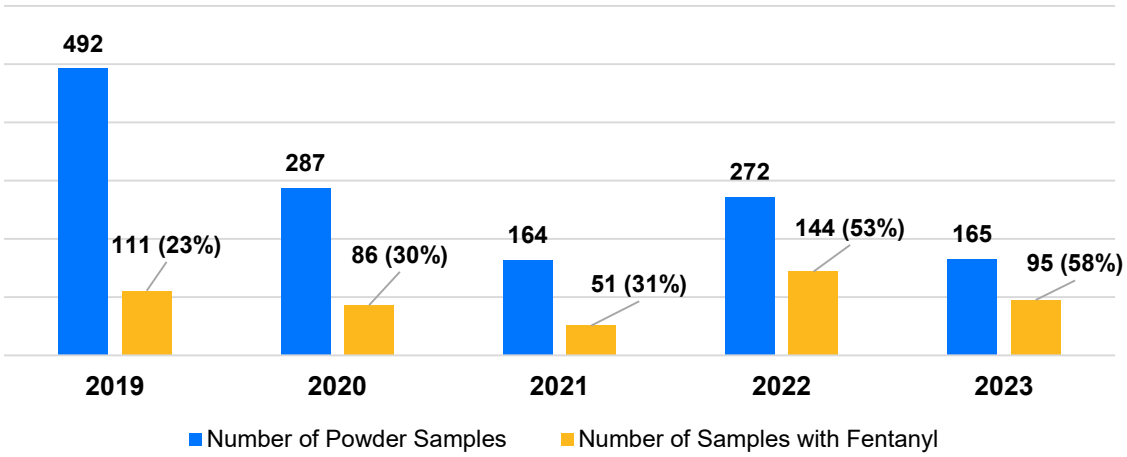


FENTANYL TRENDS OVER THE YEARS FOR POWDER SAMPLES (HSP)

As stated earlier, approximately 62% of powder samples (103 of 165 powders) were adulterated and/or diluted. Fentanyl was detected 95 times in these samples with a purity range from trace to 46%, with an average purity of 8%. There were additional 28 fluorofentanyl, seven despropionyl fluorofentanyl, and one acetyl fentanyl identifications. Several samples contained fentanyl and fluorofentanyl compounds together. Among the adulterated set, only seven samples did not contain any fentanyl(s) – this demonstrates how heroin cutting in the U.S. continues to be dominated by fentanyl. However, it is worth noting that there were 62 uncut powder heroin samples in CY 2023. Approximately 80% of these samples contained 70% heroin and more.

The trend of fentanyl in powder HSP samples over the last five years is shown below.

Figure 21: Fentanyl Trends: Powder HSP Samples



DOMESTIC SUBMISSIONS

HSP

Fentanyl purity, on average, increased from 5% in CY 2022 to 8% in 2023, in powder HSP samples. The upper range for fentanyl purity has expanded significantly over the last two years to 35% in 2022 and to 46% in 2023. The purity trends for the last five years are shown below.

YEAR	AVERAGE PURITY FOR FENTANYL (%)	PURITY RANGE FOR FENTANYL
2019	3	Trace - 10%
2020	3	Trace - 18%
2021	4	Trace - 18%
2022	5	Trace - 35%
2023	8	Trace - 46%

The table below shows the details of ten HSP powder samples with 10% and more fentanyl.

Appearance	Origin	Seized Location	Heroin as HCl	Adulterant 1	Adulterant 1 %
Tan powder	INC-SA	Troy, New York	20.1	Fentanyl as HCl	46.4
Gray powder	NA	Atlanta, Georgia	3.6	Fentanyl HCl	35.4
Tan chunky material	INC-SA	Bronx (New York), New York	25	Fentanyl as HCl	34.2
Beige powder	INC-SA	Yonkers, New York	25.7	Fentanyl HCl	33.7
Light gray powder	IS	Bronx (New York), New York	4.6	Fentanyl as HCl	28.5
Tan powder	NA	Chicago, Illinois	1.6	Fentanyl as HCl	26.5
Tan chunky material	SA	Chicago, Illinois	44.4	Fentanyl as HCl	15.1
Dark brown chunky material	MEX-SA	Rialto, California	83.1	Fentanyl as HCl	14.6
Purple powder	IS	Hempstead, New York	1.8	Fentanyl as HCl	13.7
Brown powder	NA	New York, New York	3.1	Fentanyl HCl	12.9

TAR SAMPLES (HSP)

There were 172 HSP black or brown tar submissions in 2023, of which 168 samples were classified as MEX/T. The heroin purity for MEX/T had a wide range, from 3% to 73%, with an average value of 43%. The remaining few tar samples were classified as IS or NA. As in the past years, tar heroin trafficking and distribution seemed vastly different from the trends of powder heroin, without significant adulteration with fentanyl and/or other compounds. Compared to the 38% of uncut powder samples, the vast majority, approximately 91% of tar samples, were uncut. Tar seizures ranged in weight from 3 grams to 26,500 grams. Fifty-eight tar seizures (34%) had a seized amount of a kilogram or more.

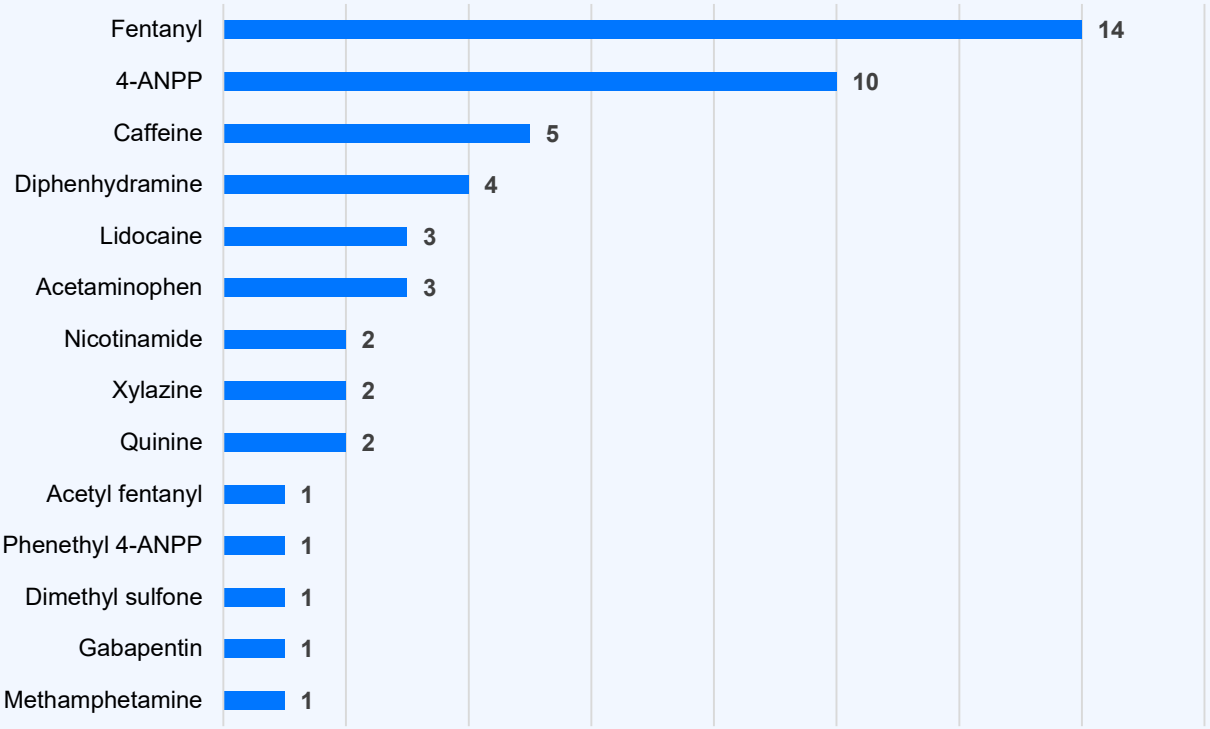
Of the 172 tar submissions, 14 samples contained fentanyl (8%); fentanyl purity in the tar samples ranged from trace to 15%. In comparison, approximately 11% of tar samples in 2022 contained fentanyl.

Fentanyl and related substances, other adulterants, and diluents in tar samples are charted on the next page.

DOMESTIC SUBMISSIONS

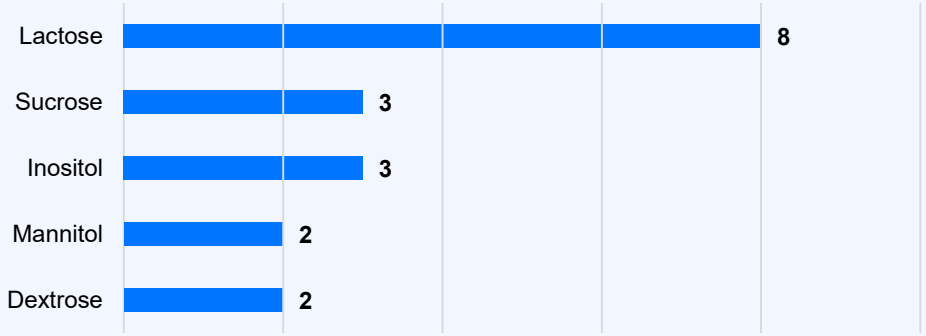
HSP

Figure 22: Adulterants and Fentanyl-Related Substances in Tar HSP Samples



The following diluents were identified in tar samples:

Figure 23: Diluents in Tar HSP Samples



TABLET SAMPLES (HSP)

Of the 12 tablet seizures analyzed by HSP, the origin of heroin was determined for only three samples. Sufficient heroin was not present in the rest of the tablets. Two samples were classified INC-SA, and one was classified MEX-SA. These tablets contained significantly high amounts of heroin - 16 mg, 24 mg, and 27 mg per tablet - respectively. The rest of the samples were either IS or NA.

DOMESTIC SUBMISSIONS

HSP

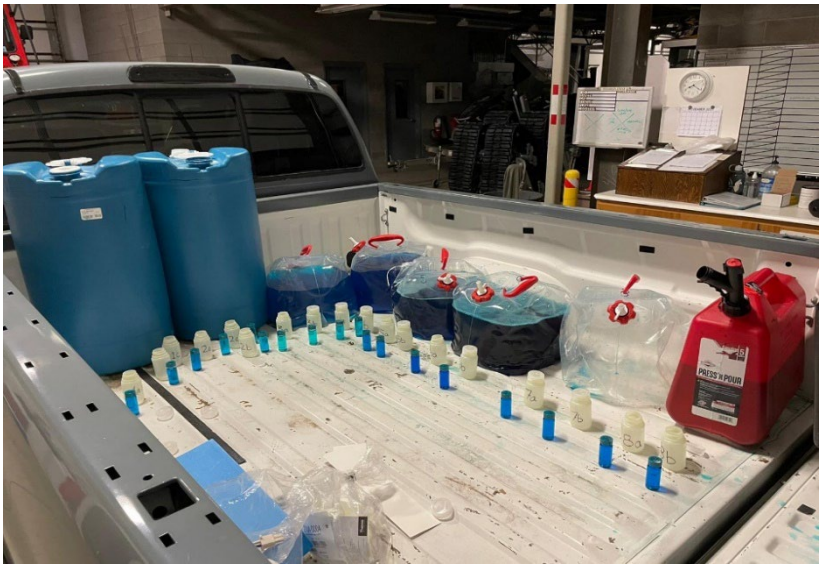
Results from the analysis of tablets are summarized below.

SEIZED PLACE	HEROIN MG/TABLET	ORIGIN	ADULTERANTS AND DILUENTS
Weirton, West Virginia	Trace	IS	None
Weirton, West Virginia	Trace	IS	None
Oxford, Georgia	Trace	IS	Fentanyl (trace), 4-ANPP, acetaminophen, caffeine, phenacetin
Oxford, Georgia	4	IS	Acetaminophen
Charlotte, North Carolina	2	NA	Fentanyl (2%), 4-ANPP, xylazine, dimethyl sulfone
Gainesville, FL	16	INC-SA	Fentanyl, fluorofentanyl, 4-ANPP, xylazine, lidocaine, caffeine, levamisole
Akron, Ohio	27	MEX-SA	Lactose, inositol
Gainesville, FL	24	INC-SA	None
Garfield Heights, Ohio	Trace	NA	Fentanyl (trace), 4-ANPP, caffeine, acetaminophen, diphenhydramine, mannitol
Aliquippa, Pennsylvania	Trace	NA	None
Pueblo, Colorado	No heroin	NA	Fentanyl (2%), 4-ANPP, phenethyl-4-ANPP, acetaminophen, mannitol
Oklahoma City, Oklahoma	No heroin	NA	Fentanyl (trace), methamphetamine, lactose

LIQUID SAMPLE (HSP)

HSP analyzed one liquid sample (aqueous), an exemplar received from Flagstaff, AZ, of suspected liquid fentanyl. Fentanyl was not identified in the liquid. Instead, it contained trace heroin, and an unusual compound, namely, carbonic acid, 4-isopropylphenyl methyl ester. Heroin is susceptible to breakdown to morphine and O6-monacetylmorphine when exposed to moisture. This compound, most likely, protected heroin from breaking down in the liquid.

Figure 24: Blue Liquid Containing Trace Heroin

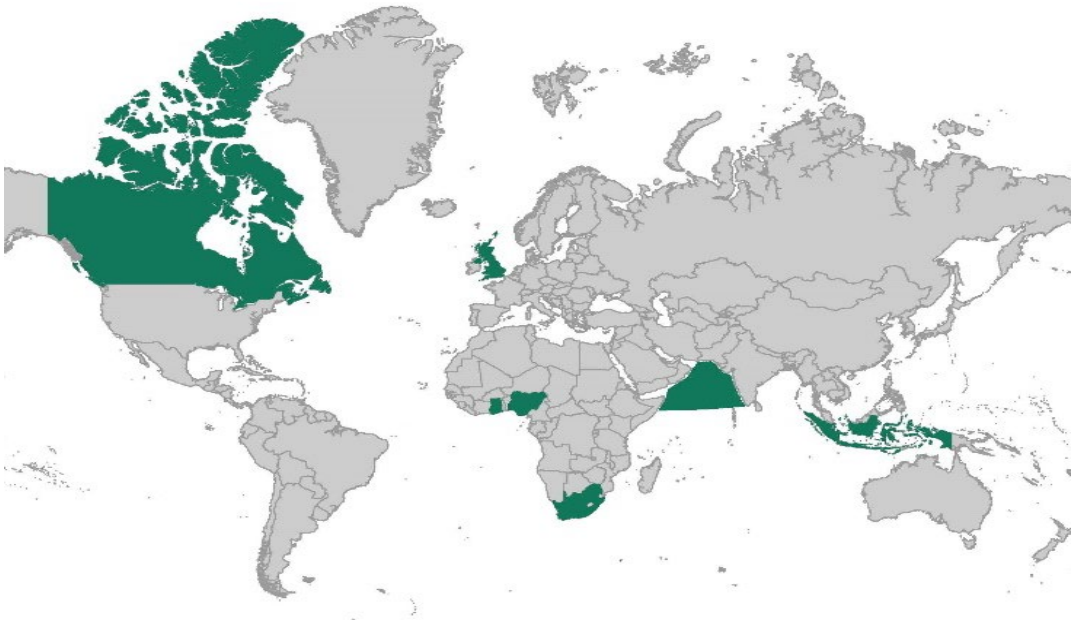


FORIEGN SUBMISSIONS

FOR

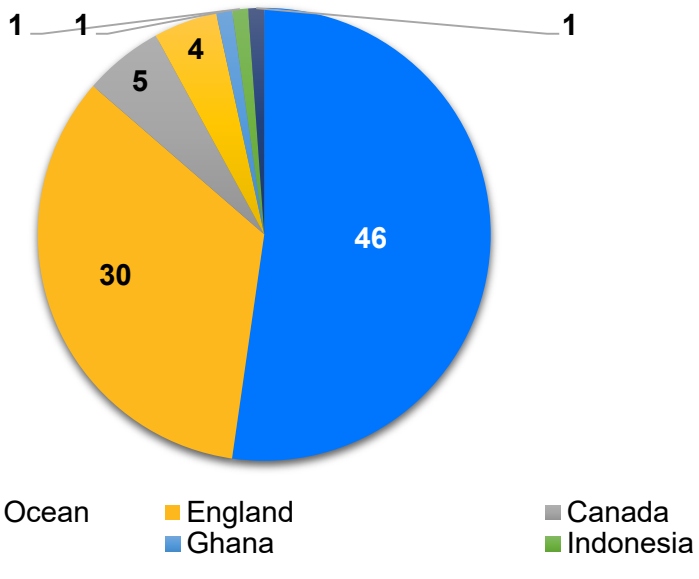
The submissions of suspected heroin exemplars by DEA foreign divisions continue to provide valuable insight into worldwide heroin production and trafficking. HSP analyzed 88 foreign submissions – all seized in CY 2023. See the map below for seizure locations.

Figure 25: Foreign Seizure Locations CY 2023



As shown in the chart below, the vast majority of submissions were from DEA Bahrain office, from suspected heroin trafficked in the Indian Ocean using fishing vessels off the Makran Coast in Pakistan. The London office submitted 30 samples seized by the law enforcement agencies in England. Five samples were submitted from Canada, and four were submitted from Nigeria. Ghana, South Africa, and Indonesia submitted one sample each.

Figure 26: Foreign Submissions CY 2023



FORIEGN SUBMISSIONS

FOR

Since there were no submissions from Central and South American DEA offices, the Foreign Results and Trends section below predominantly discusses the SWA heroin trafficking than SA, MEX-SA, and MEX/T information.

FOREIGN RESULTS AND TRENDS

Indian Ocean Heroin Trafficking - DEA Bahrain Office/ Regional Narcotics Interagency Fusion Cell (RNIFC)

HSP has analyzed hundreds of samples from RNIFC (formerly CMF, the Combined Maritime Forces) since 2012, and the results have led to publications like the Compendium of Drug Seizures at Sea by the United Nations Office on Drugs and Crime. HSP received 46 samples from RNIFC from its 2023 seizures, of which 24 samples were classified as SWA/A with an average purity of 37%, as heroin hydrochloride. The vast majority of these samples were not hydrochloride, though – they were heroin base as crudely manufactured SWA/A heroin historically has been. (Note: To maintain consistency for heroin purity throughout this report, it was reported here as hydrochloride). Classic SWA adulterants like diazepam, caffeine, acetaminophen, and dextromethorphan were identified in these samples.

Ten samples were classified as SWA/C, with an average purity of 46%. Caffeine and dextromethorphan were the primary adulterants for this type of heroin. The remaining 12 samples were classified as NA as they did not contain enough heroin to conduct signature analysis. The average heroin purity was 2%. Ten of these samples contained noscapine (an opium alkaloid that is usually discarded as processing waste) at 5% to 50% level. Heroin traffickers across the globe, including SWA heroin traffickers, tend to replace heroin with noscapine and cut it with typical heroin adulterants. Several NA-classified samples were such “sham” heroin samples. Some of these samples contained controlled substances like diazepam and pentobarbital instead of heroin, along with typical SWA adulterants like caffeine, acetaminophen, and dextromethorphan.

England

The DEA London Office submitted 30 samples – all seized in CY 2023. Twenty-seven samples were classified as SWA/A, with an average purity of 35%, with diazepam, caffeine, and acetaminophen. Three samples were classified SWA/C. These showed an average purity of 46% with caffeine and acetaminophen.

Canada

HSP analyzed five samples from Canada. The origin classifications continue to demonstrate that Canada has two source regions for heroin: SWA and Mexico. Two samples were classified SWA/C, the third was SWA/B, and the remaining two were MEX-SA.

Nigeria

The Lagos Office submitted four samples from 2023 – three were classified SWA. The last sample was not heroin; it was a Marijuana product.

FORIEGN SUBMISSIONS

FOR

The data from CY 2023 foreign submissions are summarized in the table below.

COUNTRY OF SUBMISSION	NUMBER OF SAMPLES	HEROIN PURITY % (AS HCL)	ORIGIN	ADULTERANTS AND DILUENTS
Bahrain/Indian Ocean	24	37*	SWA/A	Diazepam, caffeine, acetaminophen, dextromethorphan
Bahrain/Indian Ocean	10	46	SWA/C	Caffeine, dextromethorphan
Bahrain/Indian Ocean	12	2	NA**	Diazepam, pentobarbital, caffeine, acetaminophen, dextromethorphan
England	27	35	SWA/A	Diazepam, caffeine, acetaminophen
England	3	46	SWA/C	Caffeine, acetaminophen
Canada	2	37	SWA/C	Caffeine, dextromethorphan
Canada	1	70	SWA/B	Caffeine
Canada	2	88	MEX-SA	Procaine
Nigeria	2	7	SWA/A	Caffeine
Nigeria	1	27	SWA/C	Caffeine
Nigeria	1		NA	No heroin; a Hashish sample with THC and cannabinol
Ghana	1	23	SWA/C	Caffeine
South Africa	1	55	SWA/A	Caffeine, acetaminophen
Indonesia	1	70	SWA/A	Caffeine, acetaminophen

*20 samples were heroin base; ** "Sham" heroin exhibits with high noscapine content, instead of heroin

BACKGROUND INFORMATION

HSP

HSP'S SAMPLING PLAN

DEA's regional laboratories used a three-tiered sampling plan until 2021. This plan focused on Port of Entry (POE) seizures, domestic seizures greater than or equal to a kilogram, and random sampling. However, after geospatial and statistical targeting evaluation of over a decade of HSP data, a new sampling protocol was deployed in CY 2022 to optimize resources at SFL1 and provide more timely data.

Under the new plan, each laboratory submits a specific number of exemplars monthly, as shown in the table below.

REQUIRED MONTHLY SUBMISSIONS TO HSP

REGIONAL LABORATORY		MONTHLY TARGET
SFL2	Northeast	9
SFL3	Mid-Atlantic	5
SFL4	Southeast	5
SFL5	North Central	8
SFL6	South Central	6
SFL7	Western	5
SFL8	Southwest	12

HEROIN SIGNATURE ANALYSIS

The science of the HSP entails seven (7) in-depth analyses through which heroin purity, cutting patterns, and the geographic regional origin are determined. HSP's Standard Operating Procedure (SOP) includes Gas Chromatography Mass Spectrometry (GC-MS), Nuclear Magnetic Resonance Spectroscopy (NMR), and Fourier Transform Infrared Spectroscopy (FTIR) to identify heroin, adulterants/diluents, and the salt form of heroin. The combined analytical results provide information on the identity and quantity of all compounds present in a heroin exhibit.

In addition, four separate signature analyses are conducted to determine the origin of production:

1. Signature I Ultra High Performance Liquid Chromatography (UHPLC-PDA): This method quantitates heroin and basic opium alkaloids or byproducts
2. Signature II GC-MS with derivatization: This method determines the acidic and neutral opium and manufacturing-related impurities found in trace levels
3. Signature III Static Headspace GC-MS (SH-GC-MS): This method determines the organic solvents used in the conversion of heroin base to HCl salt form
4. Signature IV Isotope Ratio Mass Spectrometry (IRMS): This method determines the isotopic data of heroin (more specifically, the data of morphine from opium)

Statistical analyses of signature data (consisted of 40 to 60 data points, per sample) of a seized heroin sample are conducted against the data of samples from known geographical regions (7000-plus 'authentic' samples). A final origin classification is assigned when there is an agreement among the individual signature classifications.

BACKGROUND INFORMATION

HSP

HSP'S CLASSIFICATIONS

HSP targets four (4) major geographic regions/country for heroin production and sample classification - South America, Southwest Asia, Southeast Asia, and Mexico. Currently there are fifteen (15) HSP classifications. A brief explanation is provided below on these classifications:

- MEX/T: Crudely manufactured, pasty, gummy tar heroin from Mexico, typically HCl salt form.
- MEX/BP: Crudely manufactured brown powder heroin from Mexico, typically HCl salt form.
- MEX-SA: Refined to a highly-refined product that resembles SA heroin in appearance, typically HCl salt form. This classification is assigned when the processing signatures are characterized as South American with an origin component of Mexico (Introduced in 2015).
- MEX: Refined or crudely manufactured heroin from Mexico, typically HCl salt form. This classification is assigned when MEX/T, MEX/BP or MEX-SA are not applicable.
- SA: Refined to highly-refined product from South America, typically HCl salt form.
- INC-SA: Refined to highly-refined product that resembles SA heroin in appearance. This classification is assigned when the processing signatures are characterized as South American with an "Inconclusive" origin component where Mexico or South America could be the origin. Extremely adulterated and diluted (low purity) samples are likely to generate this classification (Introduced in 2015).
- SWA/A: Crudely manufactured brown powder heroin from Southwest Asia. It can be base or HCl salt form.
- SWA/B: Highly refined heroin from Southwest Asia, typically HCl salt form.
- SWA/C: Refined heroin from Southwest Asia. It can be base or HCl salt form. The refinement level of SWA/C heroin lies between SWA/A and SWA/B.
- SEA/2: Refined heroin from Southeast Asia, typically found as base.
- SEA/3: Refined heroin from Southeast Asia, typically HCl salt form. (Locally known as "Smoking Heroin").
- SEA/4: Highly refined, export quality heroin from Southeast Asia, typically HCl salt form. (Originally known as "China White").
- UNK: The signature profiles of a sample do not match with the authentic profiles of any known source region (Unknown).
- IS: Insufficient sample quantity for the successful completion of HSP analysis (Insufficient Sample).
- NA: Either classification was not obtained because the sample did not contain heroin, or HSP analysis was not conducted because of the sample's research value (Not Analyzed).

BACKGROUND INFORMATION

HSP

HSP'S WAVE CHART

Figure 27: U.S. heroin sources identified by HSP for 45 years