DRUG ENFORCEMENT ADMINISTRATION

2024

Annual Heroin Report

OFFICE OF FORENSIC SCIENCES

Special Testing and Research Laboratory

UNCLASSIFIED PRB-2025-81

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 2024. 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 the 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; the findings may not reflect the domestic or global illicit heroin supply in its entirety, nor are they 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 2024. HSP analyzed 267 samples from 2024 seizures or purchases representing, coincidentally, 267 kg of seized heroin. This represents approximately 33% (by weight) of heroin analyzed in the regional laboratories. Results from exemplars of foreign heroin seizures from 2024 are also reported. There were no Domestic Monitor Program (DMP) geo-probe submissions in 2024. As such, a DMP section is absent from this report.

INSIDE THIS ISSUE

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. HSP and regional laboratory system data were queried on 05/27/2025 and 06/26/2025, respectively. For this report, heroin was identified as the primary drug or one of the top three reported drugs in more than 98% of exhibits analyzed by the regional laboratories.

KEY FINDINGS – LABORATORY SYSTEM

- In 2024, regional laboratories analyzed approximately **2767 exhibits** representing **802 kg** of seized heroin. In comparison, 2614 exhibits were analyzed from 2023 representing 947 kg of seized heroin. The data suggests a possible leveling off in the recent downward trend for U.S. heroin markets.
- Heroin exhibits were reported in various forms including powder, rock-like, tar (gum like), resin, capsules, tablets, liquids, as well as, other/miscellaneous forms. Powder and rock-like forms represented approximately 68% of the exhibits. There were 597 tar (gum like) exhibits (22%) and 155 heroin tablet exhibits (6%) both with and without fentanyl(s).
- Approximately 73% 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 2024.
- The average purity of **powder/rock-like heroin** samples analyzed by regional laboratories was **27%** for 2024. The average purity of **tar heroin** samples was **35%**. (Note: Only approximately 16% of heroin exbibits in the regional laboratory system were analyzed for purity).

KEY FINDINGS – HEROIN SIGNATURE PROGRAM

- **Mexico continues to be the primary source of domestic heroin** analyzed through the HSP with approximately 82% by weight of 2024 seizures classified as Mexican origin.
- As in the past several years, only two types of domestic heroin were prominently detected in 2024 HSP submissions – Mexican Black Tar (MEX/T) and Mexican White (MEX-SA; Mexican origin using South American processing). **The average purity was 41% for MEX/T heroin and 79% for MEX-SA heroin.**
- A 13% increase in heroin purity and 25% decrease in fentanyl adulteration were observed in MEX-SA classified domestic submissions compared to 2023.
- Heroin from South America (SA) was minimally identified and there were no Southwest Asian (SWA) or Southeast Asian (SEA) domestic submissions to the program in 2024.
- Samples classified as INC-SA (Inconclusive origin with SA processing), IS (Insufficient Sample), NA (Not Analyzed), and UNK (Unknown origin) accounted for 17% by weight of domestic submissions. Fentanyl was prominent in most of these samples.

Figure 3: **Poppy Field in Mexico**

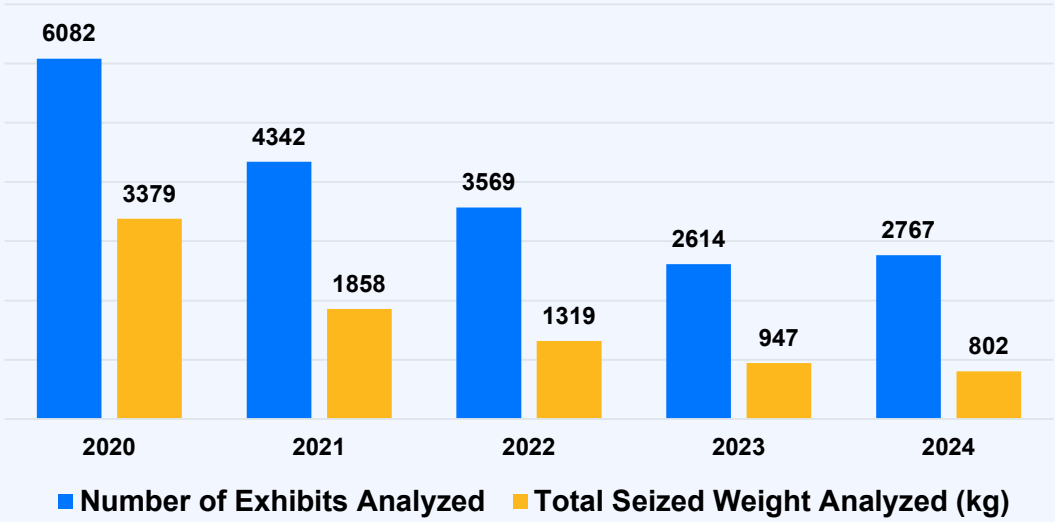
DOMESTIC SUBMISSIONS

LAB SYSTEM

LABORATORY SYSTEM - RESULTS AND TRENDS

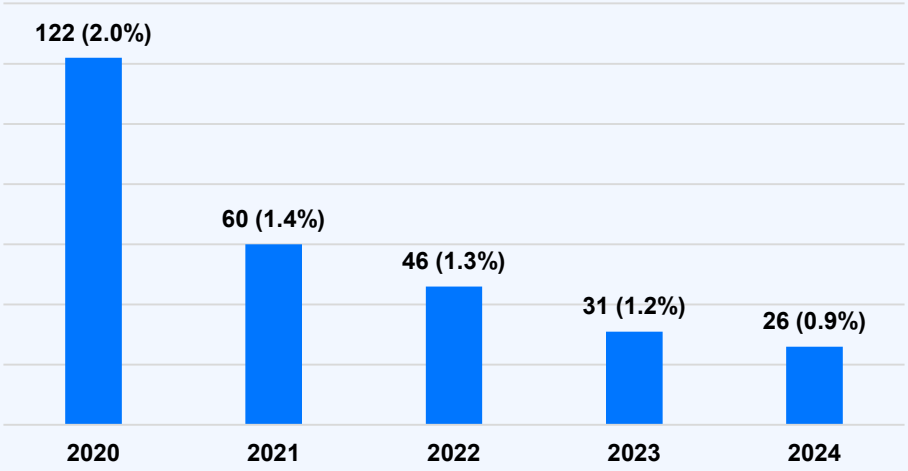
In CY 2024, 2767 heroin exhibits representing 802 kg of seized weight were analyzed by DEA regional laboratories. Following several years of decline, a slight uptick in the number of heroin exhibits was observed for 2024 as shown below.

Figure 4: Number of Heroin Exhibits - Laboratory System



Heroin submissions to regional laboratories with a seized weight of 5 kg and more over the last five years are charted below.

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



The overall decline in heroin submissions to regional laboratories is likely due in part to the reported reduction in poppy cultivation and heroin production in Mexico in recent years. However, the scope and magnitude of any decrease in overall U.S. heroin trafficking remains difficult to estimate as heroin seizure data from other federal and state agencies has not been reviewed for this report. Additionally, while the observed decline in multikilogram heroin exhibits can be attributed in part to reduced heroin production in Mexico, the concurrent decline in Port of Entry (POE) submissions to DEA regional laboratories due to some forensic examinations being conducted by U.S. Customs and Border Protection (CBP) at newly established forward operating labs along the Southern Border is a potential contributing factor as well.

DOMESTIC SUBMISSIONS

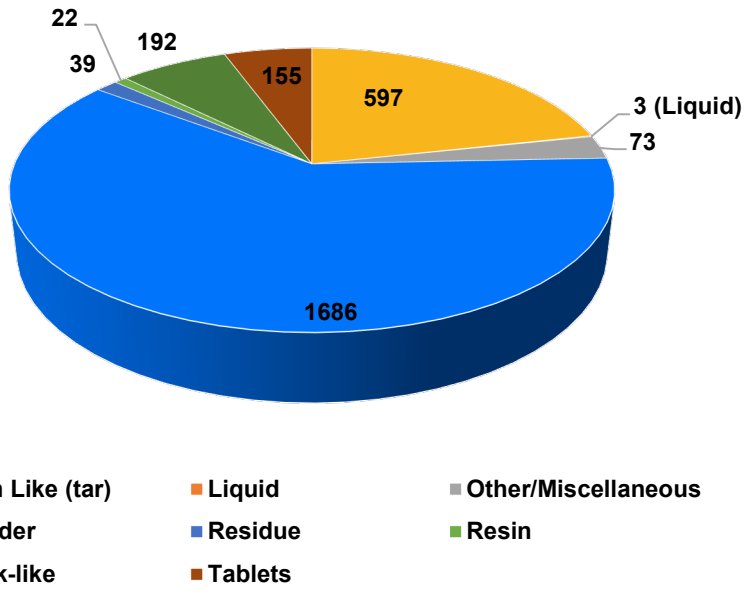
LAB SYSTEM

Heroin exhibits from the regional laboratories were categorized and reviewed by seized weight. Approximately 88% of 2024 exhibits were found to range from residue to 500 grams. Fentanyl was also identified in 66% of these samples along with typical heroin adulterants. As observed in the past years, the percentage of 2024 samples cut (with fentanyl and other adulterants) was significantly lower for wholesale trafficked heroin comprised of a kilogram or more. Summarized information for each weight category are shown below.

SEIZED WEIGHT RANGE (G)	NUMBER OF SAMPLES	SAMPLES CUT (%)	NUMBER OF TIMES FENTANYL(S) IDENTIFIED	NUMBER OF TIMES XYLAZINE IDENTIFIED
0 - 3	798	77	554	244
3 - 50	1054	72	692	313
51-500	579	65	350	153
501-1000	149	34	44	28
1001-5000	161	32	44	26
5001 and more	26	19	4	2

U.S. heroin continues to be distributed in various forms. Gum like (tar) heroin is still the prevalent type west of the Mississippi River. In contrast, the East Coast heroin markets continue to be dominated by powder samples while some Mid-West markets are comprised of both types. Heroin tablets are seized sporadically throughout the U.S. and often contain fentanyl as well. The different forms of heroin, such as tar, powder, liquid and tablets, reported by the regional laboratories in 2024 are charted below.

Figure 6: Different Forms of Heroin



DOMESTIC SUBMISSIONS

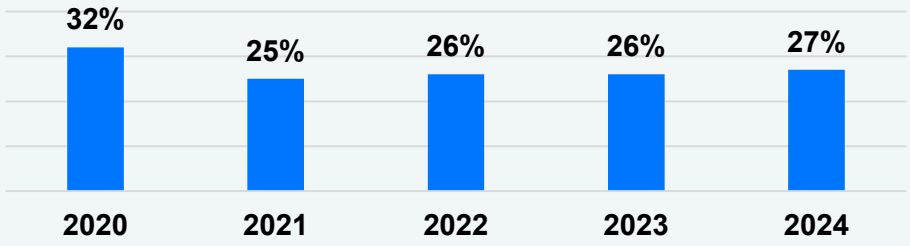
LAB SYSTEM

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

PURITY AND ADULTERANTS – POWDER SAMPLES

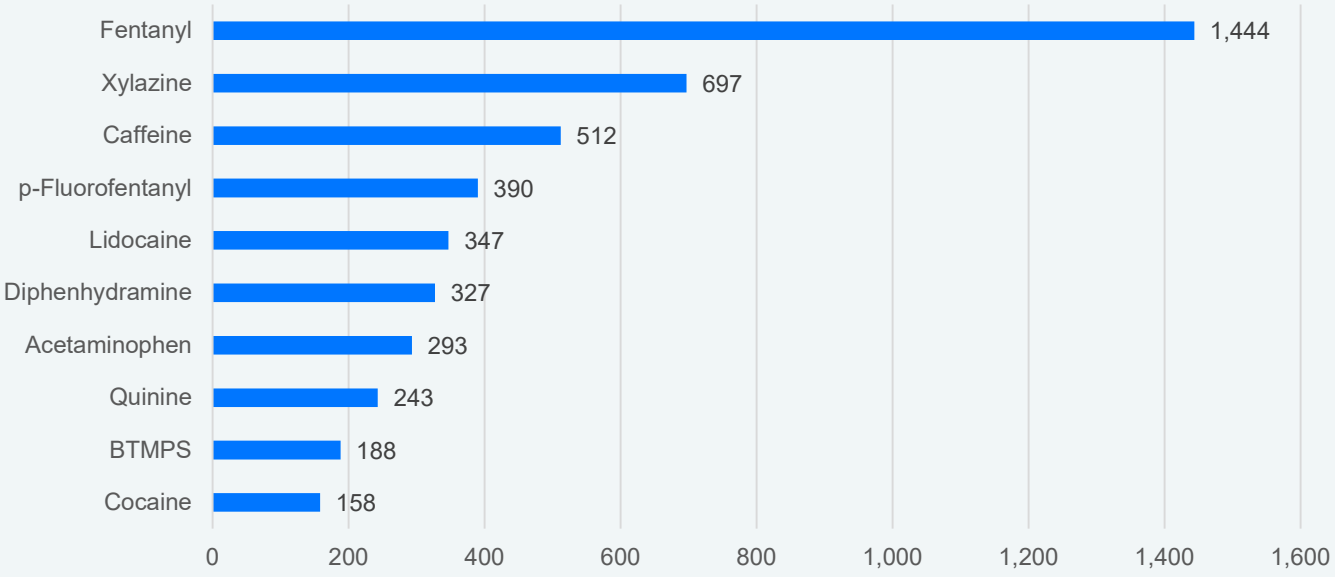
Results from 1878 powder and rock-like samples were reviewed for purity and adulterant information. Approximately 17% of these samples were analyzed for heroin purity with most coming from purchased exhibits. A wide range of heroin purity, trace to 100%, was observed with an average of 27%. The average purities for powder heroin exhibits over the last five years are charted below. (Note: Heroin purity is reported as hydrochloride in this report).

Figure 7: Average Heroin Purities in Powder Exhibits



Approximately 83% of powder samples analyzed were found to be adulterated, and fentanyl was found to be the most prominent adulterant with 1444 identifications. Xylazine was identified 697 times and p-fluorofentanyl 390 times. The prominent adulterants for powder heroin samples analyzed in 2024 are charted below.

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



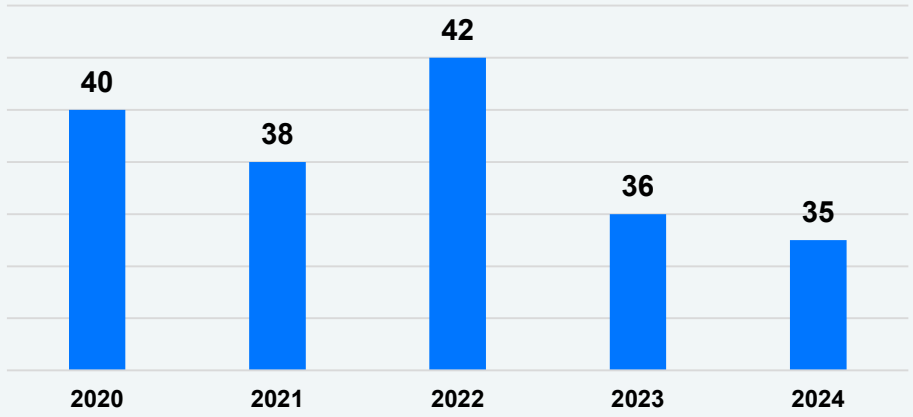
DOMESTIC SUBMISSIONS

LAB SYSTEM

PURITY AND ADULTERANTS – TAR SAMPLES

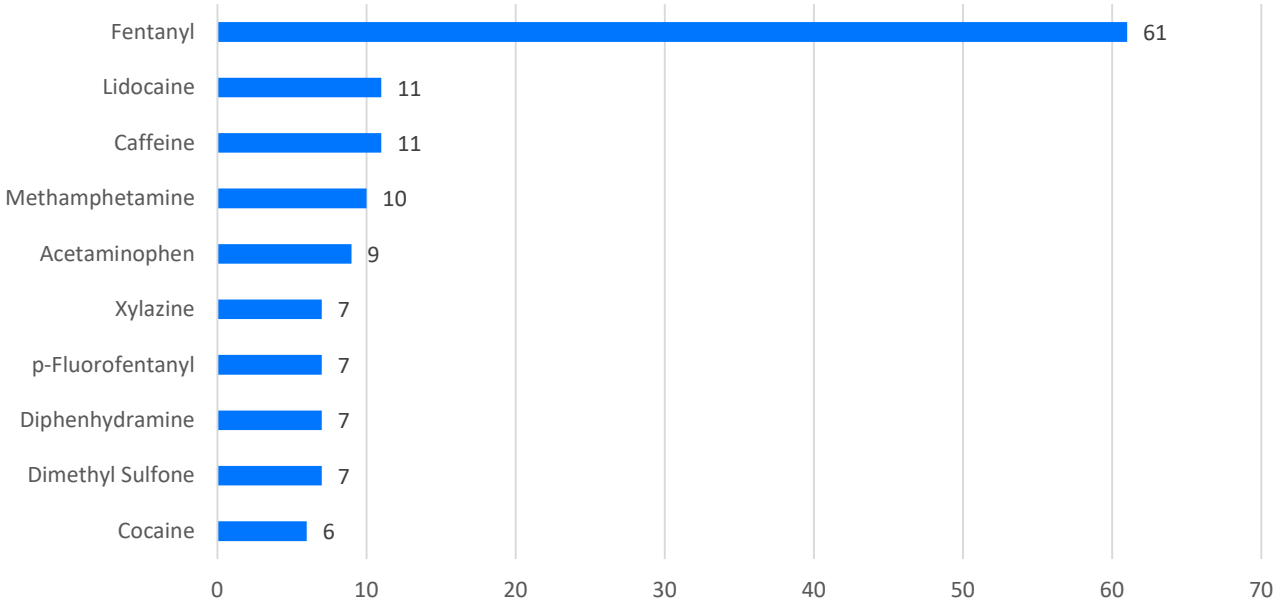
The laboratory system reported 597 samples as gum like (tar) with approximately 13% being analyzed for heroin purity. A wide range of purity, 2% to 72%, was observed with an average of 35%. As such, the tar heroin purity was 8% higher than that of powder samples analyzed by the regional laboratories in 2024.

Figure 9: **Average Heroin Purities in Tar Exhibits**



As in past years, tar exhibits are predominantly uncut compared to powder exhibits with only 14% found to be adulterated in 2024. Fentanyl was identified in 61 tar samples (10%). The prominent adulterants for tar heroin samples analyzed in 2024 are charted below.

Figure 10: **Prominent Adulterants in Tar Exhibits**



DOMESTIC SUBMISSIONS

LAB SYSTEM

TABLETS AND LIQUIDS

At the time of reporting, 155 heroin tablet exhibits were analyzed by the regional laboratories with approximately 12% reporting heroin purity. Values ranged from 1% to 24% with an average heroin purity of 7%. In 108 instances, fentanyl was also identified in the tablets. In addition to fentanyl and p-fluorofentanyl, typical adulterants like acetaminophen, caffeine, cocaine, methamphetamine, diphenhydramine, xylazine, tramadol, and others were also reported in heroin tablets. Of note, there were 5 instances of particularly potent tablet seizures where a nitazene analogue was identified along with heroin and fentanyl(s). The details of these seizures are summarized below.

SEIZED PLACE	TABLETS	ALL REPORTED DRUGS
Hollywood, Florida	9,144	Bromazolam; N-Pyrrolidino Protonitazene; Fentanyl; Heroin; Methamphetamine; Acetaminophen; Xylazine; Phenyl-2-nitropropene
Spokane, Washington	369	N-Pyrrolidino Protonitazene; Heroin; Fentanyl; Acetaminophen
Sierra Blanca, Texas	50	Protonitazene; Heroin; Fentanyl; Acetaminophen
Summit County, Ohio	47	Fentanyl; Metonitazene; Heroin; Xylazine
North Ridgeville, Ohio	11	Fentanyl; p-Fluorofentanyl; N-Desethyl Etonitazene; Methamphetamine; Heroin; Diphenhydramine; Xylazine; Caffeine

Three liquids exhibits (two suspected heroin and one suspected controlled pharmaceutical) were also analyzed in 2024. Heroin was solely identified in seizures originating in Los Angeles, CA and Corpus Christi, TX. For the remaining exhibit, three pint sized bottles seized in Anchorage, AK were labeled as promethazine/codeine oral solutions but were found to contain heroin rather than codeine along with the promethazine. Purity information for the liquid seizures was not available.

Results and trends regarding domestic submissions analyzed by the Heroin Signature Program (HSP) in 2024 are summarized in the following section.

DOMESTIC SUBMISSIONS

HSP

HEROIN SIGNATURE PROGRAM

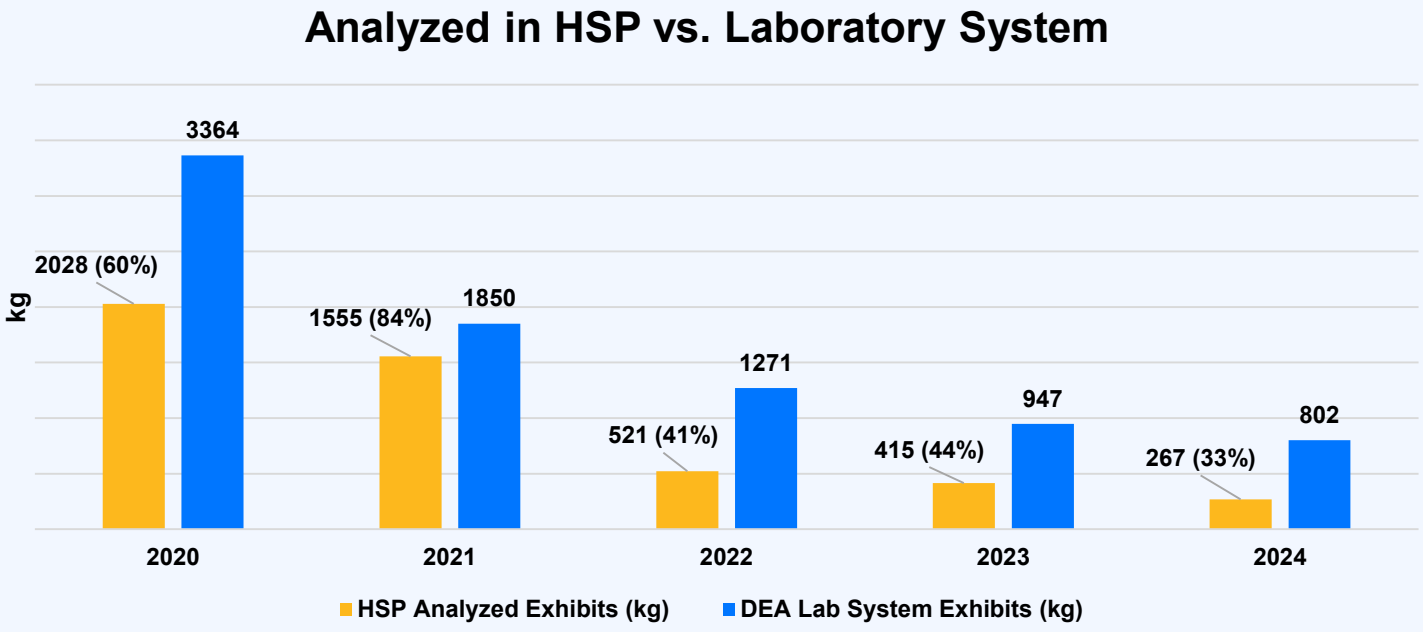
The 267 HSP samples analyzed represent, coincidentally, 267 kg of heroin with all being seized or purchased in the U.S. during CY 2024. The current sampling plan requires the regional laboratories to submit a specific number of exemplars monthly from randomly selected heroin cases.

(Note: Heroin information presented in this section is subject to change as it only accounts for the data available at the time of extraction (05/27/2025) 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 2024 submissions included 121 tar, 138 powder, and 8 tablet heroin samples. As in 2023, the submissions from seizures at POE stations, specifically the Southwest Border, remain low with only 11 POE seizures being received in 2024. Of these, 10 seizures occurred at the SWB with the remaining sample originating from a JFK International Airport seizure.

The 2024 HSP samples represented one-third, 33% by weight, of the heroin analyzed in the regional laboratories as shown below.

Figure 11: Analyzed in HSP vs. Laboratory System



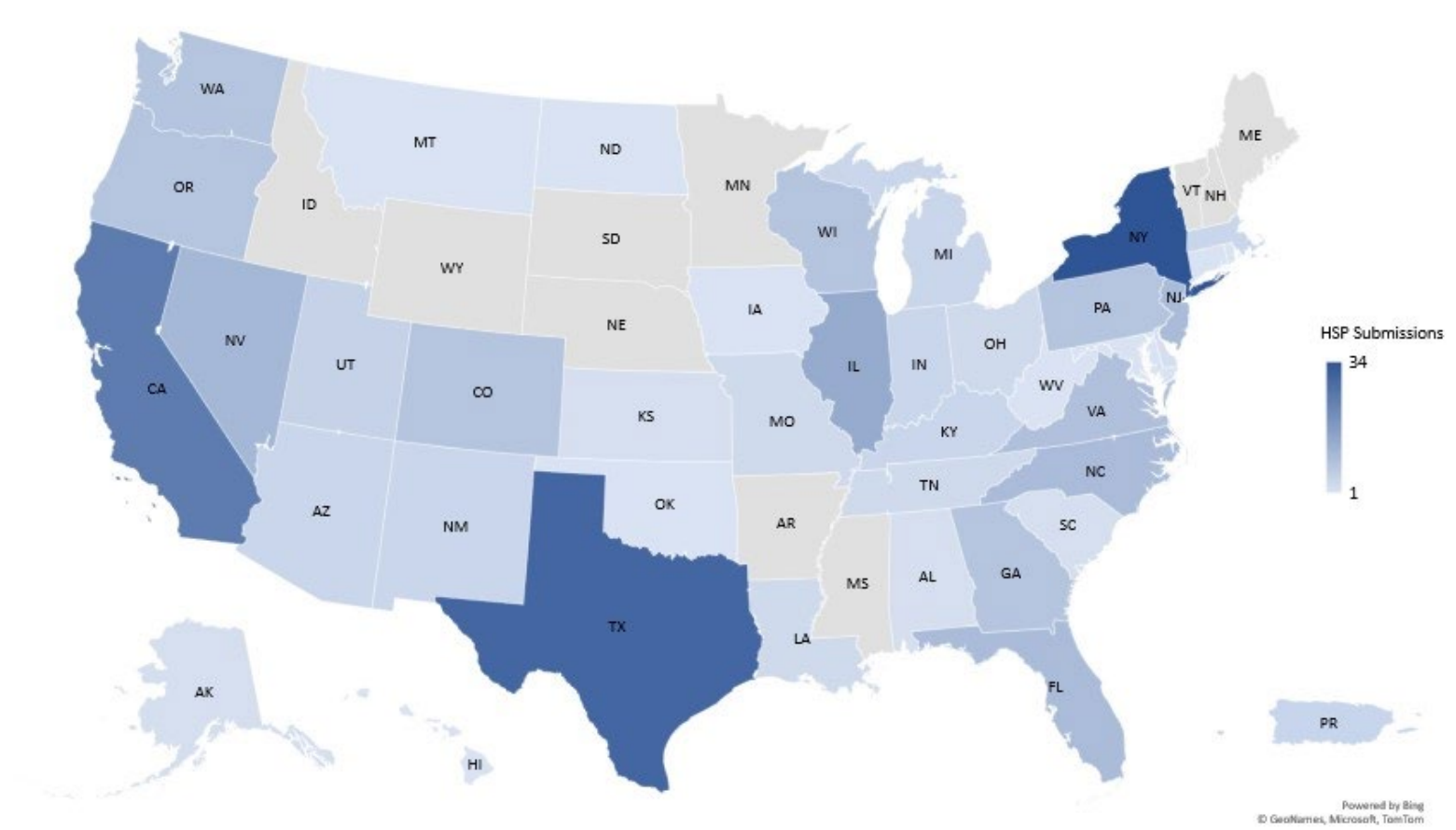
DOMESTIC RESULTS AND TRENDS - HSP

The 2024 HSP submissions originated from 40 states, Washington, D.C., and Puerto Rico (see map on the next page). New York, Texas and California were the most represented states, with 34, 30, and 25 samples, respectively. There were no submissions from northern states like Idaho, Wyoming, South Dakota, Nebraska, Minnesota, Vermont, New Hampshire, and Maine. In the south, Arkansas and Mississippi were not represented in the sampling for 2024.

DOMESTIC SUBMISSIONS

HSP

Figure 121 HSP Submissions – 2024



SOURCE CLASSIFICATION

For the 267 HSP samples analyzed in 2024, 82% of the total seizure weight was classified as having a Mexican (MEX) origin. Based on this HSP sample subset, at the 95% confidence level, 65 to 72% of the tar, powder, and tablet heroin seizures analyzed by regional laboratories in 2024 were also of MEX origin. The transition of the U.S. heroin market with multiple source regions (as in SA, SWA, MEX, and SEA) to essentially 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 2024 despite the reported reduced poppy cultivation and heroin production in Mexico in recent years.

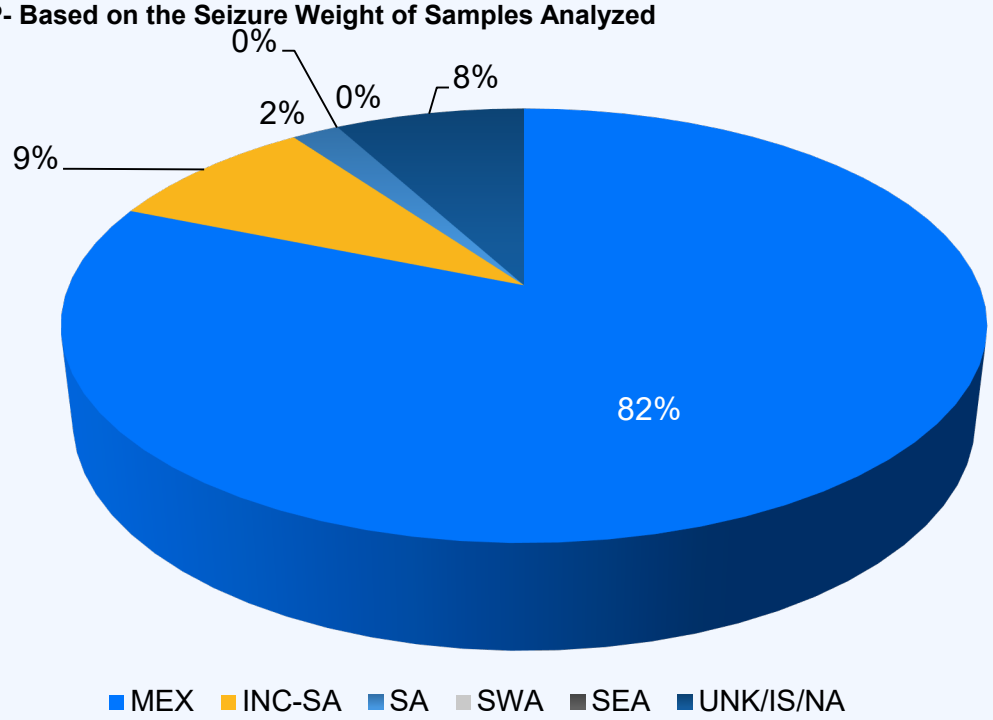
Heroin from South America accounted for only 2% by weight of the samples analyzed in 2024. Samples classified as INC-SA, IS, NA, and UNK amounted to 17% by weight. SWA and SEA heroin types were not detected in the 2024 HSP submissions.

See the chart on the next page for 2024 source regions by seizure weight.

DOMESTIC SUBMISSIONS

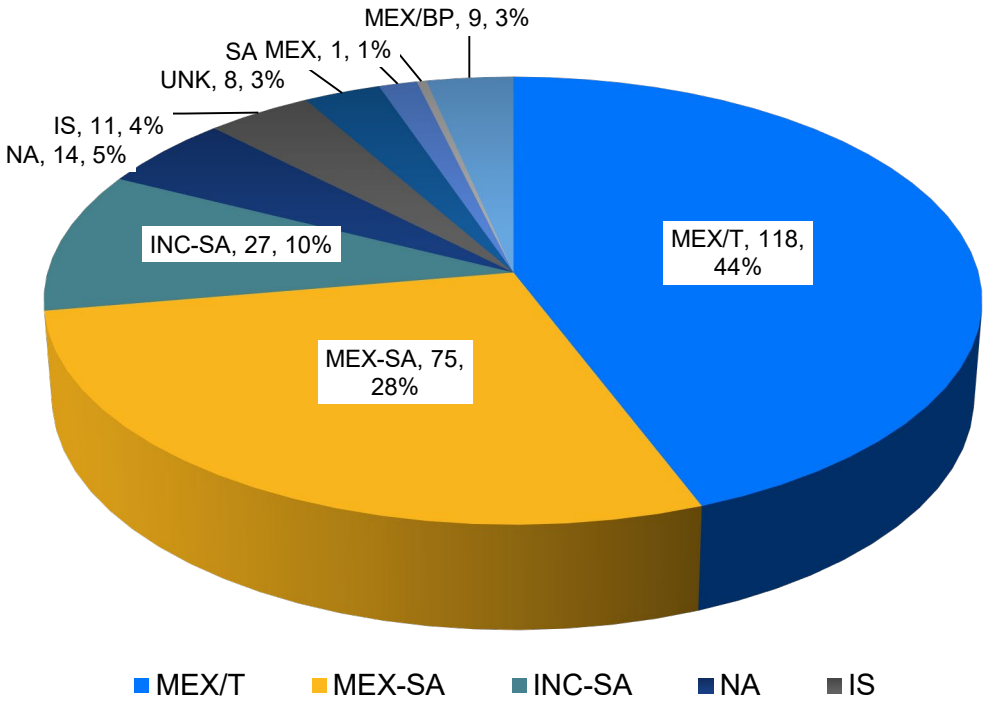
HSP

Figure 13: 2024 HSP- Based on the Seizure Weight of Samples Analyzed



Mexico remains the primary source of heroin (at 76%) based on the number of samples rather than seizure weight, as demonstrated below, with 118 MEX/T, 75 MEX-SA, 9 MEX/BP, and 1 MEX samples.

Figure 14: 2024 HSP- Based on the Number of Samples Analyzed

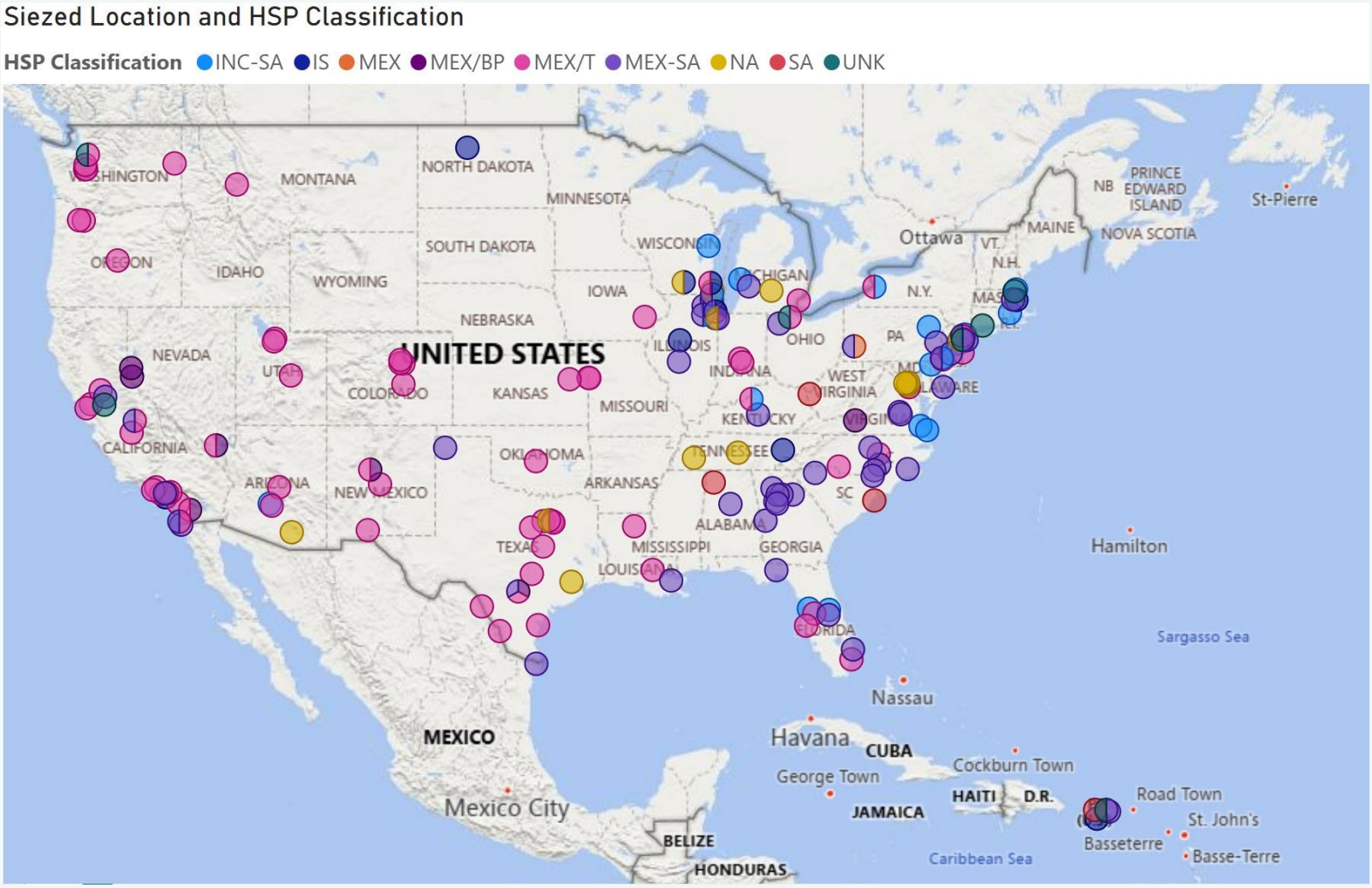


DOMESTIC SUBMISSIONS

HSP

Major HSP classifications for 2024 in the continental U.S. and Puerto Rico are mapped below. Not shown are two submissions from Alaska and one from Hawaii that were all classified as MEX/T.

Figure 15: MEX/T, MEX-SA, INC-SA, NA, UNK, and IS Classifications in 2024



As in 2023, HSP did not receive enough POE samples in 2024 (11 total) to gather pertinent information on purity and cutting patterns of heroin being trafficked into the United States. Ten samples originated along the SWB including six from California and four from Texas. Seven of the ten were classified as MEX/T with an average heroin purity of 46%. Two of the ten were classified as MEX-SA with an average heroin purity of 75%. The one remaining SWB sample was classified as MEX/BP with a heroin purity of 17%. Only one other HSP POE submission was received in 2024 and originated from a seizure at JFK International Airport. The sample was classified as MEX-SA with a heroin purity of 79% and cut with a trace amount of caffeine.

DOMESTIC SUBMISSIONS

HSP

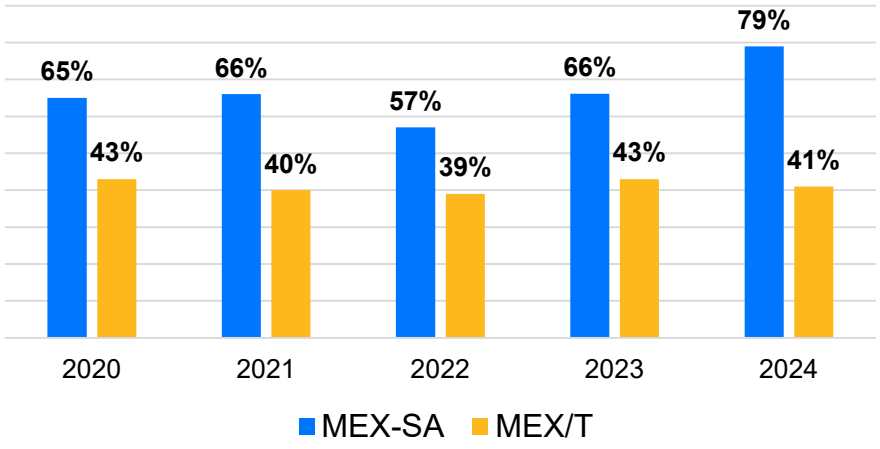
The null classifications, such as the UNK, IS, and NA, amounted to 8% by total weight in 2024. The majority of these samples had insufficient heroin (<5%) to classify. In most instances, fentanyl was also found to be present in these samples. The trend in this category for the last five years is shown below.

Figure 16: IS, NA, and UNK Classifications (% by Weight)

PURITY AND ADULTERANTS/DILUENTS

As stated before, only two types of heroin were prominently detected in 2024 samples – MEX-SA and MEX/T. The average purities of these types of heroin from domestic submissions are charted below.

Figure 17: Heroin Purity Trends - Domestic



DOMESTIC SUBMISSIONS

HSP

The heroin purity data for 2024 is summarized below for all classifications. Despite the presence of fentanyl and other opioids in the U.S. powder heroin market, there were several seizures of highly refined, high-purity powder heroin. For 2024, 83% of MEX-SA samples (62) were found to contain 70% or more heroin representing a 23% increase with respect to 2023. Four INC-SA, three SA, and one MEX/T-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	118	146.2	Trace-73	41
MEX-SA	75	63.5	18-97	79
INC-SA	27	23.1	4-92	30
NA	14	12.8	0-3	1
IS	11	4.7	Trace-3	2
UNK	8	2.9	Trace-45	15
SA	4	5	20-98	76
MEX	1	0.2	Not available	6
MEX/BP	9	8.4	13-61	42
TOTAL	**267**	**267**		

The 267 HSP samples varied in seized amounts from 0.7 grams to 17,000 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	60	39	42	35
50-500	103	40	45	28
500-1000	49	62	20	4
1000-5000	43	53	23	7
5000 and more	12	52	17	0

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

DOMESTIC SUBMISSIONS

HSP

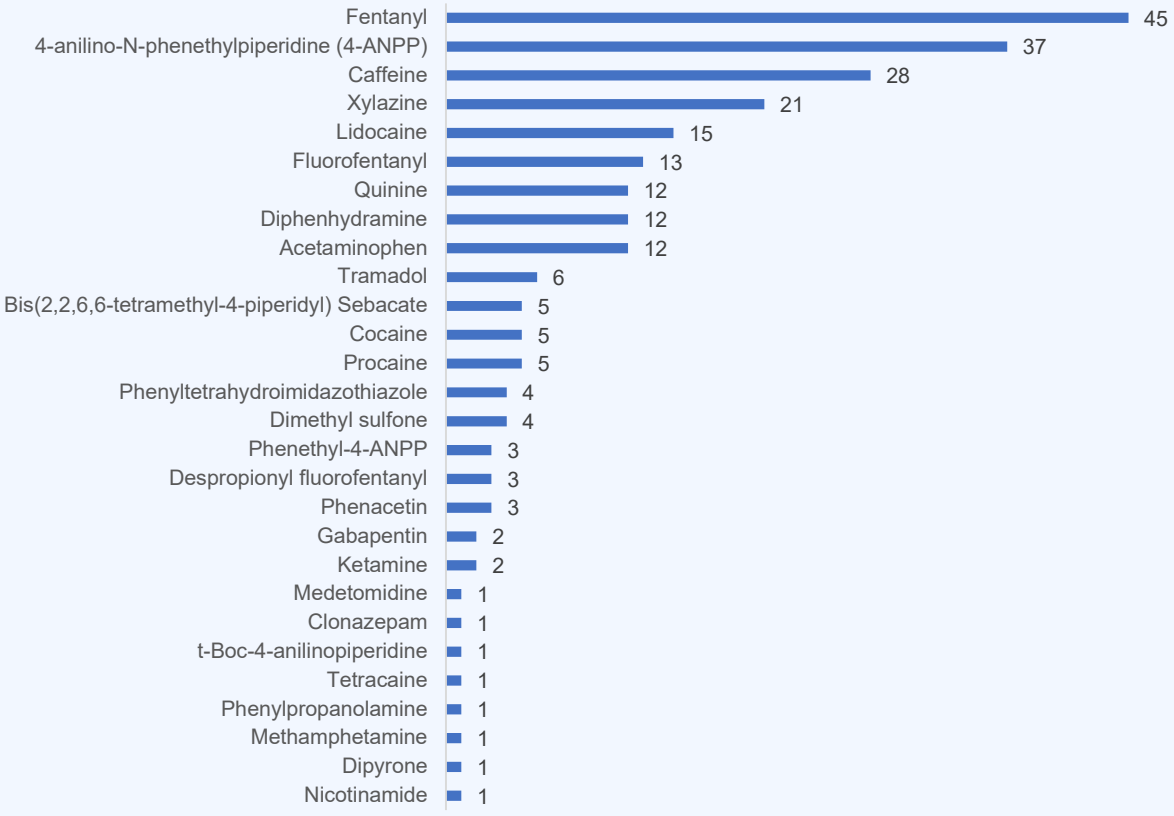
POWDER SAMPLES (HSP)

Approximately 52% of 2024 HSP submissions (138 samples) were in powder form of various colors (white, off-white, beige, tan, light brown, dark brown, black, gray, blue, orange, pink, and red) and textures (fine powder, granular or chunky). Seized weights of powder samples ranged from 0.7 grams to 12,000 grams with heroin purity ranging from trace to 98%. In 2024, 50% of powder submissions showed high purity containing 70% or more heroin. In contrast, only 35% of 2023 submissions were found to be high purity. Consistent with an increase in high purity samples, only 46% of powder samples were found to be adulterated and/or diluted (a 16% decrease from 2023).

Seventy-five samples were classified as highly refined MEX-SA with heroin purity ranging from 18% to 97% with an average purity of 79% (13% increase from 2023). Only 20% of MEX-SA samples were adulterated and/or diluted (21% decrease from 2023). There were 24 powder samples with INC-SA classification for which the average heroin purity was 30% and ranged between 4% and 91%. Nine samples were classified as crudely manufactured brown powder from Mexico (MEX/BP). One sample was classified with a simple MEX call. SFL1 was not able to sub-classify this sample as MEX-SA or MEX/BP because of the low heroin purity (6%) and heavy adulteration and dilution. SA heroin was infrequently detected, with just four samples. As stated before, there were no domestic SWA or SEA-classified powder heroin samples in 2024.

Fentanyl was detected in 33% of the 138 powder samples (25% decrease from 2023). Fentanyl(s) were most prominent in samples with INC-SA, IS, NA, and UNK classifications where heroin purities are often lower resulting from cutting with typical heroin adulterants/diluents. The most prominent adulterants in the 138 powder heroin samples are listed below. (Note: Fentanyl(s) manufacturing related 4-ANPP, phenethyl 4-ANPP and despropionyl fluorofentanyl are also listed below to provide as much intelligence information as possible).

Figure 18: Adulterants in Powder HSP Samples

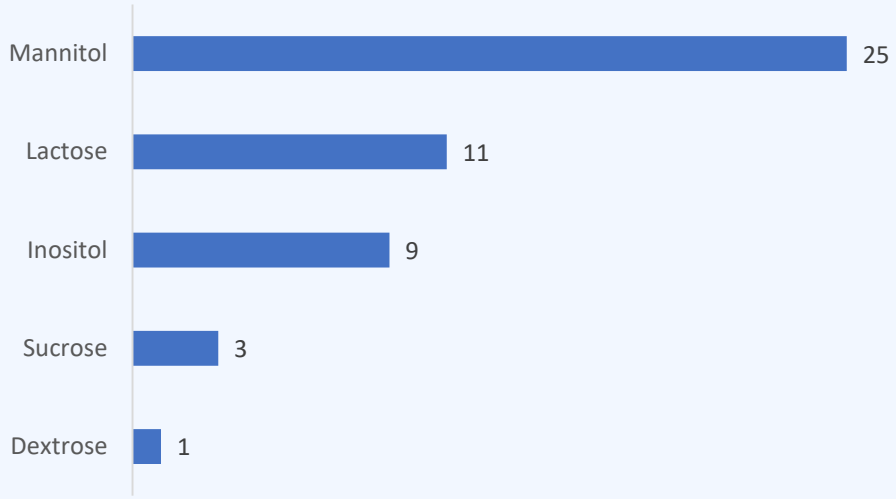


DOMESTIC SUBMISSIONS

HSP

The following diluents were also identified in powder samples.

Figure 19: Diluents in Powder HSP Samples

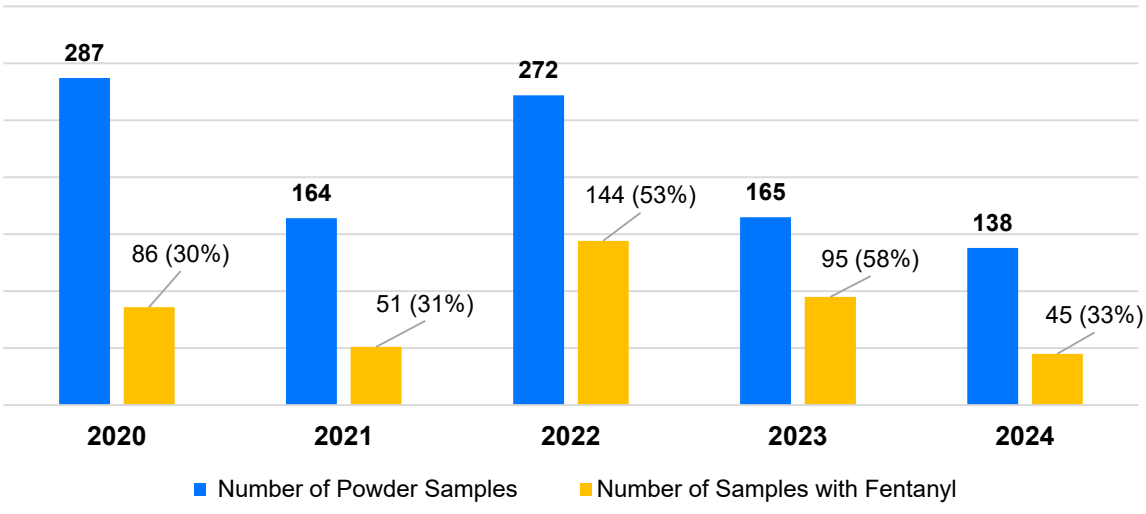


FENTANYL TRENDS OVER THE YEARS FOR POWDER SAMPLES (HSP)

As stated earlier, 46% of powder samples (63 of 138 powders) were adulterated and/or diluted. Fentanyl was detected 45 times in these samples. There were an additional 13 fluorofentanyl identifications, always occurring in the presence of fentanyl. Among the adulterated set, only nine samples did not contain any fentanyl demonstrating that, when heroin is cut, fentanyl continues to play a significant role in the U.S. markets. However, it is worth noting that there were 75 uncut powder heroin samples in 2024. Exactly 80% of these samples had a heroin purity of 70% or more.

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

Figure 20: Fentanyl Trends: Powder HSP Samples



DOMESTIC SUBMISSIONS

HSP

For the first time in the last five years, a significant decrease in fentanyl purity was observed in HSP submissions. The average fentanyl purity dropped from 8% in 2023 to 3% in 2024. Likewise, the upper limit of the fentanyl purity range observed in heroin submissions dropped from 46% in 2023 to 16% in 2024. It should be noted that a sub-exhibit of one glassine envelope heroin submission to HSP was found to contain 33% fentanyl with no heroin and, therefore, was excluded from 2024 purity trends. Shown below are the fentanyl purity trends for heroin submissions over the last five years.

Year	Average Fentanyl Purity	Fentanyl Purity Range
2020	3%	Trace - 18%
2021	4%	Trace - 18%
2022	5%	Trace - 35%
2023	8%	Trace - 46%
2024	3%	Trace - 16%

The table below shows the details of the 5 HSP powder samples with 10% and more fentanyl.

Appearance	Origin	Seized Location	Heroin Purity (as HCl)	Fentanyl Purity (as HCl)
White powder	NA	Newark, New Jersey	0%	33%
Pink powder	INC-SA	Green Bay, Wisconsin	12%	16%
Off-white powder	INC-SA	Woodbridge, New Jersey	12%	12%
Beige powder	INC-SA	Philadelphia, Pennsylvania	20%	12%
Off-white powder	INC-SA	Newark, Delaware	18%	11%

XYLAZINE AND OTHER VETERINARY ANALGESICS FOR POWDERS (HSP)

Xylazine was identified in 21 HSP submissions for 2024 ranging from trace to 37% with and average purity of 4%. In all domestic seizures, fentanyl was also identified in the sample. One seizure in Ponce, Puerto Rico contained 37% xylazine, trace heroin, caffeine, gabapentin, and 4-ANPP. Although fentanyl was not positively identified in the sample, the presence of 4-ANPP indicates that fentanyl may be present in low levels as well. High levels of xylazine were also identified in a potent seizure from Philadelphia, PA with the sample containing 32% xylazine, 23% heroin, 11% fentanyl and 4-ANPP. For the remaining 18 samples, the xylazine purity was 4% or less.

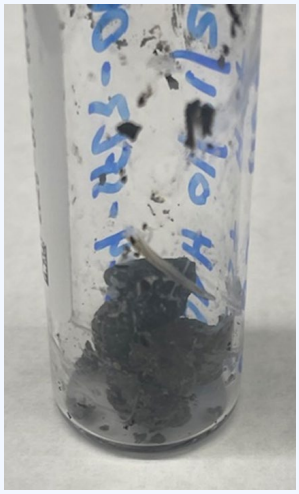
Ketamine was identified in two HSP submissions in 2024. A seizure in Lansing, MI contained 17% ketamine, 1% heroin, trace fentanyl, 4-ANPP, dimethyl sulfone, BTMPS, acetaminophen, diphenhydramine and lidocaine. The other seizure from New Haven, CT contained trace ketamine along with 5% heroin, fentanyl and fluorofentanyl (both not quantitated), acetaminophen, caffeine, lidocaine, procaine and xylazine.

Medetomidine was identified in a lone seizure from Philadelphia, PA along with 12% heroin, fentanyl and fluoro-fentanyl (both not quantitated), acetaminophen, caffeine, lidocaine, procaine, tetracaine, xylazine, and BTMPS.

DOMESTIC SUBMISSIONS

HSP

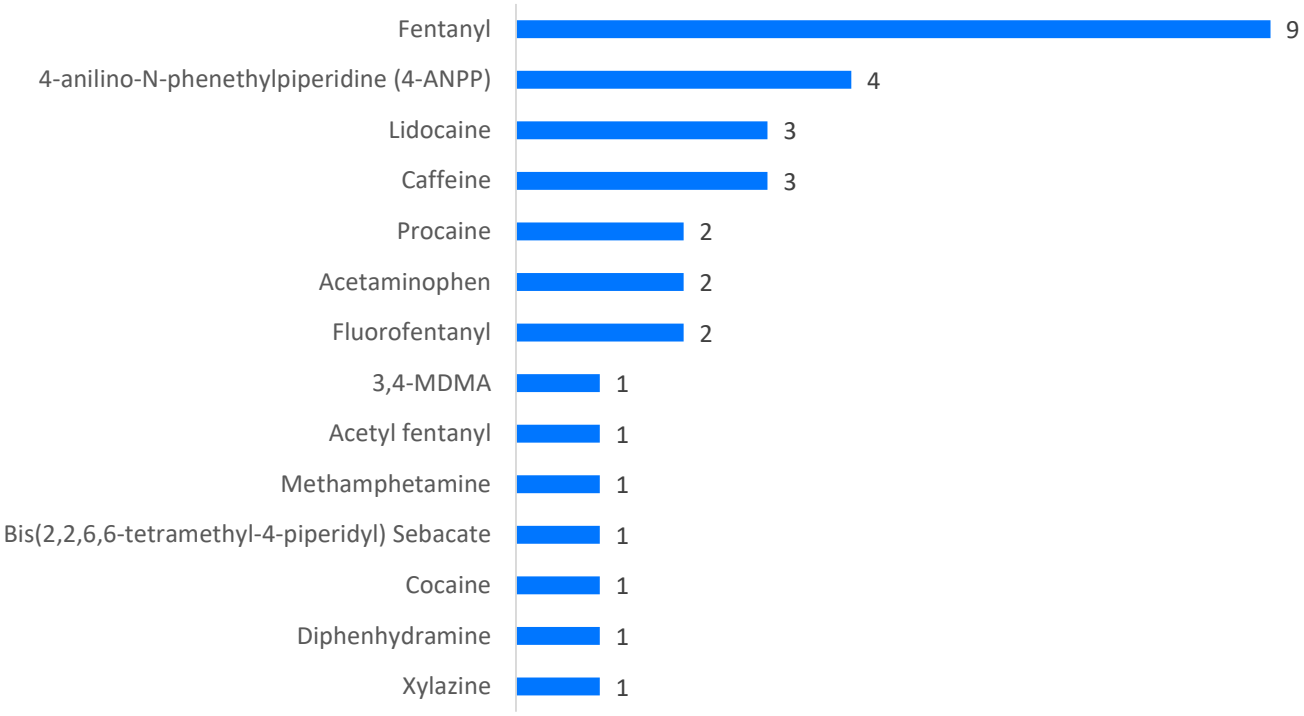
TAR SAMPLES (HSP)



There were 121 HSP black or brown tar submissions in 2024 of which 118 samples were classified as MEX/T. The heroin purity for MEX/T ranged from trace to 73% with an average value of 41%. Two tar submissions were classified as UNK origin. The remaining tar submission was classified as INC-SA. This particular sample (shown in the photograph) resulted from a seizure in Virginia Beach, VA and contained 64% heroin cut with 8% 3,4-MDMA, trace fentanyl, xylazine and caffeine. The sample marks the first instance of a HSP submission appearing to incorporate SA-type processed powder made to simulate a black tar heroin. 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 54% of uncut powder samples, 88% of tar samples were uncut. Tar seizures ranged in weight from 6 grams to 17,000 grams. Thirty-six tar seizures (30%) had a seized amount of roughly a kilogram or more.

Of the 121 tar submissions, 9 samples contained fentanyl (7%); fentanyl purity in the tar samples ranged from trace to 2%. In comparison, approximately 8% of tar samples in 2023 contained fentanyl with purities ranging from trace to 15%. Fentanyl, other adulterants, and diluents in tar samples are charted below and on the following page.

Figure 21: Adulterants and Fentanyl-Related Substances in Tar HSP Samples

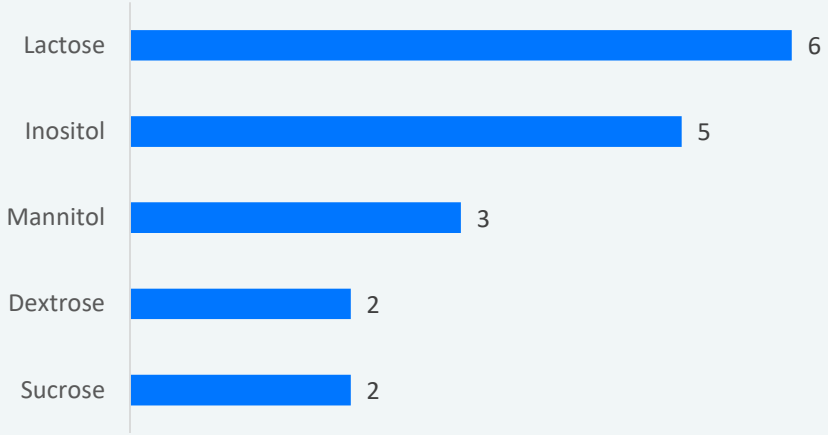


DOMESTIC SUBMISSIONS

HSP

The following diluents were identified in tar samples:

Figure 22: Diluents in Tar HSP Samples



TABLET SAMPLES (HSP)

Of the 8 tablet seizures analyzed by HSP in 2024, the origin of heroin was determined for only two samples, both of which were classified as INC-SA. Sufficient heroin was not present in the remaining tablet seizures and were classified as either IS or NA. Tablets seized in Florida (city not identified) contained a significantly high amount of heroin at 25 mg per tablet. Fentanyl, fluorofentanyl, and xylazine, along with other adulterants, were identified with heroin in tablets seized in Murfreesboro, Tennessee. Results from the analysis of tablets are summarized below.

SEIZED PLACE	HEROIN MG/TABLET	ORIGIN	ADULTERANTS AND DILUENTS
Florida (city not identified)	25	INC-SA	None
Anaheim, California	Trace	IS	None
Jackson, Tennessee	Trace	NA	Dimethyl Sulfone
Falls Church, Virginia	3	NA	Acetaminophen, Dipyrone
Tucson, Arizona	3	NA	Acetaminophen, Dipyrone, Methorphan
Alexandria, Virginia	2	NA	Acetaminophen, Dipyrone
Murfreesboro, Tennessee	Trace	NA	Acetaminophen, Diphenhydramine, Quinine, Fentanyl, 4-ANPP, Fluorofentanyl, Xylazine, Dimethyl sulfone, Melatonin
Glendale, Arizona	4	INC-SA	Acetaminophen, Diphenhydramine

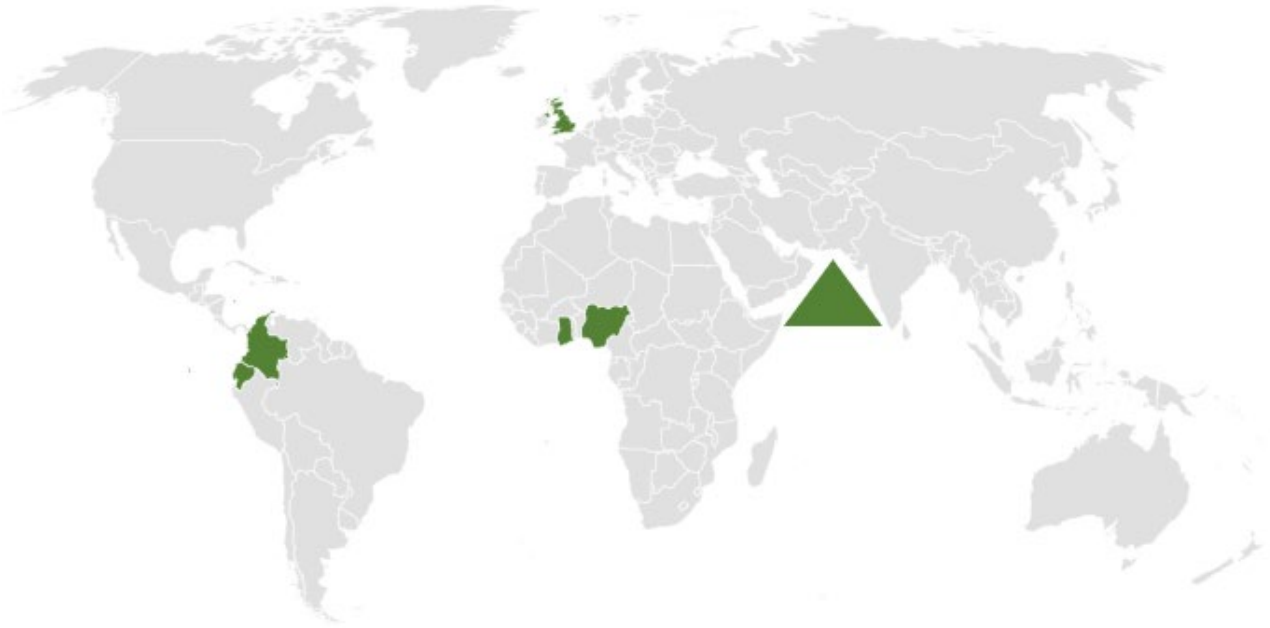
Results and trends regarding foreign submissions analyzed by HSP in 2024 are summarized in the following section.

FOREIGN SUBMISSIONS

FOR

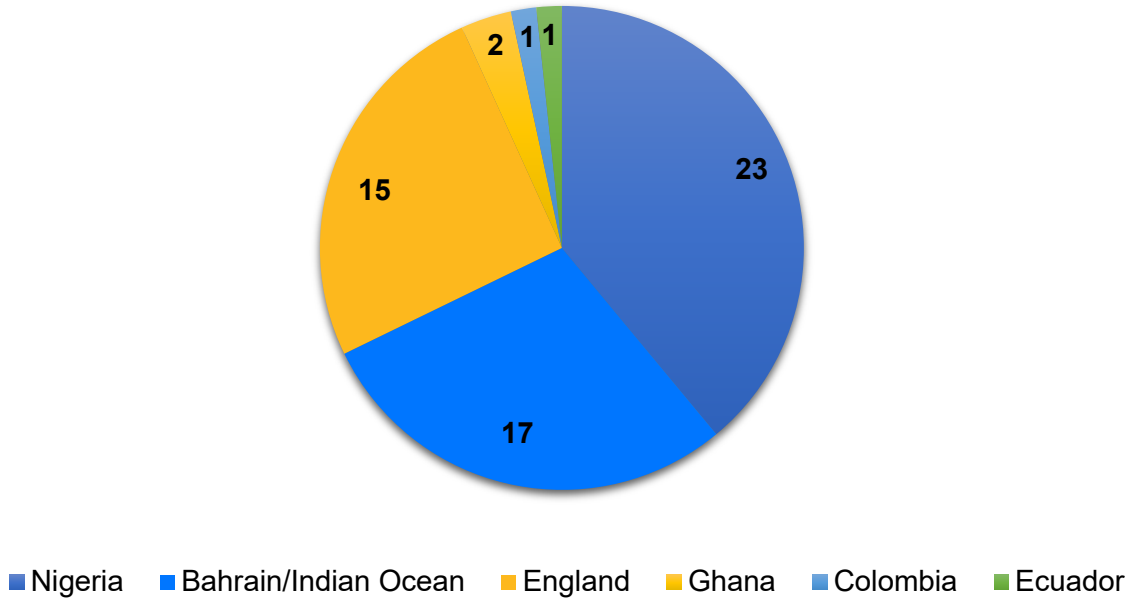
The submissions of suspected heroin exemplars by DEA foreign offices continue to provide valuable insight into worldwide heroin production and trafficking. HSP analyzed 88 foreign submissions – all seized in 2024. See the map below for seizure locations.

Figure 23: Foreign Seizure Locations 2024



As shown in the chart below, the largest number of submissions in 2024 came from the Lagos office in Nigeria (23). The Bahrain office submitted 17 samples from suspected heroin trafficked in the Indian Ocean using fishing vessels off the Makran Coast in Pakistan. The London office submitted 15 samples seized by the law enforcement agencies across England. Two samples were submitted from Ghana while Colombia and Ecuador submitted one sample each.

Figure 24: Foreign Submissions 2024



FOREIGN SUBMISSIONS

FOR

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

FOREIGN RESULTS AND TRENDS

Nigeria

The Lagos Office submitted 23 samples in 2024 with 17 being classified IS or NA These samples appeared to be "sham" heroin where processing waste containing high amounts of noscapine (with little to no actual heroin) were cut with typical SWA adulterants like caffeine, acetaminophen, dextromethorphan and chloroquine. Three samples were classified as either SWA/A or SWA/C with an average heroin purity of 30% and cut with caffeine and dextro-methorphan. Two samples were classified as UNK, and the final submission consisted of purple lollipops that were found to contain no controlled substances.

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 17 samples from RNIFC from its 2024 seizures, of which 11 samples were classified as NA. These samples, again, appeared to be "sham" heroin where processing waste containing high amounts of noscapine (with little to no actual heroin) were cut with typical SWA adulterants like caffeine, acetaminophen, dextromethorphan and diazepam. Four samples were classified as SWA/A with an average heroin purity of 10% and cut with caffeine and acetaminophen. Two samples were classified as UNK .

England

The DEA London Office submitted 15 samples from 2024 seizures. Thirteen samples were classified as SWA/A with an average purity of 36% and cut with acetaminophen, caffeine, phenacetin, and diazepam. The remaining two samples were classified as SWA/C (29%) and IS (5%), respectively, and both were cut with caffeine and acetaminophen.

Ghana

HSP analyzed two samples from Ghana in 2024. Unfortunately, only small amounts for each were received causing both to be classified as IS. However, partial analysis for one sample was possible and revealed heroin with a purity of 92% and indications of SEA origin. While the vast majority of the limited number of samples submitted to HSP from Ghana over the years have been classified as SWA origin, this particular sample resulted from a checked luggage seizure on a flight originating from Bangkok, Thailand.

South America

Only two samples were received from South America in 2024. One sample from Ecuador was classified as INC-SA containing 22% heroin cut with caffeine, diltiazem and aminopyrine. The other sample, from Colombia, was classified as NA and appeared to be heroin processing waste.

FOREIGN SUBMISSIONS

FOR

The data from 2024 foreign submissions are summarized in the table below.

COUNTRY OF SUBMISSION	NUMBER OF SAMPLES	AVERAGE HEROIN PURITY (as HCl)	ORIGIN	ADULTERANTS AND DILUENTS
Nigeria	**17**	2%	IS/NA*	Caffeine (17), dextromethorphan (16), chloroquine (8), acetaminophen (5), phenacetin (3), metronidazole (2)
Nigeria	**3**	30%	SWA/C (2), SWA/A (1)	Caffeine (3), dextromethorphan (3)
Nigeria	**2**	6%	UNK	Caffeine (2), dextromethorphan (2)
Bahrain/Indian Ocean	**11**	Trace	NA*	Caffeine (9), acetaminophen (7), dextromethorphan (7), diazepam (2)
Bahrain/Indian Ocean	**4**	10%	SWA/A	Caffeine (4), acetaminophen (2), diazepam (2)
Bahrain/Indian Ocean	**2**	1%	UNK	Caffeine (2), acetaminophen (2), dextromethorphan (2)
England	**1**	5%	IS	Caffeine, acetaminophen
England	**13**	36%	SWA/A	Acetaminophen (13), caffeine (12), phenacetin (2), diazepam (2)
England	**1**	29%	SWA/C	Caffeine, acetaminophen
Ghana	**1**	92%	IS	No adulteration; partial origin analysis indicates SEA/4 type heroin
Ghana	**1**	0%	IS	No adulterants identified
Colombia	**1**	0%	NA	Heroin processing waste
Ecuador	**1**	22%	INC-SA	Caffeine, diltiazem, aminopyrine

*** "Sham" heroin exhibits with high noscapine content, instead of heroin**

Background information on the HSP sampling plan, signature analyses, origin classifications, as well as, a wave chart of U.S. heroin source regions identified by the HSP over the 48 year history of the program can be found in the final section of the report.

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 measures the relative abundance of isotopes in heroin samples (more specifically, of the morphine derived from opium)

Statistical analyses of signature data (consisting 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 25: U.S. heroin sources identified by HSP for 48 years