



# Fentanyl Signature Profiling Program Report

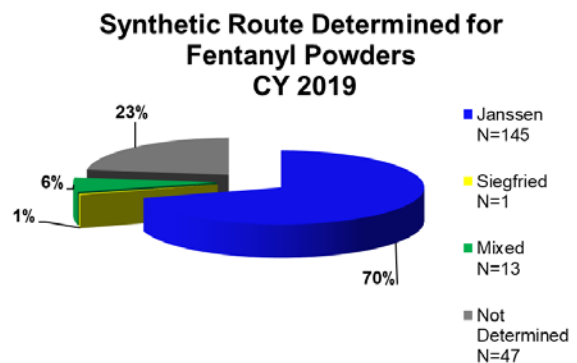
The Fentanyl Signature Profiling Program (FSPP) performs in-depth chemical analyses on fentanyl and fentanyl-related exhibits obtained from seizures made throughout the United States. Analytical methodologies developed at the Special Testing and Research Laboratory (SFL1) through *Operation Death Dragon*, give in-depth reporting on seizures and also link seizures for intelligence purposes. Seizure linkages are disseminated to DEA agents through a Scientific Intelligence Report (SIR), which details the linkages of two or more seizures. This report details the results and conclusions derived from these analyses that are reported on a quarterly basis. FSPP data is not intended to reflect U.S. market share, but is rather a snapshot of samples submitted to this laboratory from the 7 DEA regional laboratories.

For this reporting period, 344 fentanyl and fentanyl-related exhibits seized during CY 2019 were examined by the FSPP (cumulative). Of these exhibits, 316 were fentanyl, and the remaining 28 were fentanyl-related compounds.

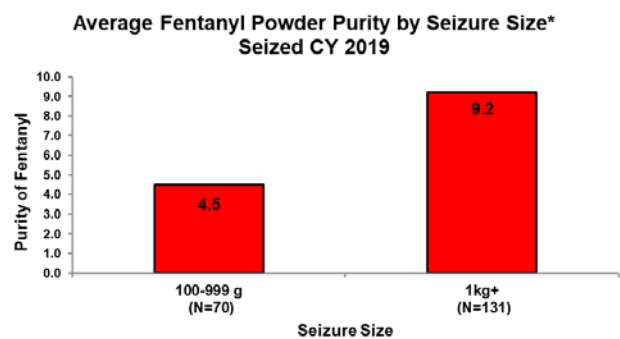
## CY 2019 Fentanyl Seizures

**Powders:** Two hundred six powder exhibits representing 382 kg were examined. The average fentanyl purity was 9.7% with a range of 0.05% to 98.1%. Five exhibits were high purity fentanyl HCl having purities exceeding 90%. The overwhelming majority of exhibits were fentanyl HCl with the exception of 9 exhibits identified as fentanyl citrate. Approximately 70% of all exhibits were primarily diluted with sugars: lactose (33%), mannitol (20%), and inositol (19%). Heroin was detected in 21% of the exhibits (1.1% to 85.8% heroin purity). The predominant synthetic route was determined to be the Janssen Method. The FSPP has added an additional category indicating the presence of

impurities from multiple routes. This category will be referred to as “Mixed.” The following graphic illustrates the determined synthetic routes for powder exhibits.



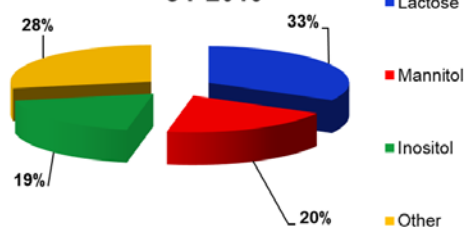
The following graphic illustrates average fentanyl powder purity by seizure size. Due to changes in the FSPP sampling plan, seizures below 100 g are no longer represented.



\*Seizures of very high purity fentanyl not included.

The following graphic illustrates the most common cutting agents.

**Primary Diluents/Adulterants in Fentanyl Powders CY 2019**



\*Primary indicates more than 50% of the sample contains the listed adulterant/diluent

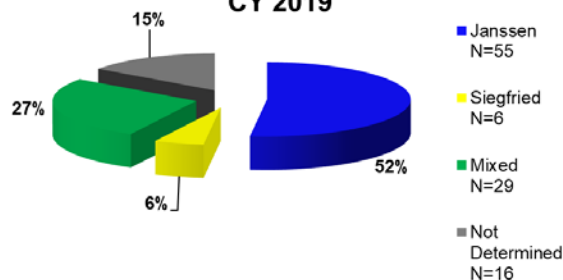
**Fentanyl/Heroin Mixtures:** As previously noted, fentanyl was mixed with heroin in 21% of the exhibits examined. Wholesale fentanyl/heroin seizures within the continental U.S. (typically  $\geq 1$  kg) accounted for 35 kg of the 382 kg of powders examined (9% by weight). Analyses of 11 exhibits (31% sample rate) from these seizures found an average fentanyl and heroin purity of 2.4% and 29.6%, respectively.

The following table summarizes the number of powder samples, total kg seized, and purity by state.

State	# Samples	Total kg	Purity (%)
AL	1	<1	0.16
AZ	3	15	13.3 – 16.4
CA	44	117	0.70 – 19.4
CT	5	2	4.0 – 12.9
DC	1	<1	3.8
FL	4	2	1.3 – 12.2
GA	6	14	0.30 – 91.4
IL	10	35	0.18 – 13.1
IN	1	<1	0.98
MA	10	13	0.01 – 9.1
MD	3	10	11.3 – 12.3
MO	5	10	1.3 – 7.8
NJ	8	13	9.6 – 19.1
NM	13	9	8.6 – 14.0
NY	43	64	0.38 – 14.0
PA	20	18	0.28 – 14.7
PR	1	<1	0.05
RI	6	3	1.3 – 8.5
SC	6	32	0.39 – 13.2
TN	3	6	3.5 – 3.7
TX	5	28	1.9 – 13.4
WA	1	<1	12.0
WV	3	1	1.3 – 6.4

**Tablets:** One hundred six tablet exhibits representing 154 kg were examined. The average tablet contained 1.7 mg of fentanyl with a range of 0.02 to 4.2 mg/tablet. All exhibits were fentanyl HCl. The salt form could not be determined for eight exhibits due to low fentanyl concentration. Approximately 75% of tablet exhibits contained a combination of acetaminophen, dipyrrone, lactose, and mannitol. The following graphic illustrates the determined synthetic routes for tablet exhibits.

**Synthetic Route Determined for Fentanyl Tablets CY 2019**

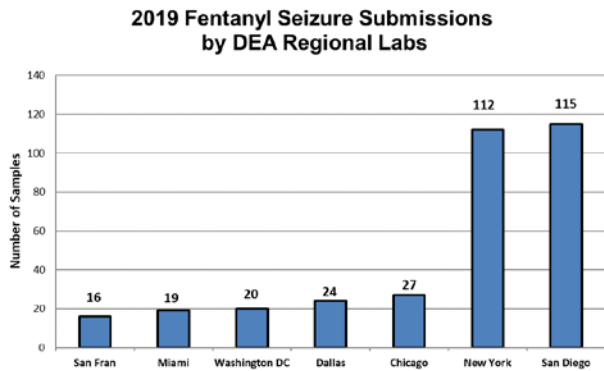


**Tablets Containing Lethal Doses:** A lethal dose of fentanyl is postulated to be about 2 milligrams (0.002 grams). Twenty-nine of the tablet exhibits described above (27%) contained a potential lethal dose.

The following table summarizes the number of tablet samples and amount of fentanyl by state.

State	# Samples	mg/tablet
AK	1	2.0
AZ	24	0.92 – 3.6
CA	40	0.02 – 4.2
CO	2	0.93 – 1.7
FL	5	0.01 – 3.4
GA	3	1.2 – 2.0
IL	2	1.0
IN	1	1.8
MA	6	0.6 – 1.2
MN	1	2.1
MO	1	1.8
MT	1	1.8
NJ	1	0.89
NM	3	1.0 – 1.7
NV	3	1.8
NY	5	0.91 – 2.4
PA	2	2.0
TX	1	0.47
WA	3	1.9 – 2.0
WI	1	1.7

The majority of samples are submitted to the FSPP from the seven DEA regional laboratories. The following graphic illustrates submissions to SFL1 from DEA regional laboratories and is intended to show the distribution of examined samples throughout the U.S.



### Foreign Submissions (CY 2019)

The FSPP has begun receiving foreign submissions for the first time. To date, there have been four powder exhibits analyzed from seizures in Prescott, Ontario. Each exhibit was determined to be fentanyl citrate with a purity range of 93.7% to 98.1%. All four exhibits were determined to be synthesized via the Janssen route.

### Seizure Linkages (CY 2019)

The primary focus of the FSPP is to make seizure linkages through multiple, in-depth signature methodologies developed at SFL1. The majority of the linkages made are “cold hit” linkages where the investigators are unaware that two or more seemingly unrelated seizures contained the same fentanyl. Many of these seizure linkages show cross-country trafficking routes (i.e., identical fentanyl seized on both the east and west coasts). For CY 2019 seizures, 11 separate sets of seizure linkages have been made which encompass 25 different exhibits totaling over 16 kg.

### CY 2019 Fentanyl-related Compound Seizures

Twenty-eight exhibits containing fentanyl-related compounds as the primary fentanyl were examined. The following table summarizes the data obtained from the signature analyses.

Fentanyl-related Compound	# Exhibits	Purity (%)	Descriptions
2-Furanylfentanyl	4	0.01 – 4.1	Powders=1, Tablets=1
4-ANPP	1	91.7	Powder
4-Fluoroisobutyrylfentanyl	1	0.56	Powder
Acetylfentanyl	1	11.6	Powder
Benzoylfentanyl	1	81.9	Powder
Butyrylfentanyl	1	6.2	Powder
Carfentanil	12	0.01 – 0.15	Powders=9, Tablets=3*
Cyclopropylfentanyl	1	82.3	Powder
Methoxyacetylfentanyl	1	90.3	Powder
Valerylfentanyl	5	5.5 – 8.9	Powders

\*All three carfentanil tablet exhibits contained  $\geq 20$  micrograms/tablet (postulated to be lethal doses).

This report was prepared by the Special Testing and Research Laboratory (SFL1) of the Office of Forensic Sciences.