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Solid Dosage Forms: 1975-1983

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ABSTRACT: The changes in the types and drug content of solid dosage forms as analyzed in the ballistics program at the Drug Enforcement Administration (DEA) Special Testing and Research Laboratory from 1975 to 1983 are discussed. Trends and patterns in stimulants, depressants, and hallucinogenic drugs are explained.

KEYWORDS: criminalistics, controlled substances, illegal drug sales, surveys

The ballistics program at the Drug Enforcement Administration's (DEA) Special Testing and Research Laboratory in McLean, VA, is given the task of determining the common manufacturing source of solid dosage drug exhibits. (In the ballistics analysis, evidence samples are compared with reference collection samples for identical toolmarks and ingredients. If the samples are the same then it is assumed that they have a common manufacturing source.) The principle purpose of this toolmark analysis is to provide courtroom testimony of a scientific nature that will corroborate conspiracy charges or otherwise tie together defendants in criminal cases and to establish the commercial versus clandestine (counterfeit) origin of evidence [*1-2*].

A by-product of the results of the ballistics program is an annual summary of the year's exhibits that is used in training programs conducted at the McLean laboratory. When one reviews the annual results in sequence, some trends and long-term changes become obvious. This paper is a summary of these trends in solid dosage drug forms from 1975 to 1983 plus some pre-1975 background information.

The estimated total demand for dangerous drugs on United States illicit market in 1981 was approximately 3 300 000 000 dosage units. By dangerous drugs we mean stimulants (and their look-alikes), sedatives, tranquilizers, and hallucinogens (marijuana, cocaine, and heroin are not included in these numbers (Table 1) [*3*].[2] The total demand is broken down as follows:[3]

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[2]The annual drug consumption data in this report based on "DAWN [Drug Abuse Warning Network annual reports] data (emergency room) were aggregated by therapeutic class to fit the classes in the Household Survey" and ". . . the reported 1979-1981 DAWN data were extrapolated to the abuser estimate, for each class of drug. Data regarding frequency of use were derived primarily from the NIDA [National Institute of Drug Abuse] survey of abuse patterns of persons aged 18-25 (NIDA Monograph 5)" from Appendix C, p. 108, of the NIE in Ref *3*.

[3]Powder quantities of drugs are converted to "dosage units" by dividing the pure drug weight by the DEA standard dosage unit weights. For the principle drugs of interest these are: amphetamine—10 mg, barbiturates—100 mg, LSD—50 μg, methamphetamine—5 mg, methaqualone—300 mg, and PCP—5 mg. For example 1 g of pure amphetamine powder would be 100 dosage units.

Stimulants	2 900 000 000 dosage units
Sedatives	206 000 000 dosage units
Tranquilizers	165 000 000 dosage units
Hallucinogens	35 000 000 dosage units

Stimulants

Of the stimulant demand above, 2 700 000 000 dosage units are for methamphetamine, most of which is supplied in powder form from local clandestine laboratories. Approximately 50% of all clandestine laboratories seized by DEA between 1978 and 1981 produced methamphetamine [*4*]. Nearly all the methamphetamine sold on the illicit or "street" market comes from illegal sources [*3*]. Of the rest of the stimulant demand, some 200 000 000 dosage units are amphetamine. Most of the amphetamine is also sold as powder and 80% of all the amphetamine is estimated to be from clandestine laboratories [*3*]. Referring again to the laboratories seized by DEA in the 1978 to 1981 period we find that 9 to 10% of all laboratories produced amphetamine [*4*]. Informal discussions with state and local drug chemists at regional forensic science meetings support the order of magnitude of these figures. Drug law enforcement agencies continue frequently to find methamphetamine and amphetamine clandestine laboratories. The demand figures shown above help account for this continual illicit laboratory problem.

Since nearly all methamphetamine is distributed as powder along with 80% of the amphetamine, this leaves approximately 40 000 000 dosage units of amphetamine in 1981 to be accounted for by tablets and capsules. In the 1960s, amphetamine and methamphetamine were frequently encountered in the form of legal commercial products that had been diverted into the illegal channels. In May 1971, both drugs were rescheduled into Schedule II which meant that DEA, after consulting with other federal agencies, was now able to impose manufacturing quotas. By reducing these quotas each year DEA has considerably changed the diversion of commercial amphetamine and methamphetamine tablets and capsules into the illicit market since the 1960s.

Originally there were numerous legitimately produced tablet and capsule types: methamphetamine was often seen as oblong, speckled tablets in varying shades of blue and green; amphetamine was seen as round, double-scored tablets (usually 12.7 mm [0.5 in.] in diameter, white in color, called "bennies" or "cartwheels"), as rounded triangular tablets (for example, Dexedrine® known as "dexies" and Benzedrine®), as oval shaped tablets (often pink in color known as "footballs" on the street), and as capsules in black, yellow, brown/clear, green/clear, and white/clear colors. The black capsules, "black beauties" or "black mollies," were one of the most popular preparations. Before rescheduling, most amphetamine exhibits on the illicit market, and the methamphetamine exhibits to a lesser extent, were these commercial products. As the manufacturing quotas were reduced the supplies of the commercial products to the street market were reduced. In the early 1970s, two illegal solutions for this stimulant supply problem were developed: (1) an increase in clandestine methamphetamine

TABLE 1—*The major categories of solid dosage form drug samples as a percent of the total samples examined by the ballistics program in the years 1975 through 1983.*

	1975	1976	1977	1978	1979	1980	1981	1982	1983
Mini-bennies	44	29.5	23.5	24	15	5.5	3.5	5	4
Commercial stimulants	12	15.5	15	16	10	8	9.5	8	7
Look-alikes	...	...	...	...	6	10.5	18.5	11	7
Depressants	12	21	25	15	34	46	36	39.5	43
LSD	13	8	8	18	17	13	14	14	15

("speed") laboratories whose product was sold as powder samples and (2) the "mini-bennie" phenomenon.

Mini-bennies are white, doubled-scored tablets, about 6.35 mm (1/4 in.) in diameter which are produced by numerous tabletting operations in this country and in Mexico. Mini-bennies quickly became popular and dominated the stimulant solid dosage form trafficking in the mid and late 1970s. The largest operations were established in 1973 and 1974, and the all-time largest producer is still active today.

In the period of 1973 to 1980, 87.5 million mini-bennie tablets were removed from the illicit market [5]. The largest manufacturer of mini-bennie tablets, nick-named "grandpappy" by DEA chemists in the ballistics program, produced 58 million tablets that were seized in this time frame. This is 66% of all mini-bennie tablets (controlled and noncontrolled drugs). This operation is very likely located in Mexico with most of its products being smuggled into the United States through the southern California border. The "grandpappy" mini-bennies accounted for 95% of the illicit amphetamine tablets seized in the United States and Mexico in this time period. The amphetamine in "grandpappy" mini-bennies is synthesized in a two stage procedure: (1) phenylacetic acid reacts with acetic anhydride to form methyl benzyl ketone (P2P) which is then processed (2) by the Leuckart reaction to form amphetamine. The mini-bennie tablets from "grandpappy" show trace amounts of the various precursors and by-products of this synthetic procedure. To date, about 70 million "grandpappy" mini-bennies have been seized with an average of 1 mg of amphetamine per tablet.

Mini-bennies in general were at their peak in the mid 1970s and since then law enforcement efforts on both sides of the border have reduced the number of samples seen. Seizures of clandestine chemical laboratories and illicit tabletting operations by the Mexican Federal Judicial Police have reduced supplies while increased efforts against smuggling on the southern U.S. border have reduced the flow of this illicit product and thus lowered its availability on the street market. Figure 1 shows the steady decrease of mini-bennies in the exhibits analyzed by the ballistics program. State and local agencies have seen the same trend toward this decline in mini-bennies. Mini-bennies in 1983 account for about 4.5% of the ballistics exhibits, which is one tenth of the mini-bennie workload in 1975 (Table 1 gives 44%). Most of the mini-bennie tablets seen today (90% or so) have noncontrolled drugs such as ephedrine.

The reduction in the number of mini-bennies available for street sales has left the demand for stimulants unsatisfied. This demand has been partly met by the clandestine drug labora-

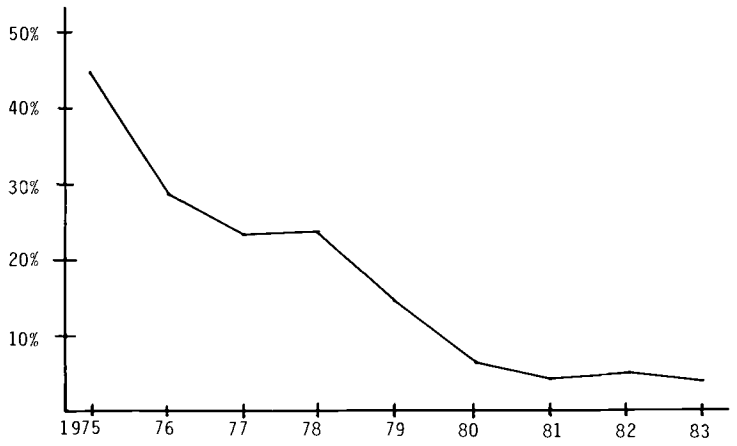

FIG. 1—*Mini-bennie samples as a percent of the total samples examined by the ballistics program.*

tories which manufacture amphetamine and methamphetamine powder products. Seizures of clandestine methamphetamine laboratories peaked in 1979 and have *slowly* decreased since then [*3*]. The level of seized clandestine amphetamine laboratories has been fairly constant over the 1976 to 1981 time frame.

Figure 2, the commercial stimulant samples analyzed in the ballistics program, shows that these samples have been relatively constant in their availability on the street market since 1975. This shows the effectiveness of DEA's diversion control policies and manufacturing quotas system for Schedule II drugs.

However, the demand for stimulants was not fully satisfied by increased production of clandestine methamphetamine powder. There was, and still is, a demand for the traditional stimulant solid dosage forms such as the black or yellow capsules and the various tablet types mentioned earlier. This demand fostered the growth of the "look-alikes." Look-alike solid dosage forms are tablets or capsules with any combination of ephedrine, pseudoephedrine, phenylpropanolamine, and caffeine in a form that imitates or mimics the traditional stimulant products containing amphetamine or methamphetamine. The look-alike preparations are manufacturerd by small unlicensed companies in the United States (at first mostly in Pennsylvania and Long Island but then at locations all over the country). Originally there were no specific regulations against the manufacture of look-alikes, beyond the normal "good manufacturing practices" relating to cleanliness, purity, and quality control. Taking advantage of the "open space" in the law, numerous small production facilities were started. These manufacturers supplied literally hundreds of distributors. (On 15 Feb. 1981, *The Washington Star* reported that at least 40 residents of Lewistown, PA, a small county seat in the Allegheny Mountains, were licensed to distribute look-alike preparations.) By 1981 the look-alikes had become a $50 000 000 a year industry [*6*].

The look-alike drugs were sold quite openly through magazine advertising and by other direct methods (such as cards or flyers [see Fig. 3]).

The openness of this new product type enables the sellers to reach new markets. Students in junior and senior high schools (and in some cases elementary schools) who did not have ready access to "hard drugs," either the rarely available commercial amphetamine and methamphetamine products or mini-bennies, suddenly found that they could buy look-alikes by mail or from enterprizing entrepreneural classmates. The distributors' ads emphasized that look-alikes were "100% legal stimulants!" With prices at $6 per 100 and $25 per 1000 and COD orders readily accepted as well as MasterCard and Visa orders, the look-alike industry bloomed at an alarming rate. The danger of look-alikes lies mostly in (1) creating a demand for the "real" drugs—the commercial stimulants that these products were imitating—thus building up the total demand for stimulants which is already near 3 billion dosage units and (2) the problem of look-alike abusers accidently getting some product actually containing amphetamine or methamphetamine without knowing about it (look-alike abusers routinely take two to five capsules at a time; five amphetamine capsules in a young teenager will induce much larger physiological responses than expected).

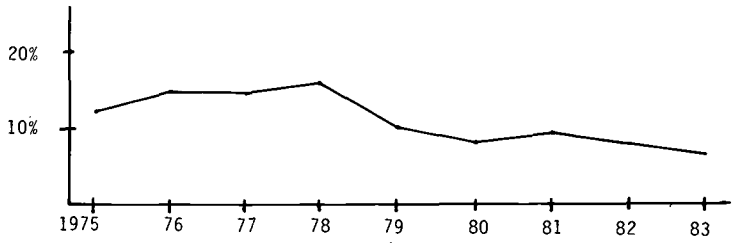

FIG. 2—*Commercial stimulant samples (amphetamine, phendimetrazine, phentermine, and phenmetrazine) as a percent of the total samples examined by the ballistics program.*

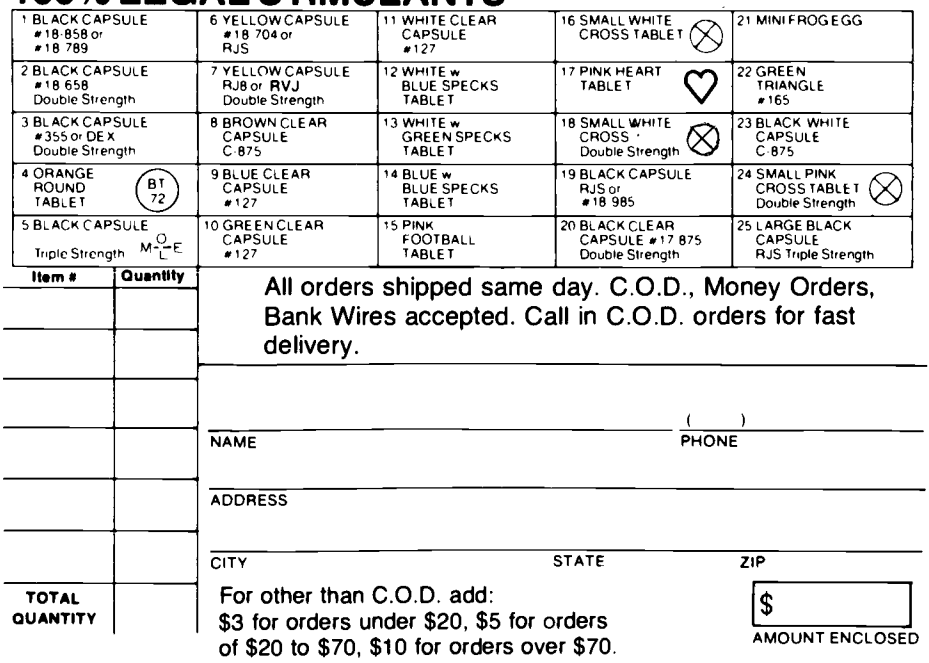

FIG. 3—*Order form for look-alike drugs.*

From a law enforcement viewpoint, control of look-alikes is difficult. The U.S. Postal Service started administrative law court procedures against distributors using the mail service and the U.S. Food and Drug Administration (FDA) closed down several manufacturing plants for violations of FDA regulations. In August 1982, the FDA banned production of triple combination look-alike products unless the manufacturer had obtained a NDA (new drug application) or an ANDA (amended NDA based on some other manufacturer's NDA). This effectively stopped production of the triple combination products throughout this country. In December 1983, FDA also banned production of double combination look-alike preparations without NDAs or ANDAs. Already there is some evidence that look-alike manufacturers have followed the mini-bennie producers south of the border. Smuggling look-alikes across the U.S.-Mexico border will be much more difficult than open manufacture and distribution within the United States.

Figure 4 shows the percentage of look-alikes as seen in the ballistics program workload. The federal government does not have a "turkey law" against look-alikes and thus DEA agents cannot initiate cases against look-alike sellers and manufacturers (43 states now have "turkey laws" to prohibit manufacture, sale, or distribution of look-alike products) [7]. ("Turkey" is a slang word for a noncontrolled substance being sold or distributed as a controlled drug. "Turkey laws" are criminal laws for the sale, distribution, or manufacture of these noncontrolled substances whenever they are sold or offered as controlled drugs.) The look-alike samples in the ballistics program reached a peak in 1981 and decreased thereafter. State and local agencies, especially in the areas where mini-bennies were once very popular, report that look-alike preparations are still a significant portion of their drug workload sometimes reaching 50% of all drug samples (excluding marijuana) they analyze. However, the overall trend is downward as FDA moves to stop production in the United States and continued enforcement at the state and local levels discourage distribution and sales.

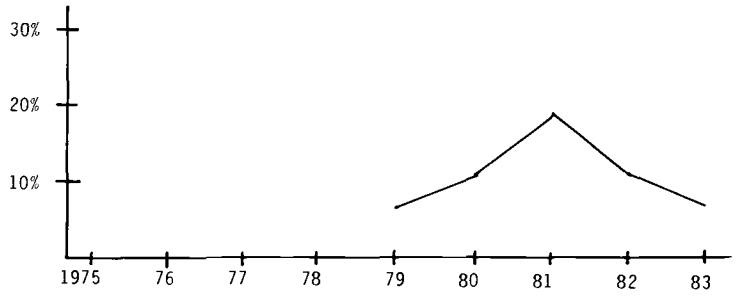

FIG. 4—*Look-alike samples as a percent of the total samples examined by the ballistics program.*

Depressants

The 1981 Narcotics Intelligence Estimate calls for 206 000 000 dosage units of sedatives (barbiturates, methaqualone, and so forth) and 165 000 000 units of tranquilizers (diazepam and so on). Another reference reports that "Americans consume more than 5,000,000,000 (5 billion!) legally purchased benzodiazepines annually, and countless millions more are bought on the streets . . ." [*6*, p. 185].

Figures 5 and 6 tell an interesting story. First, Fig. 5 shows a generally increasing trend in depressant samples overall. Figure 6 shows that this trend has three distinct components within the upward trend.

In the 1960s when commercial amphetamine and methamphetamine products were being diverted from legitimate channels, capsules containing amobarbital, pentobarbital, or secobarbital were the principal depressants demanded in the illicit traffic. Known as "bluebirds," "yellow jackets," and "red devils" from their distinctive colors, these products were the "big three" of the depressant market. In May 1973, DEA moved to reschedule these three drugs to Schedule II. Again with the power to set manufacturing quotas, DEA was able to reduce the numbers produced in this country rapidly. Since the barbiturates are not easy to synthesize in a clandestine laboratory setting, the traffickers moved south to Mexico to divert barbiturates from the legitimate channels there and smuggle them across the U.S.-Mexico border. As efforts by DEA and the Mexican Federal Judicial Police stopped legitimate capsules from being diverted in Mexico, the traffickers again shifted their sources to bulk quan-

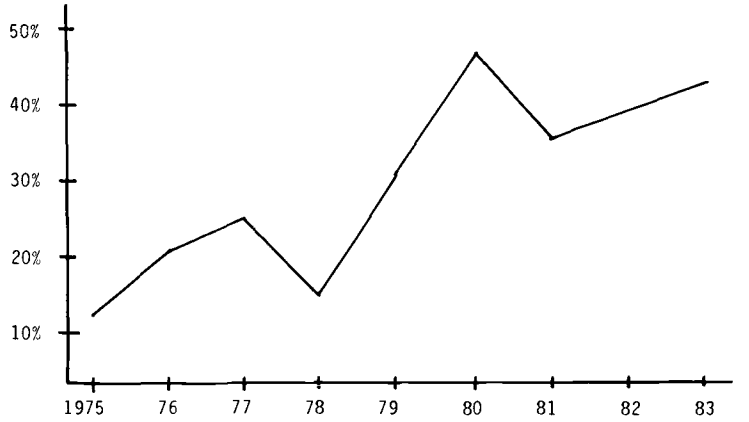

FIG. 5—*Depressant samples as a percent of the total samples examined by the ballistics program.*

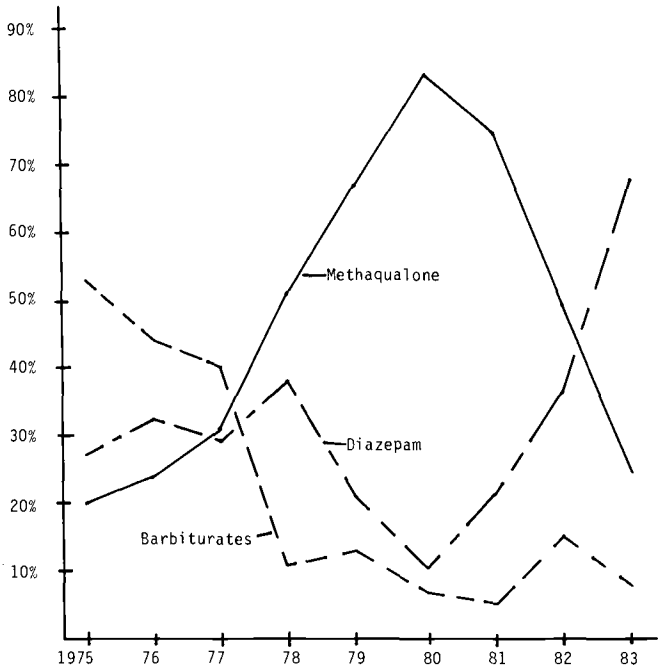

FIG. 6—*Depressant samples by type of depressant drug as a percent of all depressant samples.*

tities of various barbiturates (including phenobarbital) and other depressant drugs (such as meprobamate and other tranquilizers) which were then filled into red capsules ("Mexican reds") in clandestine capsule operations in rural northern Mexico. Mexican reds supplanted the legitimate products in a short time and for several years these capsules dominated the depressant samples. From 1978 and onward to today, the Mexican reds have disappeared and barbiturate samples today are almost totally the result of diversion of legitimate products.

As the percentage of depressant exhibits containing barbiturates decreased, exhibits containing methaqualone rapidly increased as shown in Fig. 6. Methaqualone was widely recommended as a replacement for barbiturates in treating insomnia and so forth. It was advertised as being safer, particularly with respect to tolerance, multiplicative effects with alcohol, and withdrawal symptoms. In each of these areas amobarbital, pentobarbital, and secobarbital had "a bad reputation." As with other depressants, methaqualone gave feelings of euphoria and a sense of calmness. "Users of this drug claim that in addition to producing a euphoric and sensual state of relaxation, methaqualone also has aphrodisiacal properties. These effects, if they are more than imagination, are probably due to the drug's muscle relaxant qualities, which also can cause a lack of coordination" [*6*, p. 179]. Thus based on rumors methaqualone became the "love drug" of the 1970s and 1980s.

Methaqualone was produced commercially in several forms: (1) Quaalude® tablets (150-and 300-mg methaqualone base manufactured by William H. Rorer Inc. until September 1978 and by Lemmon Pharmacal Company until December 1983; distribution of Quaaludes ceased 31 Jan. 1984); (2) Sopor™ tablets (150- and 300-mg methaqualone base manufactured by Arner-Stone, discontinued from production about 1980 to 1981); (3) Parest® capsules (200-and 400-mg methaqualone hydrochloride originally manufactured by Parke-Davis Company until 1979 when Lemmon bought the rights—Lemmon manufactured Parest for a short period of time—perhaps one to one-and-one-half years—and then discontinued the product line); and (4) Mequin™ tablets (150- and 300-mg methaqualone base—these tablets, identical

to Quaaludes except for the tradename and monogram—were made between 1979 and 1982 by Lemmon Pharmacal Company in an attempt to avoid the adverse publicity associated with Quaaludes). In the commercial or legal market, Quaalude was the dominant product with approximately 80% of the legitimate sales.

In April 1973, methaqualone was made a Schedule II controlled substance and manufacturing quotas were set by DEA. While there were exhibits containing methaqualone being seen in the mid 1970s, there was no evidence of its future popularity. As the supplies of legitimate barbiturates decreased and then later as Mexican reds disappeared, the demand for a strong depressant substance continued. Methaqualone was being touted in the medical press as safe and effective. The "good news" penetrated into the illicit channels and diversion of legitimate preparations in the United States started. This demand was countered by lowering the manufacturing quotas for U.S. pharmaceutical firms. As on the legitimate market, Quaaludes were the most popular form of methaqualone in the illicit channels. In 1976, we saw the first counterfeit Quaalude tablets manufactured by a clandestine operation in Florida.

The chemical synthesis of methaqualone is quite simple and has good yields. The precursors are not extremely dangerous materials and they were readily available in large quantities along with the appropriate solvents. DEA immobilized 5 to 15 clandestine methaqualone laboratories a year between 1976 and 1981. Several of these laboratories were quite large. One operating illicit laboratory in Dallas, TX (1977) had purchased 3490 kg (7700 lbs) of *N*-acetylanthranilic acid (the principal precursor for methaqualone) or enough to make 15.5 million counterfeit Quaalude tablets assuming 90% yield in the chemistry and an average of 225 to 250 mg of methaqualone base per tablet. Another operation in the Los Angeles area had stockpiled 9980 kg (11 tons) of the same precursor, but this lab was seized before starting their methaqualone synthesis (this stockpile was financed by the profits from their phencyclidine [PCP] synthesis product sales!).

Successful seizures of clandestine laboratories in the United States along with good press coverage of the raids and trials convinced some criminal elements to move to Mexico. There they started the wholesale diversion of Quaaludes manufactured by Rorer de Mexico and supplied the street market by smuggling the tablets across the border. As compared to minibennie smugglers, the Quaalude smugglers used all portions of the U.S.-Mexico border as crossing points. Also some marine and air vehicles were used. Action by Mexican authorities effectively stopped the legal manufacture of all methaqualone products in 1979. Before this, Rorer headquarters in Pennsylvania had stopped Quaalude production in Canada, Colombia, and Mexico in December 1977. Of course, it took a number of months to sell off all the tablets in inventory at each location and these commercial products were seen on the street markets for approximately one year after manufacture ceased.

With the loss of the commercial supplies, the criminals pursued two avenues to restore their stocks: (1) some Mexican operations moved to import bulk methaqualone from European sources under false bills of lading or they substituted other depressant drugs for the methaqualone in their clandestine products (barbiturates and various tranquilizers were soon seen in counterfeit Mexican Quaaludes) and (2) a few of the Mexican illicit groups tried the synthesis of methaqualone from the usual precursors.

In addition to the Quaalude types from Mexico (first legitimate tablets, then counterfeits as Mexican authorities stopped the legal production), there was another very popular form of methaqualone—Mandrax® (250 mg of methaqualone hydrochloride and 25 mg of diphenhydamine hydrochloride). This product manufactured by Roussel Laboratories in France, Germany, England, Canada, Mexico, Cuba, Italy, Australia, India, Spain, and Argentina was the worldwide competitor to Quaaludes. Grupo Roussel of Mexico City experienced inflated sales as did Rorer de Mexico before the Mexican government effectively banned production. When various groups turned to counterfeiting tablets, Mandrax was as well represented as Quaaludes. The counterfeit Mandrax tablets saw both substitution of other depressants as well as illicitly synthesized methaqualone hydrochloride and base.

In late 1978, Rorer sold manufacturing rights for Quaaludes to Lemmon. When this oc-

curred, the legitimate monogram changed from "Rorer 714" to "Lemmon 714." Within months the first Lemmon 714 counterfeits were on the market. Later when Mequin was first marketed by the Lemmon Pharmacal Company, the counterfeiters had their "LMN 300" tablets on the street market almost as fast as Lemmon got the legitimate tablets to the local drugstores!

Early 1979 saw a new source of counterfeit Quaalude tablets—Colombia. With smuggling routes already well established for marijuana and cocaine and passing through East Coast cities where methaqualone smuggling was virtually unknown at that time, the Colombian Quaaludes moved rapidly to dominate the entire U.S. methaqualone market. By June 1983, DEA had seized 1100 exhibits accounting for more than 22 million counterfeit tablets from *one* operation in Colombia, the world's largest illicit Quaalude operation or 80% of all illegal Quaalude methaqualone tablets seized in the United States in the same time period. Methaqualone in Colombian tablets came from the diversion of legitimately produced raw powder from countries such as Germany, Austria, Hungary, and most recently, China. The enormous quantities of Colombian Quaaludes nearly pushed most of the other clandestine methaqualone operations (Mexico and United States) out of the market place.

Again, by June 1983 we had identified 95 different methaqualone containing counterfeit tablet types (Rorer 714, Lemmon 714, LMN 300, plus various misspellings). Five of these 95 are very probably based in Colombia and accounted for 90% or more of the tablet seizures (about 28 million total) since the beginning of the methaqualone problem. When the clandestine operations first started in Colombia there were no legal restrictions on the possession or manufacture of methaqualone products. With DEA's urging, Colombia soon moved to institute legal restrictions on methaqualone. This forced the counterfeit Quaalude laboratories to import their bulk powder methaqualone under bogus bills of lading. To date there has been no chemical indications of clandestinely synthesized methaqualone in Colombian tablets, nor have these operations tried to substitute other depressant drugs for the methaqualone. Of the 1100 exhibits from the largest Colombian operation, less than 10 exhibits contained either phenobarbital or pure cellulose.

Thus the Colombian tablet makers seem to be uniquely dependent on foreign sources of methaqualone powder smuggled into Colombia and also dependent on smuggling the finished product out of Colombia and then, like other methaqualone preparations, smuggling the product into the United States. The smuggling aspects are, of course, traditional law enforcement problems and the Colombian federal police and U.S. authorities such as Customs and DEA handled these. The DEA office of Diversion Control tackled the methaqualone supply problem with considerable success. They tracked the bulk powder through various duty free ports including Panama City (where the bogus lading bills were usually provided), Miami, London, and Hamburg. At Hamburg, they were able to institute procedural changes that cut that channel of supply. More importantly, Diversion Control persuaded one country after another to stop the export of methaqualone powder. Now only mainland China still allows the export of bulk methaqualone powder. The effect of this work coupled with increased enforcement efforts (the Vice-President's Task Force in Miami and new laws on smuggling in Florida, Georgia, and the Carolinas) and now that five states have rescheduled methaqualone to Schedule I have lead to the fall of methaqualone samples in 1981 to 1983 (see Fig. 6). In 1981 methaqualone represented 74% of all depressant exhibits, whereas it was only 25% in 1983—a very rapid descent for the "love drug!"

There was still the demand for a depressant type of drug that had euphoric overtones. Abusers preferred that the drug be relatively safe as the majority of them did not want to go back to the barbiturates with their dangers and very unpleasant withdrawal syndrome.

Diazepam, the 5-billion-tablet-a-year legitimate business, is the latest depressant chemical to fill the demand for that market. Diazepam is a Schedule IV substance in this country; it is not illegal to possess diazepam in Canada or Mexico. In the United States, the supply of diazepam is strictly limited by patent protection to one company, Hoffmann-LaRoche. This patent protection expires in mid 1985 and then we should see a large number of generic

diazepam products. In Canada there are 30 to 40 generic sources of diazepam. Thus the powder is readily available from various industrial sources. At least five counterfeit diazepam Quaalude operations are very probably located in Canada. The readily available bulk powder and a porous border contributed to diazepam's rise as the depressant of choice.

The Mexican counterfeit Quaalude and Mandrax operations have revived with the substitition of diazepam in their counterfeit tablets. When diazepam was first seen in the illicit tablets, some manufacturers apparently used the same weight of diazepam powder in their products as the weight of methaqualone they had been using. This lead to tablets on the street market with up to 290 to 300 mg of diazepam each! The inevitable result was a rise in deaths as many Quaalude abusers take the tablets with alcohol.[4] The clandestine manufacturers were quick to reduce the diazepam content in their tablets to the average of 30 to 40 mg seen today.

The reduction of methaqualone tablets (seen mostly in the reduction of Colombian Quaaludes) has also improved the sales of counterfeit Mandrax tablets. Apparently produced only in Mexico, there have been several new types of counterfeit Mandrax tablets in late 1983. Some of these new types have diazepam and others use secobarbital.

To date, we have seen nearly 110 different counterfeit preparations that do *not* contain methaqualone including (1) numerous RORER 714 types with some misspellings such as "RRR 714" and "ROREP 714"; (2) a much larger group of LEMMON 714 types; (3) a series of Mandrax types; and (4) several Sopor types plus numerous types that also could be called "look-alike" preparations, that is, they contained drugs such as ephedrine, pyrilamine, aspirin, and so forth, and often these "look-alike" counterfeits were misspelled including "LEMON 714," "LENNON 714," ROROR 714," and "714" alone. We have not seen any counterfeits of the Parest capsules.

The depressant traffic will apparently continue to be the largest segment of the ballistics program. The dominance of diazepam seems to be assured for the next few years.

Hallucinogens

As Figs. 7 and 8 show, the lysergic acid diethylamide (LSD) traffic has been stable for some years now. The Narcotics Intelligence Estimate (NIE) divides the hallucinogen market of 1981 into 20 000 000 dosage units of PCP and 11.5 million units of LSD plus 3.5 million units of other hallucinogens [3]. PCP tablets are extremely rare (we had one PCP tablet exhibit in 1983 in the ballistics progam, less than 1/10% of the total ballistics samples). PCP powder samples apparently account for all the PCP demand. LSD on the other hand is rarely seen as a powder unless a clandestine tabletting operation is seized.

Before 1979 (but after 1972) nearly all LSD samples were tablets. The larger tablets of 1972 to 1974 in the 4.76- and 6.35-mm ($^3/_{16}$- and $^1/_4$-in.) sizes had nearly died out by 1975. These

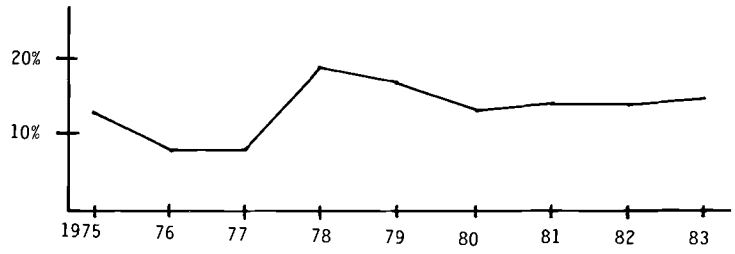

FIG. 7—*LSD samples as a percent of the total samples examined by the ballistics program.*

[4]Based on the Drug Abuse Warning Network (Project DAWN) quarterly and annual reports which are prepared by the National Institute of Drug Abuse (NIDA) that monitor several categories of drug abuse data including emergency room reports and injuries or deaths by controlled substance as reported by medical examiner/coroner offices in selected metropolitan areas in the United States.

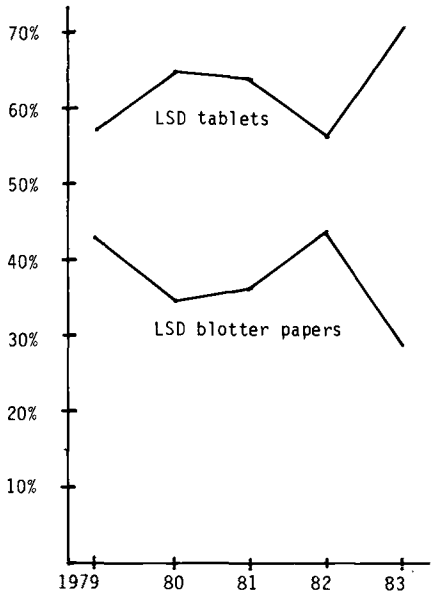

FIG. 8—*LSD samples by type of product as a percent of all LSD samples.*

were replaced by the "microdots" in 2.38- and 3.175-mm ($^3/_{32}$- and $^1/_8$-in.) sizes. The most popular type through the 1975 to 1983 period has been the 2.38-mm ($^3/_{32}$-in.) types. One of the tabletting operations has apparently produced so many tablets that they have remachined their punches twice because of wear and this operation has been working steadily since 1972. The composition of the microdot tablets has been very consistent over the years.

In 1972 there were several exhibits of LSD impregnated paper with printed designs. This sort of sample was seen for a period of approximately one year and then disappeared. The LSD "blotter papers" returned in 1979 and have been active since then. At first the designs on the papers were rubber stamp impressions or were done by the silk-screen process. Neither of these methods is conducive to large-scale production. Rapidly, lithographic offset printed papers took over the market. Offset printing is easily performed in numerous shops throughout the country in a variety of colors and with different types of paper. The LSD in a methanol solution is usually applied to the paper after the printing has been done. This occasionally causes the printing ink dyes to run giving the paper a faint colored stain.

In addition to the lithographic printing, an occasional sample is received printed by the letterpress method (raised metallic plate) and so far only one sample by xeroxographic reproduction has been received. The quality of some printing with registered fully screened four-color work is excellent. Several samples have been found where the manufacturer embossed the paper with a seal-like image after printing, apparently as proof of the product's quality. Also, one recent exhibit had a rubber stamp image on top of the lithographic printed pattern, perhaps for the same reason.

Most of the blotter paper designs fall into two classes: (1) figures, animals, and variations on cartoon figures including Mickey Mouse, Donald Duck, Superman, Snoopy, Tweetybird, and so forth and (2) abstract designs, some of which are quite complex.

There was a reduction in percent of blotter papers relative to tablets in 1983, but it is too early to determine if this is a trend or a minor variation. The blotter paper designs change frequently and occasionally there is an attempt to counterfeit a popular blotter design. The number of new blotter designs in 1983 has not significantly diminished so that the supply of

blotter paper is apparently strong. However, it is very difficult to predict the blotter versus tablet ratio. On the other hand, the LSD supply as a whole was, and is likely to remain for the next few years, stable or slowly increasing.

The sources of the LSD are well described in the 1981 Narcotics Intelligence Estimate [*3*, p. 72]:

> The bulk of the LSD that is distributed throughout the country is believed to be manufactured on the West Coast. DEA ballistics data indicate that only a handful of laboratories are responsible for manufacturing the raw granulated material used in LSD tablet presses. Tabletting operations are not necessarily located at the laboratory site; sizeable quantities of the raw granulated material may be distributed to "franchised" co-conspirators with their own tablet presses. As an additional security measure to hinder law enforcement detection, tabletters change their punches and dies periodically. This practice would help to explain the variety of LSD tablets with basically the same chemical composition currently being offered for sale on the illicit drug market.
>
> Although more diverse than tablets, LSD blotter operations also appear to be controlled by the same handful of individuals on the West Coast. Prepared as a liquid, the LSD is believed to be shipped to trusted intermediaries who then produce the LSD dosages for distribution in the United States and other countries.

Summary

The types of solid dosage drug forms (commercial and clandestine origin) have varied over the time period of 1975 to 1983. The dominance of stimulant tablets, particularly minibennies, have been replaced by the growth of depressant drug samples. Within the depressant category, barbiturates were the principal samples of 1975 to 1977, followed by methaqualone in the years of 1978 to 1982, and now diazepam is the most common depressant drug. The DEA drug ballistics program will continue to monitor these changing patterns in the process of determining the manufacturing source of samples of solid dosage forms submitted for analysis.

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