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**MEDICATION VIOLATIONS AND PENALTIES FOR ARCI CLASS 1, 2 AND 3
FOREIGN SUBSTANCES, IN NORTH AMERICA FROM 1995-1999:
A PRELIMINARY REPORT**

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SUMMARY

This report analyzes and summarizes the Association of Racing Commissioners International (RCI) class 1, 2 and 3 foreign substances identifications, suspensions and penalties reported which were levied from 1995 to 1999 in California, Canada, Florida, Kentucky, Louisiana, Maryland, New York and Ohio.

The introduction of new tests produced the largest number of individual identifications: 56 for clenbuterol (RCI class 3) and 23 for metaraminol (RCI class 1). Environmental contaminants were also highly represented, 16 identifications for morphine (RCI class 1), 15 for benzoylecgonine, and 21 for caffeine (RCI class 2). The third most commonly identified group was therapeutic medications including 28 identifications for Elocaine and 8 for mepivacaine, both RCI class 2 agents. Among the RCI class 3 agents, there were 35 identifications for promazine, 30 for pyrilamine, 28 for albuterol and 22 for procaine.

These identifications are based on an estimated one million samples tested. On this basis, the 62 RCI class 1 identifications represent a "call-rate" of about 6/100,000 samples. If we eliminate morphine and benzoylecgonine, potential environmental contaminants, this rate approximately halves. Beyond this, the rate for RCI class 1 identifications in Thoroughbred racing is even lower, presumably in the order of one per 100,000 samples. By any standards, this is a vanishing low identification rate.

Similarly, the overall identification rate for RCI class 2 agents is about 8/100,000 samples tested, and for RCI class 3 agents it is 2/10,000 samples tested. The overall identification rate for all RCI class 1, 2 and 3 agents is about 1/2,500 samples tested. These are very low identification rates, the more so when one considers that many of these "calls" apparently represent residual traces of therapeutic medications.

The data presented here show that horseracing, and especially Thoroughbred racing, is an extremely "clean" sport in terms of deliberate misuse of RCI class 1, 2 or 3 agents. Additionally, there appear to be significant differences between the identification rates for Thoroughbred, Harness and Quarter Horse racing, with Quarter Horse and Harness racing in certain areas being associated with higher rates of foreign substance identification.

Review of the fine and penalty data shows that the sanctions applied are less stringent than those presented in the ARCI guidelines. However, in view of the relative rarity of ARCI class 1, 2 or 3 identifications and the fact that many identifications reported involve environmental contaminants or "traces" of therapeutic medications, the penalties applied may well be appropriate.

INTRODUCTION

The Uniform Classification Guidelines for Foreign Substances and Recommended Penalties and Model Rules of the Association of Racing Commissioners International's, (RCI) (RCI Classification Guidelines, 2000) was adopted in August, 1991 in response to the McKinsey Report (McKinsey et al., 1991). These guidelines were developed "to assist racing stewards, hearing officers and racing commissioners in evaluating the seriousness of alleged violations of medication and prohibited substance rules in racing jurisdictions." Each agent is placed in a category ranging from Class 1 (drugs with the highest potential to affect performance) to Class 5 (drugs with the least potential to affect performance). Assignment of an agent to a particular class is determined based on: 1) the pharmacology of the drug, 2) drug use patterns and 3) appropriateness (therapeutic value) of the drug. Class 1 agents include opiates, opium derivatives, synthetic opioids and psychoactive drugs, amphetamines and amphetamine-like drugs as well as related drugs, including but not limited to spemorphine, nikethamide, mazindol, pemoline, and pentylentetrazol. These drugs have stimulant and depressant actions that will very likely affect the performance of the racing horse without any therapeutic effects. Class 2 agents have a high potential to affect performance, but less than the class 1 agents. Class 2 agents are psychotropic, certain nervous system and cardiovascular system stimulants, depressants and neuromuscular blocking agents. Local anesthetics that are injected are also placed in this class because of their increased potential to be abused as nerve blocking agents. Class 3 agents include bronchodilators and other drugs with primary effects on the autonomic nervous system. They include antihistamines with sedative properties and some diuretics. They may or may not have acceptable therapeutic use in racing horses. Class 3 agents have less potential to affect the performance than the Class 2 agents. (RCI Classification Guidelines, 2000)

At the same time, the RCI also developed penalty recommendations for each class of drugs. For a class 1 violation, the recommended penalty is a 1-5 years suspension and a \$5,000 fine with a loss of purse. For a class 2 violation, the recommended penalty is 6 months to 1 year suspension and a \$1,500-\$2,500 fine with a loss of purse. For a class 3 violation, the penalty recommended is 2-6 months suspension and up to \$1,500 fine with a loss of purse (RCI Classification Guidelines, 2000).

These guidelines were designed to be a part of a National Medication Policy to bring uniformity to penalties and suspension days for offenders in various jurisdictions. In this communication we review all ARCI class 1, 2 and 3 medication violations reported by California (CA), Canada (CAN), Florida (FL), Kentucky (KY), Louisiana (LA), Maryland (MD), New York (NY) and Ohio (OH). The analysis was limited to RCI class 1, 2 and 3 agents, and the number of violations per thousand tests were calculated or estimated for Thoroughbred, Standardbred and Quarter Horse races in each state.

Materials and Methods:

These data were retrieved from the database of the RCI. This is an extremely extensive database and on occasions the data available were either ambiguous or at odds

with other information. In such cases, we communicated directly with the RCI or Commissions involved to resolve ambiguities. A search was performed for each chosen jurisdiction identifying the number of "calls" of class 1, 2 and 3 agents from 1995-1999. Each search listed the particular foreign substance that was called, the breed (Thoroughbred, Standardbred or Quarter Horse), amount of fine and the number of suspension days levied, and the results are presented in figures 1 through 3.

Results and Discussion:

RCI Class 1 agents:

Figure 1a shows the RCI class 1 foreign substance "calls" from 1995 to 1999 in the major racing jurisdictions: California (CA), Canada (CAN), Florida (FL), Kentucky (KY), Louisiana (LA), Maryland (MD), New York (NY) and Ohio (OH) whose data was analyzed. The total number of class 1 "calls" for this five-year period was 62. Of these, 12 were from Thoroughbred racing, 26 were from Standardbred racing and 24 were from Quarter Horse racing.

Twenty-three of these 24 Quarter Horse identifications were for metaraminol in Louisiana. These identifications occurred over a short period of time and were associated with the introduction of a new test for metaraminol. This unusually large number of identifications presumably reflects the frequency of use of this agent in the Quarter Horse population, and also the time between introduction of the method and reporting of the first "identification". To some extent, this "burst" of identifications is a unique and onetime event.

Review of the remaining class 1 "calls" shows that 15 of these were for "cocaine", presumably as benzoylecgonine, and another 16 were for morphine, to yield a total number of "calls" for both of these agents of 31, exactly 50 percent of all a RCI class 1 identifications. Given the fact that both of these agents have the potential to occur as a result of environmental contamination, it appears that at least some of these RCI class 1 identifications may be due to circumstances outside the control of the trainer.

Since we do not know the total number of samples tested or the number of samples tested for each breed, we estimated that about 200,000 total samples were tested per year based on our early 1980s figures. This yielded a "call" rate for RCI class 1 agents of about 6/100,000 samples. If we take out the 31 "calls" due to morphine and benzoylecgonine (cocaine), then the call rate is approximately half this value, or about 3/100,000 samples. If we take out the large number of metaraminol positives in Louisiana which occurred in Quarter Horse racing, then the call rate for RCI class 1 agents in Thoroughbred and Standardbred racing drops in the order of less than 1 in 100,000.

Figure 1b presents the mean suspension days associated with RCI class 1 identifications. Ohio suspended offenders for RCI class 1 violations for an average of 365 days, Louisiana for 171 days, California for 79 days and New York for 21 days.

Among all the states that suspended trainers for RCI class 1 violations, Ohio clearly has the most rigorous suspension policy.

Figure 1c presents the mean fines associated with class 1 identifications. Again, Ohio levied a mean fine of \$750 for an class 1 violation, while New York was second, and Louisiana a clear third, with an apparent mean fine per violation of seven dollars. Presumably, this very modest figure from Louisiana reflects a single fine spread over the 23 violations for metamaminol reported from Louisiana.

These penalties are clearly much less substantial than the ARCI recommended penalties of 1-5 years suspension and/or a \$5000 fine for class 1 violations.

RCI class 2 agents:

Figure 2a summarizes the RCI class 2 "calls" during the five-year period from 1995 to 1999 in the jurisdictions reviewed. The most commonly identified agent was lidocaine, with 28 identifications evenly distributed between Harness and Thoroughbred racing. These identifications are consistent with what we know of the pharmacology and disposition of lidocaine. Lidocaine is a local anesthetic with an appropriate use in horses in training and it yields a relatively high urinary concentration of its major metabolite, the glucuronide of hydroxylidocaine and is readily detectable in post-race samples. Additionally, lidocaine is commonly added to topical over-the-counter antibiotic preparations to reduce the pain associated with local inflammatory responses. (Harkins et al, 1998) Given these circumstances, it is not surprising that lidocaine is the most commonly identified ARCI class 2 agent in North American racing, and as such it was targeted as a research priority by the Kentucky Equine Drug Counsel Research program. (Harkins et al, 1998; Tobin et al, 1998; Dirikolu et al, 2000)

The next most commonly identified agent, reported 21 times, was caffeine. Caffeine identifications were distributed across the continent and included: California, Canada, Florida, Louisiana, Maryland, New York and Ohio. Again, this is not surprising, since caffeine is the most commonly used psychoactive agent and is a common environmental contaminant. (Harkins et al, 1999)

The third most commonly reported agent was mepivacaine, with 8 identifications in New York, predominantly in harness racing. Since mepivacaine is an important agent used in the diagnosis of lameness in horses and is a legitimate therapeutic medication, these identifications may well be residues of therapeutic medications. It is important to note that of the top three RCI class 2 identified agents, two are legitimate therapeutic agents and the other is a common environmental contaminant. (Harkins et al, 1999 & Woods et al, 1998)

Outside of these three agents, the reported identifications of other RCI class 2 agents were sporadic and somewhat localized. Harness racing in New York appeared to be particularly well represented, yielding six of seven buspirones, three of three

nalbuphines, two of two imipramines, and one ketamine. These identifications speak to both frequent use and effective testing for these agents in this jurisdiction.

If we assume that these identifications were made in about 1,000,000 samples tested over a 5 year period, then the raw identification rate for RCI class 2 "calls" is about 8/100,000 samples analyzed. Review of the New York data presented here also suggests a large preponderance of identifications in Harness racing as compared with Thoroughbred racing. Inspection of the buspirone, imipramine, ketamine, and nalbuphine identification rates show that of the 13 identifications reported in New York racing, 12 were made in Harness racing and only 1 in Thoroughbred racing, a remarkable differential of RCI class 2 "calls" between Harness and Thoroughbred racing.

Figure 2b presents the data on mean suspension days for RCI class 2 agents. This figure shows that Louisiana had the highest mean number of suspension days (100), while Canada was the lowest with 20 days.

Mean fines for RCI class 2 agents are presented in figure 2c, which shows that the largest mean fine of about \$1500 was levied in California, and the lowest fines were levied by Canada (\$125). These numbers were also less than the RCI recommendations of 6-12 months suspension and a \$1500-\$2500 fine.

ARCI class 3 agents:

Figure 3a presents the 248 RCI class 3 identifications by state and racing breed. The most commonly identified agent was clenbuterol (56 identifications), for which a new and highly sensitive test was introduced in May of 1998. Review of the data show that virtually all of these identifications occurred after May 1998 and presumably were associated with the introduction of the new and more sensitive technology, which can detect clenbuterol for 28 days or longer after the last administration. On the other hand, no clenbuterol identifications were reported in Canada during this time, although approximately one third of the total number of samples tested were from Canada.

The second most commonly identified agent was promazine which is a tranquilizer used in racing horses. While promazine, for which a highly sensitive ELISA test exists, has not been studied in detail, it is less potent than clenbuterol and is administered at relatively high doses. As such, this relatively high call rate for promazine is consistent with what we know about the therapeutic use of this agent and its relative ease of detection. (Yang et al., 1988)

The next most commonly identified agent was pyrilamine, which is commonly used and for which a highly sensitive ELISA test exists. Pharmacokinetic data show that pyrilamine administered by any route remained detectable in the urine for seven days or longer. (Tobin et al, 2000) Again, the relatively high call rate for pyrilamine is consistent with what we know about the therapeutic use of this agent and its relative ease of detection.

The next most commonly identified agent was albuterol, a therapeutic bronchodilator widely used in racing horses. Throughout the period of the survey, California had in place a decision level for albuterol of 1 ng/ml in urine. Despite this decision level, there were apparent reports of albuterol identifications in California. It is also interesting to note that no Canadian identifications of albuterol were reported during this period.

Procaine was the next most commonly reported identification. Given the widespread therapeutic use of procaine penicillin and its ease of detection in post-administration samples, this moderate rate of identification was encouraging. At one time procaine, presumably from procaine penicillin, was one of the most commonly reported post-race identification in the area of equine forensic science. (Harkins et al, 1996)

Assuming that the total number of tests run were in the area 1,000,000 for the 5 year period, these data yield an identification rate of about 2/10,000 samples tested for RCI class 3 agents.

Figure 3b shows that for RCI class 3 agents, the highest mean number of suspension days were 36 in Canada, 35 in New York, 23 in Ohio with all other numbers of suspension varying from 18 each in Kentucky and Florida to eight days in California. Similarly, Figure 3c shows that the mean values for fines for RCI class 3 infractions range from mean fines of \$1000 in Florida, to a \$125 fine in Kentucky and Maryland.

The major variable influencing the drug identification rate was the introduction of a new or more sensitive test. In at least two circumstances during this five-year period, a more sensitive test (clenbuterol) and a new test (metaraminol) were introduced. In each case the number of identifications for the agent increased dramatically.

The second factor influencing the identification rate was the possible role of environmental contamination in the sample. Almost half of the RCI class 1 identifications are for morphine and cocaine, agents considered in some circles to be environmental contaminants. Caffeine is also considered an environmental contaminant and is highly represented in the RCI class 2 identifications. An ability to distinguish between environmental contamination and misuse of these agents would be very helpful, and would serve the racing industry and its public image well.

A third factor influencing the identification rate appears to be venue. When the metaraminol test was introduced in Louisiana, it detected abuse of this drug in Quarter Horse racing, but not in Thoroughbred or Standardbred racing. Similarly, and somewhat surprisingly, the data from New York seemed to suggest a much greater rate of medication misuse among Harness horses than among Thoroughbred horses, and the reasons for this difference are not clear.

For those who are familiar with the types of therapeutic medications used in horses in training, the disposition characteristics, and the sensitivity of the test in place,

there are few surprises in the pattern of identifications or findings of residues of therapeutic medications. When therapeutic agents are administered at relatively large doses, are excreted in urine at relatively high concentrations for relatively long periods, and are sensitive to ELISA testing, these agents will clearly be among those most frequently identified.

Among drug testing programs, horseracing has the longest established broad-based and most highly sensitive system in place. Among the 500 listed RCI class 1, 2 and 3 agents, testing during the period of 1995-1999 detected 40 different substances a total of 398 times. Based on these figures, the overall identification rate in these jurisdictions was about one identification per 2,500 samples tested. Additionally, the data suggest that the identification rate in Thoroughbred racing may be substantially less than in Harness or Quarter Horse racing.

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Figure 1a

Violations for RCI Class 1 Agents in the Major Racing Jurisdictions from 1995-1999

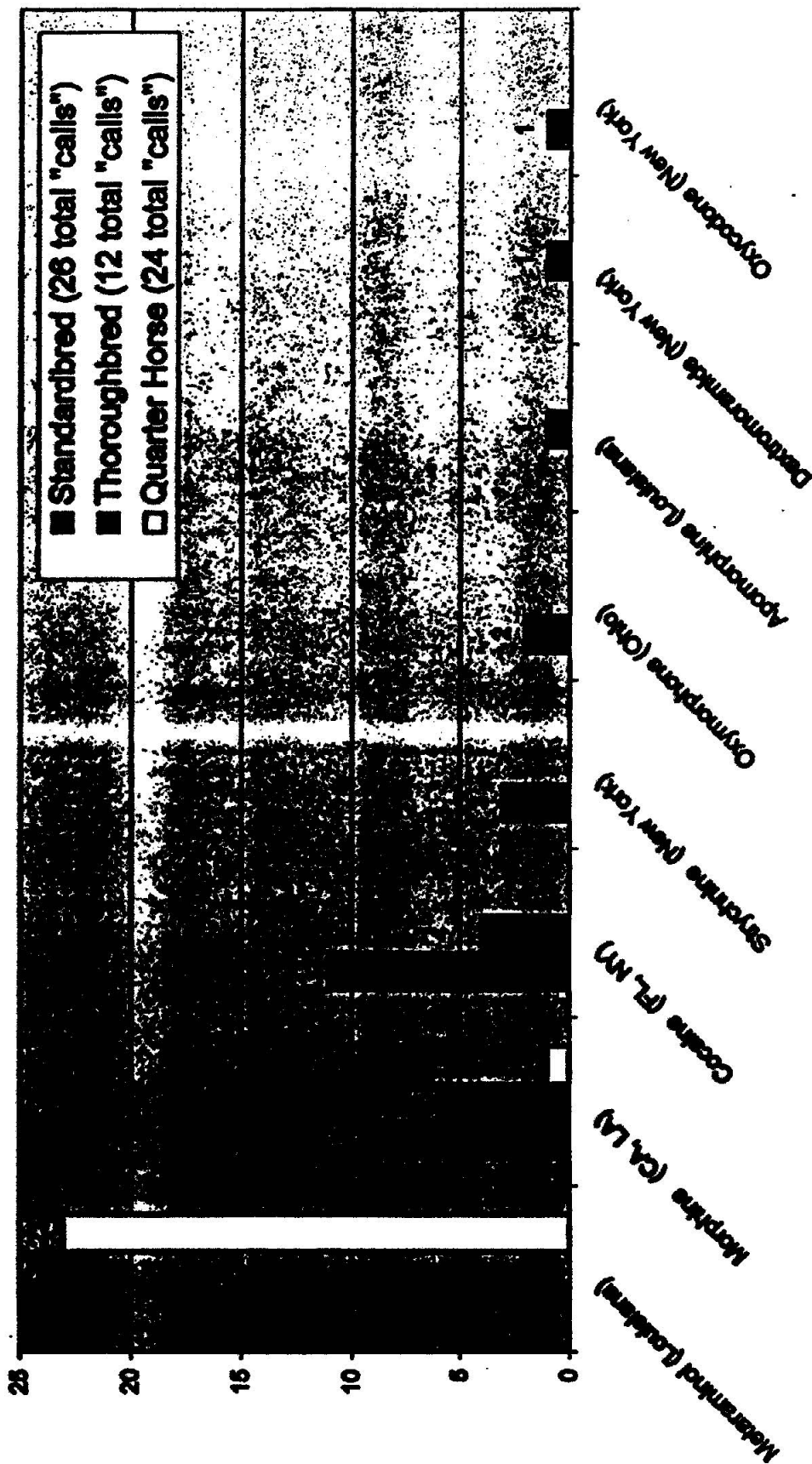
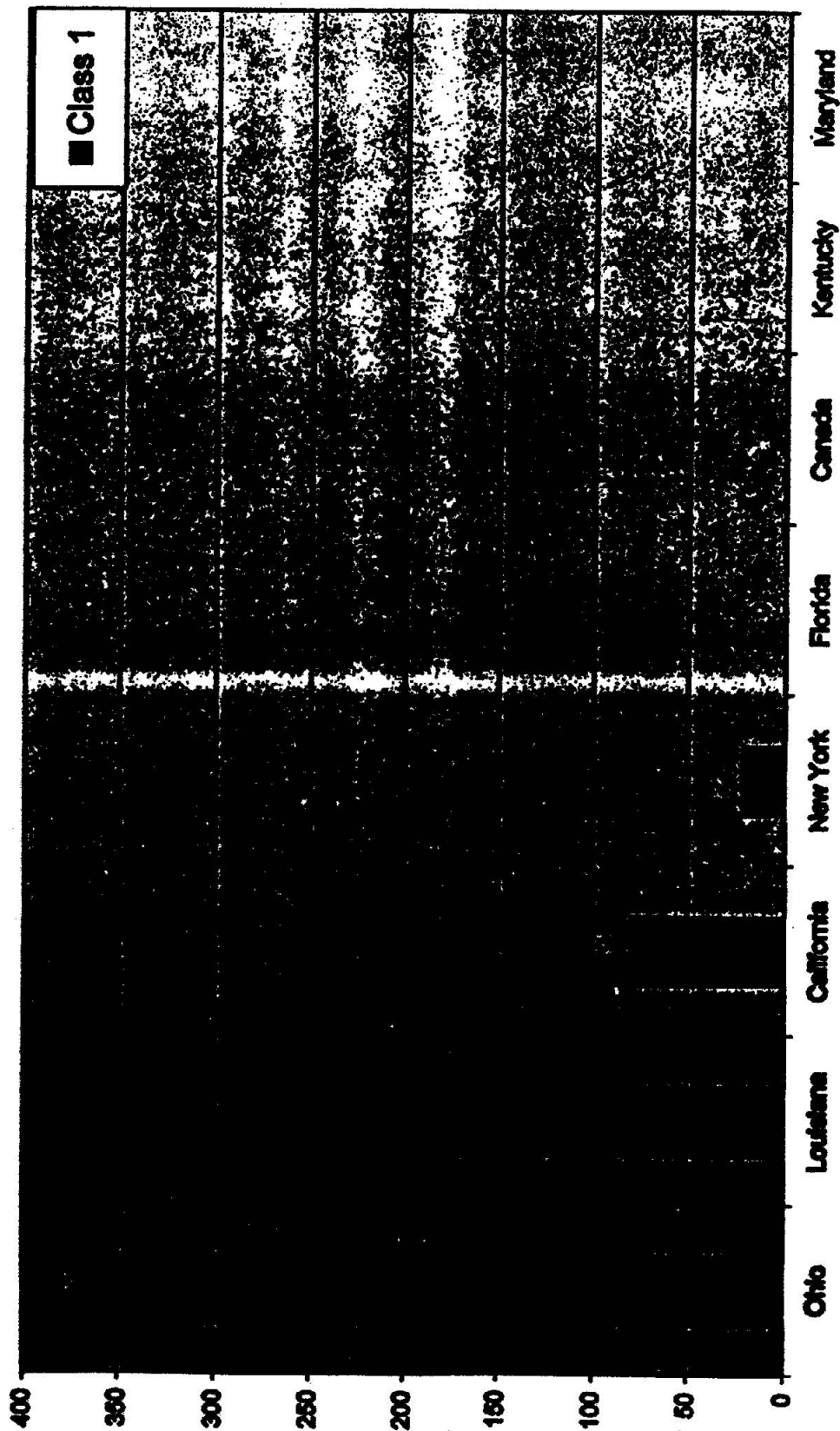


Figure 1b

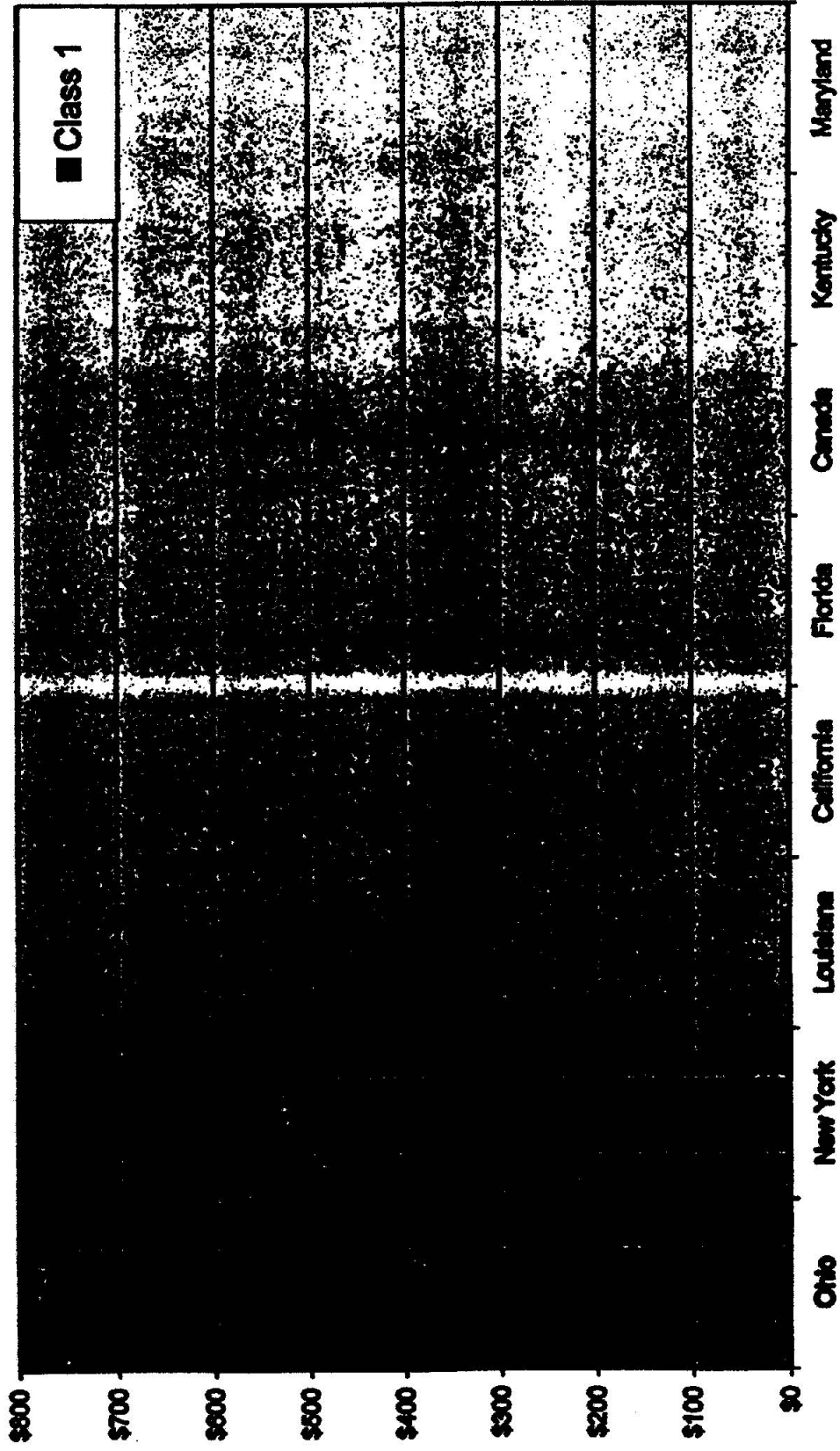
Mean Suspension Days for RCI Class 1 Violations in the Major Racing Jurisdictions from 1995-1999



* blank value indicates there were no "calls" for this state

Figure 1c

Mean Fines for RCI Class 1 Violations in the Major Racing Jurisdictions from 1995-1999



*blank value indicates that no "calls" were made in this state

Violations for RCI Class 2 Agents in the Major Racing Jurisdictions from 1995-1999

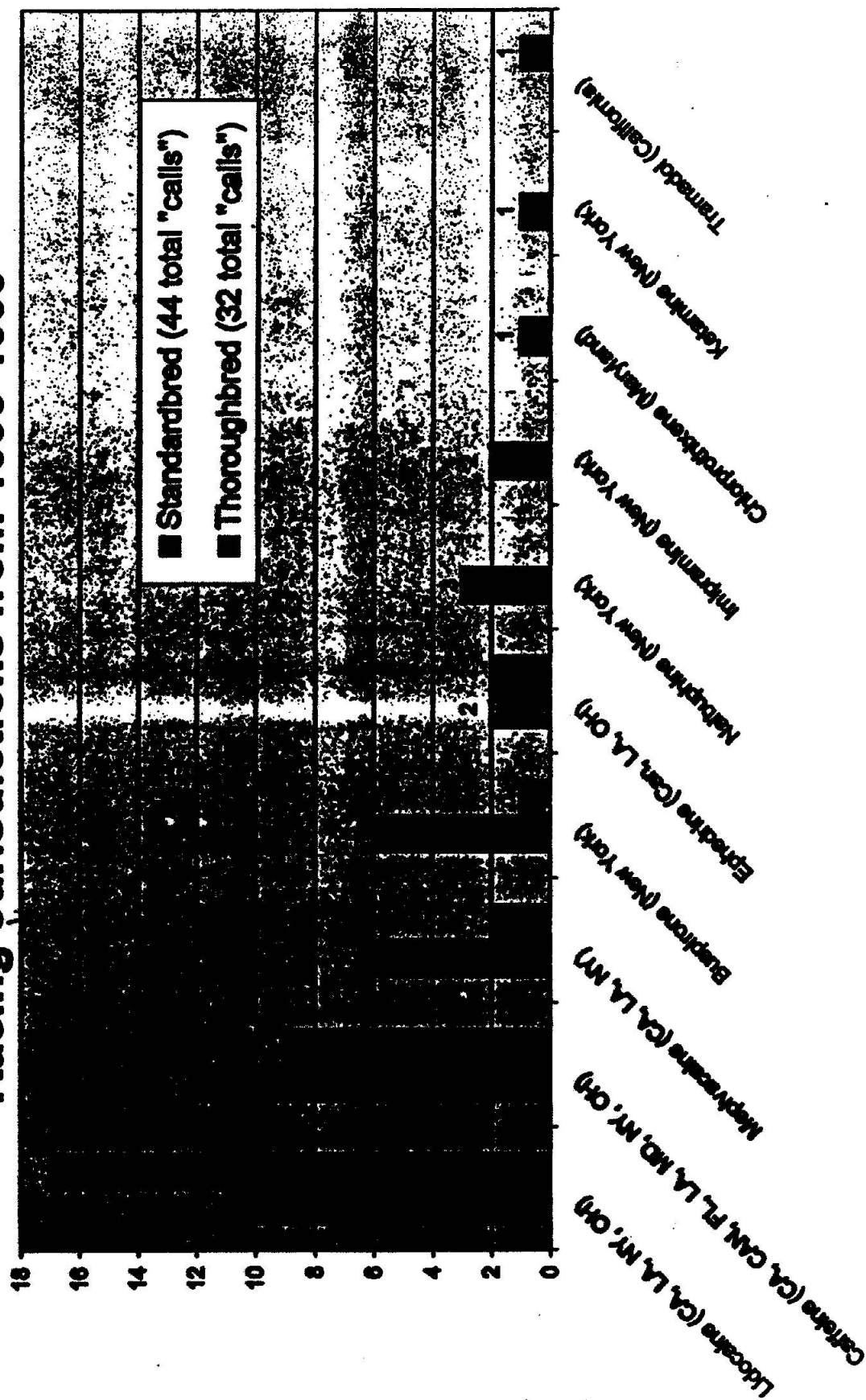
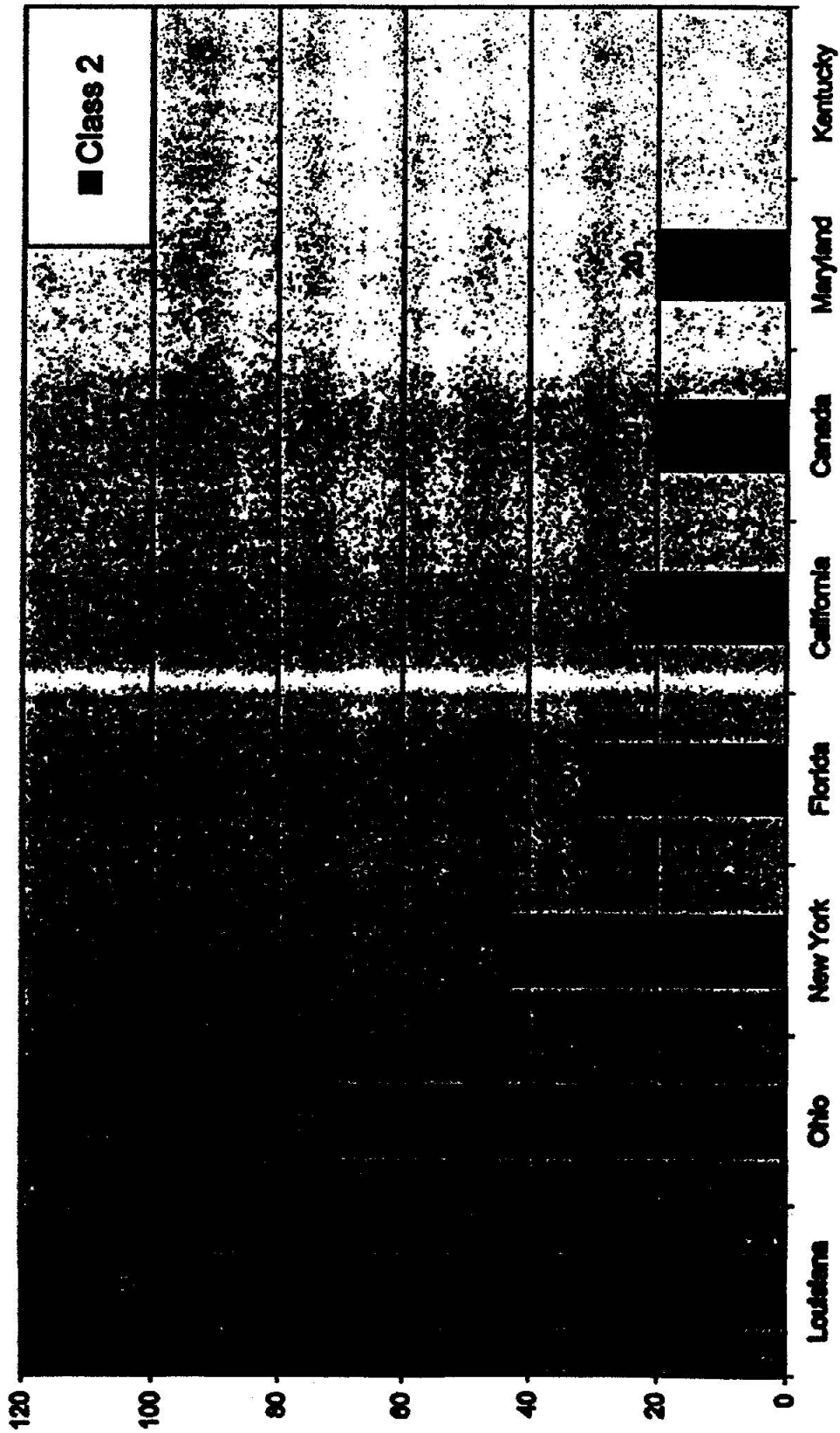


Figure 2b

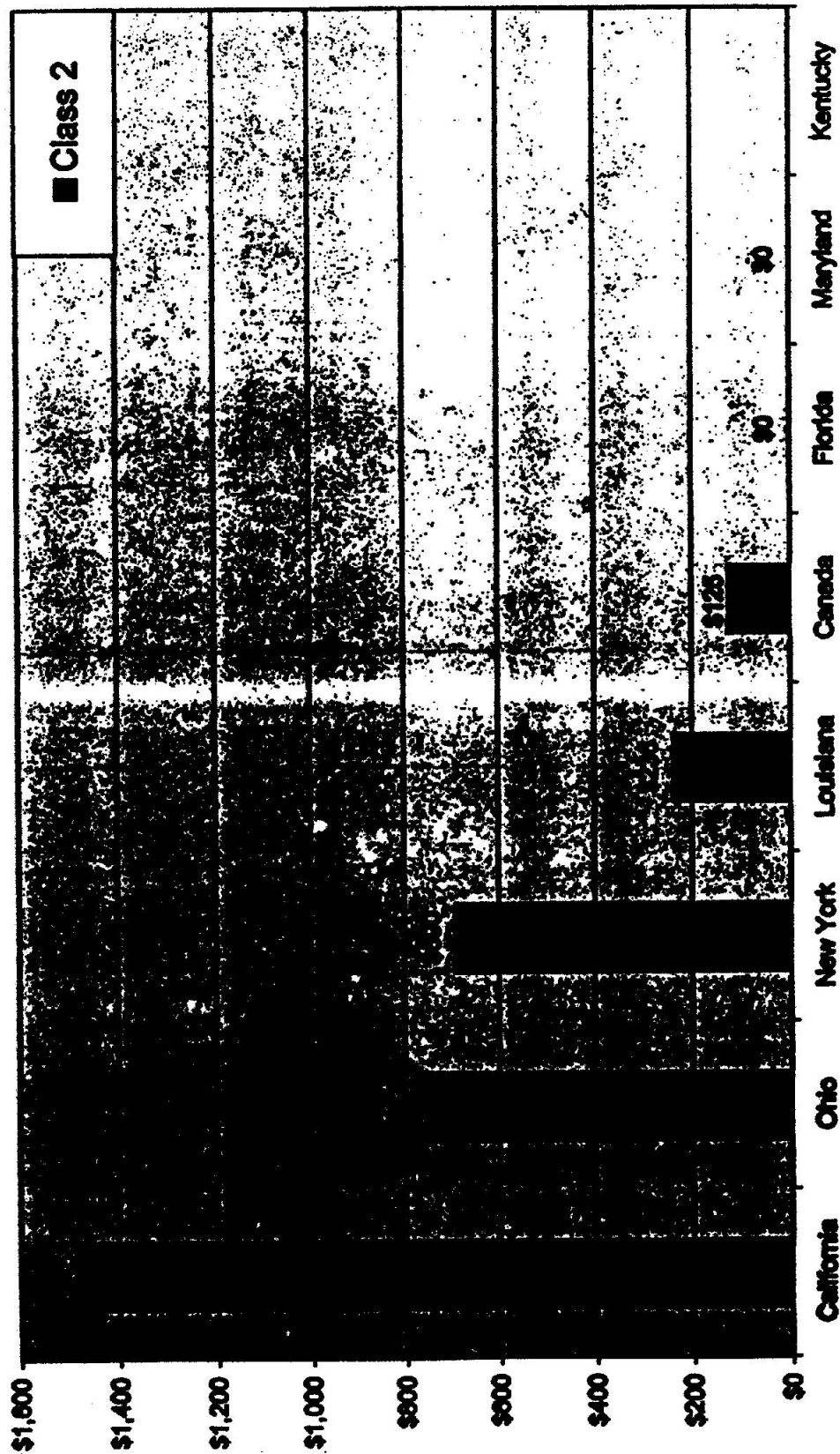
Mean Suspension Days for RCI Class 2 Violations for the Major Racing Jurisdictions from 1995-1999



*blank value indicates that no "calls" were made in this state

Figure 2c

Mean Fines for RCI Class 2 Violations in the Major Racing Jurisdictions from 1995-1999



*blank value indicates that no "calls" were made in this state

Violations for RCI Class 3 Agents in the Major Racing Jurisdictions from 1995-1999

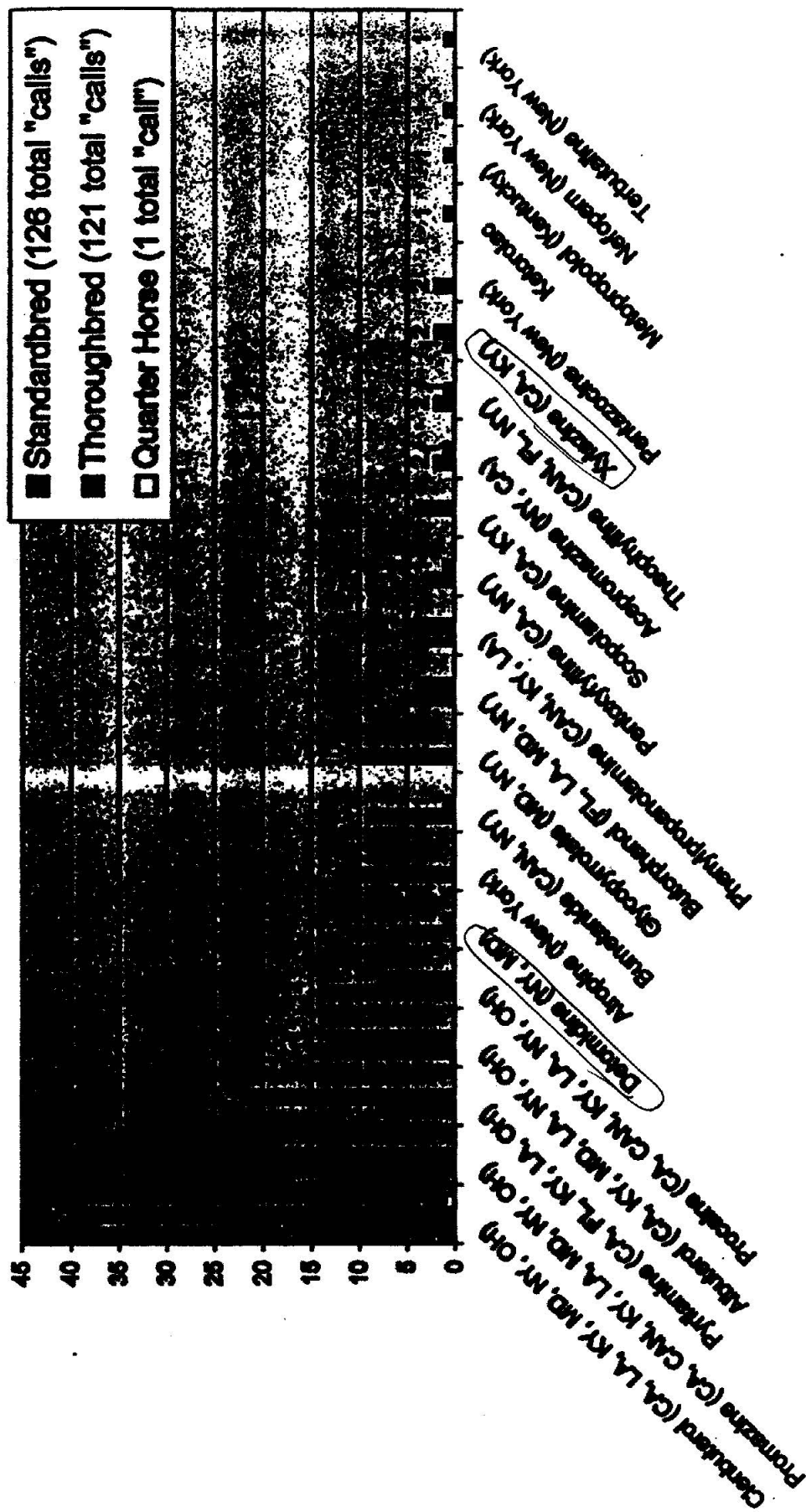


Figure 3b

Mean Suspension Days for RCI Class 3 Violations in the Major Racing Jurisdictions from 1995-1999

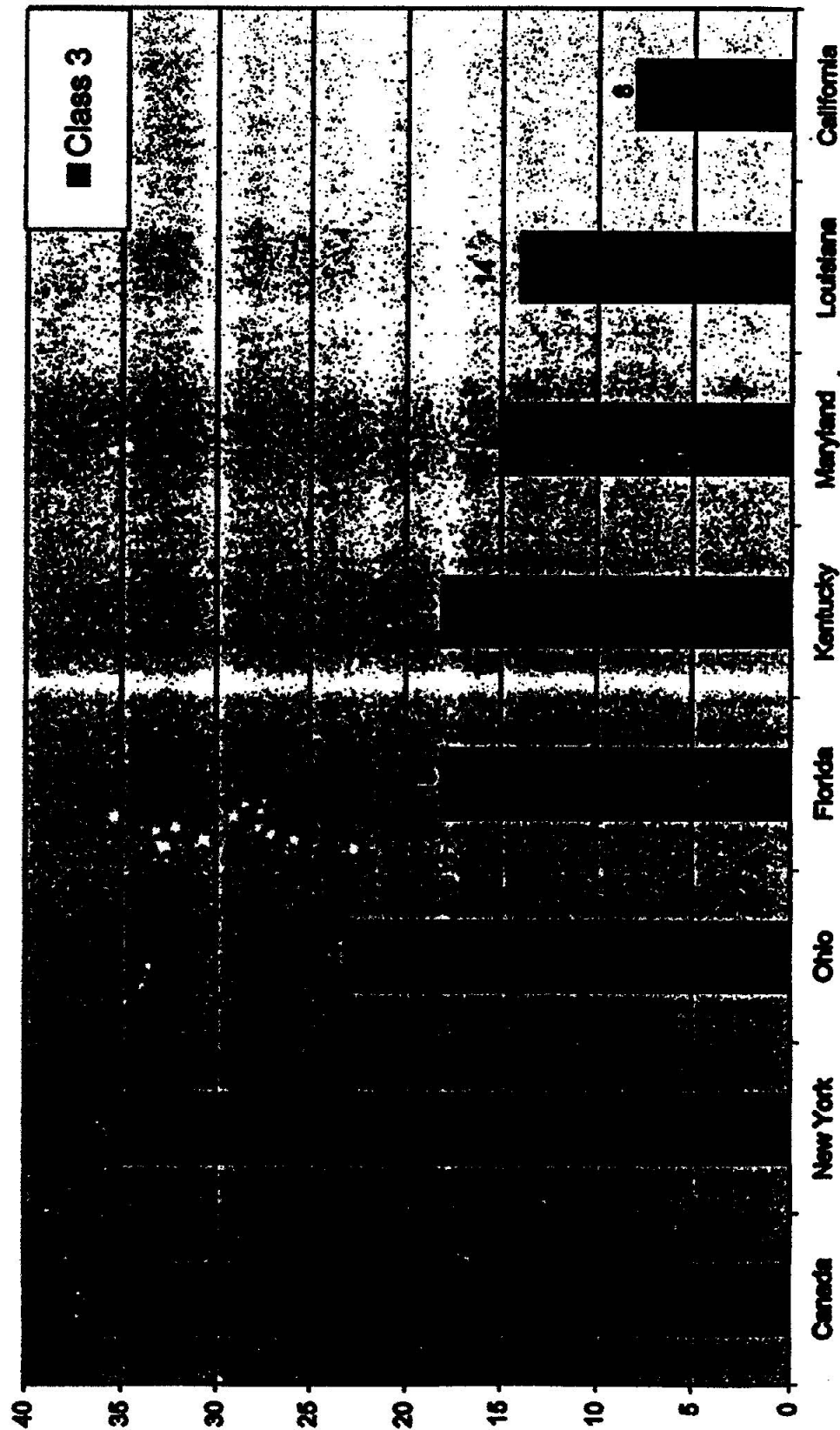


Figure 3c

Mean Fines for RCI Class 3 Violations in the Major Racing Jurisdictions from 1995-1999

