In 1946 State and Territorial Health Officers asked the Public Health Service to develop a plan for certification of interstate milk supplies, and in 1949 again requested assistance in this matter. Representatives of several states arranged for a National Conference on Interstate Milk Shipment in 1950, and their original and subsequent recommendations have been reported elsewhere (1). These recommendations included a provision that "...the state may accept the results from local official laboratories which they have approved as complying substantially with American Public Health Association Standard Methods and checking closely with results obtained at least twice per year on split samples." Another provision stated that: "To insure uniformity, the U.S. Public Health Service is to spot check the laboratories of the state agencies participating in the certification of milk for interstate shipment and to certify their compliance with Standard Methods."

**STATUS OF FEDERAL AND STATE MILK LABORATORY CERTIFICATION PROGRAM**

Table 1 Part A summarizes Public Health Service activities for 1950 through 1957 as to the number of states and the central or local laboratories visited each year in connection with certification of their compliance with Standard Methods for the Examination of Dairy Products. Thirty-three interstate milk shipment states and the District of Columbia are listed in the current "Sanitation Compliance Ratings of Interstate Milk Shippers." The central laboratories of 6 additional states also have been certified at their own request, three having been listed at one time as interstate milk shipment states with the other three having indicated their desire to participate. The central laboratories of these 39 states and the District of Columbia are in substantial compliance with Standard Methods. As of September 1, 1956 all states now listed as interstate milk shippers had been visited within the preceding two years.

**Table 1 — STATUS OF INTERSTATE MILK SHIPMENT LABORATORY CERTIFICATION**

| States visited | 21 24 25 11 16 26 17 10 |
| Laboratories surveyed | 36 27 42 29 45 44 22 10 |

| Approval program | 12 15 13 19 40 41 42 42 |
| Surveys available | 1 2 14 5 9 17 28 33 |
| Split sample data available | 1 3 8 18 25 |

Table 1 Part B summarizes state activities in certification of milk laboratories. All but one of the states (and D.C.) currently listed as interstate milk shippers now have programs for approval of local milk laboratories, as well as 5 of the 6 past or potential shipping states. In addition, two milk receiving states and two other states are known to require approval of all local milk laboratories within their respective jurisdictions. Completed survey forms for local milk laboratories surveyed by the states have been forwarded to the Public Health Service in increasing number from 1950 to 1957 (Table 1 Part B). They have been received from all but two states. Similarly an increasing number of interstate milk shipment states have forwarded the results of samples which they have split with their approved local milk laboratories.

State compliance with the provisions of the National Conference for Interstate Milk Shipment relative to certification of local milk laboratories has been charted in Figure 1. From this chart it may be seen that many states initiated annual surveys of local laboratories following the first National Conference in 1950 and initiated split sample programs about 1953. The rapid peak achieved in 1954 for states having local milk laboratory approval programs no doubt reflects the terminal date of December 15, 1954 beyond which states utilizing local laboratories not under approval would no longer be listed. Since it was proposed to establish January 1, 1958 as the terminal date for listing interstate milk shippers from states which are not fulfilling both the annual laboratory inspection and semiannual split sampling requirements, the level for split sample data should also show a peak about that time and then remain

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1Substance of discussion presented at Sixth National Conference on Interstate Milk Shipment, Memphis, Tennessee, April 23, 1957.
at the level for survey forms.

**State Activities In Approval of Local Laboratories**

Because of incomplete data for some of the interstate milk shipping states, in January 1957 all PHS regions were advised of the need for data as accurate and up-to-date as possible for presentation at the Sixth National Conference on Interstate Milk Shipments. The regions were asked to request information from the states currently participating in the cooperative State-PHS program for interstate milk shippers, to include the number of local laboratories approved, the tests approved for pasteurized and raw milk, and the practices in split samples. Their response was excellent, with replies received from all states. The results were tabulated as of March 29, 1957. The information was requested under seven headings, with several alternative methods of examination named, but without providing a reply chart. As a result a few replies could not be tabulated properly, even by reference to files of state laboratory surveys and split sample data, so a few blank spaces and question marks appear in the tabulations. The replies from individual states were entered by code number under the appropriate PHS region.

Table 2 summarizes the nature of laboratory tests approved for pasteurized and raw milks. One of the interstate milk shipping states was not currently using any laboratory other than the central state health department, but the remaining 33 were utilizing 344 local laboratories. Of these, 300 were examining pasteurized milk, 286 were also using coliform counts and 263 were making phosphatase tests. In 24 states the number of local laboratories approved for each method is identical, as it should be since these three tests are required for proper laboratory examination of pasteurized products. The data reported by 8 states showed fewer coliform and phosphatase tests than standard plate counts.

Plate counts were being used by 209 of the local laboratories examining raw milk for interstate shipment. In 13 states this was the only test used. Direct microscopic clump counts were used by 129 of the local approved laboratories. This was the only test used by 4 states, all located in PHS Region III. Methylene blue reduction tests were used by 47 laboratories located in 7 states, and resazurin reduction by only 8 laboratories in 3 states.

The distribution of the states and the number of local laboratories reported by each as used for inter-

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2A detailed table was distributed and copies are available from the author.

<table>
<thead>
<tr>
<th>States Approving</th>
<th>Tests Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Laboratories</td>
<td>Pasteurized Milk</td>
</tr>
<tr>
<td></td>
<td>Plate Count</td>
</tr>
<tr>
<td>33</td>
<td>344</td>
</tr>
</tbody>
</table>

**State Split Sample Practices**

The split sample procedure for testing laboratory performance consists of splitting a sample of milk into several portions and shipping these portions, preserved by freezing or refrigeration at 32°-40°F to the participating laboratories for concurrent examination. The laboratories are then evaluated to some extent by comparing their results with those of one or more control laboratories.

Several states involved in interstate milk shipments initiated programs of split samples, and the need for this program was mentioned at the 1954 meeting of the Association of State and Territorial Public Health Laboratory Directors. The Association subsequently passed a resolution expressing its desire to cooperate in the examination of split samples and recommended that the Sanitary Engineering Center "work out a method whereby it may serve the various states in the Milk Sanitation Program as a Central Control Laboratory in the examination of split samples for Interstate Shipment of Milk." Since then at least two plans for preparing, shipping, and examination of split milk samples have been described by state health departments active in interstate milk shipments.

Personnel of the Robert A. Taft Sanitary Engineering Center have participated in several evaluations of procedures planned by states that were interested in examination of split samples. A recent article (2) has outlined benefits reported by states that have engaged in this activity. Periodic evaluation of analytical procedures by state authorities through use of a variety of split milk samples not only is beneficial to the participating laboratories as reassurance of the suitability of their material and procedures, but it also enables approving authorities to reposition confidence in these procedures and the routine results reported by approved laboratories.

Table 3 summarizes the information pertaining to split sample practices reported by the interstate milk shipping states. It shows that states have placed initial emphasis on examining pasteurized milk, 23
Table 3 - State Split Sample Practices Showing Number of States Currently Splitting or Not Splitting Milk Samples, Laboratory Methods, and Products (Based on 33 Interstate Milk Shipping States) (March 29, 1957)

<table>
<thead>
<tr>
<th>Pasteurized Milk</th>
<th>Products</th>
<th>Raw Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plate Count</td>
<td>Coliform</td>
</tr>
<tr>
<td>Split</td>
<td>23</td>
<td>21</td>
</tr>
<tr>
<td>Not split</td>
<td>9</td>
<td>11</td>
</tr>
</tbody>
</table>

Tests currently used in states for raw milk:
- States shipping liquid split samples: 14
- States shipping frozen split samples: 8
- States splitting samples at time of visit: 3
- States not yet activating split sample programs: 8

Utilizing plate counts, 21 coliform, and 18 phosphatase tests. Only 8 states have included cream in split samples, and only 4 other milk products. Since all states utilizing local laboratories should use split samples for all tests and products approved, it should be noted that 9, 11, and 13 states respectively were not currently using split milk samples for plate, coliform, and phosphatase tests; 22 and 26 were not examining cream or other milk products. Twenty states reported examining split samples of producers' milk by one or more of the methods approved, 15 used plate counts, 6 direct counts, 1 methylene blue, and 1 resazurin reduction. Again it should be noted that 12, 10, 6, and 2 states approving laboratories using plate, direct, or reduction tests were not currently examining split raw milk samples for these four procedures. The tabulation shows that 27 states use plate counts for raw milk, 16 use direct counts, 7 methylene blue.

*Figure 1. State compliance with laboratory certification program.*
reduction, and 3 resazurin reduction.

As of March 1957, liquid split samples were being shipped by 14 states; 8 were shipping frozen samples. Three states, carrying their own sterile apparatus and media, split samples at the time they visit the local laboratories. Thus split sample data had been received from 25 of the interstate milk shipping states.

Containers, Insulation, and Refrigeration
For Split Samples

Studies have been carried out at the Sanitary Engineering Center during the past fifteen months to develop lightweight shipping containers to enable the Public Health Service to ship split milk samples to all state laboratory agencies certified for interstate milk shipment. These studies were primarily concerned with design and evaluation of packages containing a suitable refrigerant to hold milk samples at 32°-40°F for at least 30 hours, the time estimated to be the longest required for air shipment and examination. These studies were reported at the annual meeting of the International Association of Milk and Food Sanitarians in Louisville, Kentucky, October 1957 (5). Insulated containers utilizing refrigerants have been developed and used to ship pilot samples to several of the more distant states concerned. Before the end of 1957 shipment was initiated to the central laboratories of all state agencies certified for interstate milk shipments.

Training Courses in Milk Laboratory Analysis

Public Health Service training activities in milk laboratory analysis from 1950 to date are summarized in Table 4. Attendance and number of states represented are listed for the annual course given at the Sanitary Engineering Center. The number of courses

Figure 2. Interstate Milk Shipment. State Health or Agriculture Central Laboratories Certified by Public Health Service, and Number of Local Milk Laboratories Approved by State Authorities Based on Jan. 1, 1957 List of Sanitation Compliance Ratings.
held by states in which Center personnel participated is given for 1950 through 1957, as well as the total attendance. Reports indicate that both types of training activities have been helpful in attaining greater compliance with Standard Methods and more uniformity in milk laboratory analysis and results. In some instances initiation of a split sample program by a state has called attention to diversity in analyses reported by local laboratories, and has resulted in a state milk laboratory workshop to remedy the situation.

**Recommendations of Laboratory Task Committees**

Although in general the laboratory certification aspects of the Interstate Milk Shipment Program have functioned well, in some instances state milk sanitation authorities have not adequately informed their laboratory agency as to new shippers which may involve use of additional laboratories or methods not currently approved. The 1951 National Conference . . . "recommended that the state certification agency notify the state laboratory agency as soon as possible of required laboratory surveys, and that the state laboratory agency send duplicate copies of its laboratory surveys, together with supporting data of the results of split samples, to the appropriate US Public Health Service Regional Office." It would be helpful if state milk sanitation authorities would send state milk laboratory certification authorities a copy of each Interstate Milk Shipper Report (Form 1659) at the time this report is furnished to the PHS Regional Office. This procedure should avoid discrepancies in date of approval of laboratory, or of tests for which the laboratory is or is not approved. It would also enable state milk laboratory certification authorities to determine which milk products are being certified for interstate shipment and to include appropriate milk products in their split sample program.

**Laboratory Reports and Records**

The Fourth National Conference in 1953 . . . "recommended that the State laboratory agency publish annually or semiannually a list of those laboratories it has approved, including the date and test or tests for which approved." Also, . . . "It is recommended that the test or tests for which a laboratory is certified be clearly specified on the Interstate Milk Shipper Report Form 1659."

Periodic lists of approved laboratories and tests have been received from only 4 states. These lists have been most helpful in following state certification activities. If such lists were available annually from all interstate milk shipping states together with completed survey forms and split sample data, the Public Health Service could more readily summarize and disseminate pertinent laboratory information.

PHS regional offices are responsible for maintaining the routine contacts necessary for the operation of the laboratory certification program, including such actions needed to maintain the flow of laboratory inspection reports from the states. These reports should include formal inspections of each laboratory included in the control of interstate milk at the frequency specified by the National Conference on Interstate Milk Shipment, and reports of biannual split sample examinations.

**Report of Task Force on Laboratory Certification Procedure, 1957**

On May 21, 1957 the State Laboratory Directors and Milk Laboratory Certifying Officials of all interstate milk shipping states were sent copies of the "Report of the Task Force on Laboratory Certification Procedures" as adopted by the NCIMS on April 25, which incorporates recommendations made by their standing Laboratory Committee. The chairman of the National Conference on Interstate Milk Shipment authorized this limited distribution in advance of publication. It was believed that the report would be advantageous to state milk laboratory certifying officials and state laboratory directors, and would help clarify the interstate milk shipment laboratory certification procedures and recommendations.

**References**


H. L. Hortman.