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A Survey of Blemishes on Processed Microfilm

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As part of an investigation of the formation of six types of redox blemishes on microfilm, 7411 rolls of microfilmed records in 36 Federal Government agencies were microscopically inspected by 34 inspectors trained by the National Archives and the National Bureau of Standards. About 350,000 observations were statistically analyzed. Careful photographic processing, adequate washing, careful handling, cool and dry storage in inert containers, and adequate ventilation, are among the conditions that have been found beneficial in preventing blemish formation. Data are compiled in an appendix.

Key Words: Aging blemishes; archival records; blemishes; microfilm blemishes; microscopic spots; redox blemishes.

1. Introduction

About 1961, spots and other blemishes were observed on some commercial microfilms and an industrial laboratory undertook an investigation. By the end of 1962 it was clear that the phenomenon was quite widespread and that these blemishes were of a type not previously known. The matter came to the attention of the National Bureau of Standards in the first days of 1963 and studies were immediately initiated. Thousands of rolls of microfilmed Government records were microscopically inspected and the findings were classified by blemish type.

That preliminary survey clarified the problems and established the need for a broader survey than could be made directly by the NBS staff. Two objectives were sought: an appraisal of the condition of the millions of rolls of microfilmed Federal records and the discovery of relationships among pertinent variables which would assist in determining the causes of blemish formation and in formulating recommendations for action to prevent further attack.

To assist in unifying research on this problem, a handbook naming and describing the blemishes and methods of sampling collections and inspecting films was published [1].[1]

With the cooperation of the National Archives, 100 inspectors were trained to sample collections, inspect the films microscopically, and report their findings. About one-third of these participated in the survey reported here. Inspections were made in 36 Federal Government microfilming facilities.

1.1. Inspection Procedure

Information was obtained from the files of the agency holding the microfilm, from the original source of the materials, or from people who had been involved with the preparation and storage of the materials. Unfortunately, there were few if any records of the conditions of processing and storage over the years. The need for such records was not previously apparent, however obvious it may now be. Other information was found on the labels of the storage containers or was obtained by inspecting the film with the unaided eye. Although some blemishes are visible to the unaided eye, it was found necessary to use a microscope to inspect the films. A complete description of the inspection technique is given in reference 1.

The microfilming facilities of a number of other government agencies and private institutions were visited by one of the authors (Wiley). These included processing laboratories and storage facilities in all climatic areas of the United States. In a number of instances the data reported on the inspection sheets may not have been properly interpreted if the mass inspections and statistical reports were not followed by inspection of many facilities by a trained observer. Furthermore, these field trips included non-government facilities, from which information would not otherwise have been obtained.

2. Classification of Blemishes

Many kinds of defects and blemishes can appear on processed microfilm. This study was initiated because of the discovery of apparently related types of blemishes of unknown origin in some commercial

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[1] Figures in brackets indicate the literature references at the end of this paper.

collections. These blemishes have been referred to by many names: "microscopic spots" or "microspots," even though many are clearly visible to the unaided eye and many aren't spots; "measles," a totally inappropriate term because the blemishes bear no relationship to the human disease by that name, the blemishes were not caused by any biological activity, and this term has already been used in photographic engineering for some time for the effect better known as the "half-tone effect"; "J-type blemishes" or "J-spots," a shorthand allusion to Project Jupiter, the name assigned to the project at NBS during the first months; and "aging blemishes," the name which seemed to describe them most accurately. However, after considerable investigation we know that the oxidation and reduction of silver are the principal reactions and we can induce such reactions in a day or so [2, 3, 4, 5, 6, 7]. Therefore we feel that the name "redox blemishes" is the most accurate descriptor.

These blemishes were classified in six types as follows:

Type 1

Type 1 redox blemishes are circular spots, usually 50 to 150 micrometers in diameter, with sharp boundaries. Concentric light and dark rings are common. Spots normally occur as reduced density in high-density "background" areas, but may make incursions into low-density lines or characters. They are usually brown, orange, reddish, or yellow in color. It is common to find many spots about the same size on a sample. The circular boundaries of two or more spots may intersect. The spots are often seen centered on scratches in the emulsion, sometimes closely packed like beads on a string. They sometimes occur in higher concentration at steep density gradients between high- and low-density regions, sometimes being so closely packed as to give the appearance of a continuous band. By reflected light, the spots may display a silvery sheen.

Type 2

Type 2 are defects in the light lines forming the characters themselves, rather than in the high-density "background." The lines making up the characters become lighter, yellowish, and broader. The boundaries of the defect are sharp.

Type 3

Type 3 are very small spots, about 10 to 15 micrometers across. When they occur, there is usually a large number per unit of area. They usually range from pale yellow to orange in color. Their boundaries are sharp. By reflected light, the spots may display a silvery sheen.

Type 4

Type 4 blemishes are spots of less regular shape than type 1 but about the same size or a little larger, usually lighter in color, and less sharply bounded. A circular central "nucleus" is common. These spots occur in high-density "background" areas. They do not make incursions on low-density characters; on the contrary, their shapes may be very distorted to accommodate to the spaces between characters or parts of characters.

Type 5

Type 5 is a reddening of the dark background in the immediate neighborhood of lighter characters. The boundaries of the discoloration are very diffuse. The shape is not regular, being determined by the shape of the characters or line of characters with which the discoloration is associated.

Type 6

Type 6 is a reddish, orange, or yellow spot of reduced density, lightest at the center and gradually blending into the surrounding background. An irregular opaque or crystalline particle is commonly observed on the surface of the film at the center of the spot. The sizes of the spots may vary considerably, even within a small region.

3. Reporting

The incidence of a type of blemish could have been reported on the basis of the percentage of rolls affected but this method would not indicate the severity of the attack. In recording severity, it was necessary to consider the blemishes to be of two major kinds: *spot blemishes* (types 1, 3, 4, and 6) and *character-associated blemishes* (types 2 and 5). The concentration of *spot blemishes* was indicated by the number of spots per square centimeter. Five classes of severity were assigned numerical designations from 1 to 5, a severity of 1 was less than one spot per square centimeter, 2 was 1 to 8, 3 was 8 to 63, 4 was 63 to 500, and 5 was over 500. A severity of "zero" meant that no blemishes were found. After measuring the microscope field, the inspectors soon learned to recognize the severity on sight. Five severities of character-associated blemishes were defined as follows:

1. Blemishes barely detectable, have no effect on the original shape and size of the characters.
2. Blemishes clearly visible, coloration change clearly visible, but shape and size of characters unchanged.
3. Blemishes well developed. Lines or parts of lines making up characters changed, but general shape of characters is unchanged.
4. Blemishes have altered the shape and size of characters to the extent that individual characters could not be identified with certainty out of context. Characters can be identified in context.
5. Blemishes have so altered the size and shape of characters that they cannot be identified with certainty even in context. This constitutes information loss, on a given roll, in the practical sense. Information from other rolls of microfilm should not be considered part of the context.

The findings were reported on General Services Administration forms 1990 and 1990A, shown in the appendix. Form 1990A was prepared for each roll inspected. Three parts of each roll were inspected:

the leader, where only types 1, 3, 4, and 6 were possible, frames next to the leader, and center frames. The 16 severity ratings were reported along with answers to 32 questions concerning characteristics of the given roll of film, the conditions under which it had been stored, and the presence of certain common defects. Form 1990 was a summary of the findings for a stratum.

4. Statistical Analysis

The main purpose of the analysis was to discover factors or combinations of factors considered likely to affect the formation of blemishes. The data were grouped into categories on the basis of one or more of the 32 items reported on the inspection sheets and calculations were performed to summarize information on the incidence and severity of the blemishes for each category. For this purpose, each roll was considered to have 2 severity scores: the total severity score for the leader (the sum of the severities for the 4 different types of blemishes); and the total severity score for the information section (the sum of the 12 severities for the 6 different types of blemishes and for the 2 positions). For each category, the following information was tabulated:

n, the total number of rolls in the category
k_L, the number of rolls with blemishes on the leader
k_I, the number of rolls with blemishes on the information section
f_L, the fraction of rolls with blemishes on the leader
f_I, the fraction of rolls with blemishes on the information section
$\bar{x}_L$, the average, over k_L rolls, of the total severity score for the leader
$\bar{x}_I$, the average, over k_I rolls, of the total severity score for the information section.

In the statistical analysis it was not practical to consider all possible combinations of factors. For this reason, there is the possibility that differences could result from the coincidence of some unrecognized factor with other factors under study.

Statistical analysis is based on the assumption of random sampling. Since the rolls of film were usually selected by the inspectors and the procedures probably varied among inspectors, randomness is not as well assured as it might be in controlled experiments in a single laboratory.

The severity ratings gave no indication of whether a given severity was localized in a small area or was characteristic of the whole roll. Thus the choice of location for inspection could materially affect the results if the severity varied greatly over the roll. For the purpose of appraising the condition of a collection of microfilms, the total quantity of film affected might be of considerably more interest than it would be for the present purpose. It is of scientific interest to know that the physical and chemical conditions for blemish formation were present, even if on a small area, although it would have been desirable to know the extent as well.

The information involving storage conditions was not as reliable as we would have liked. For example, reported temperatures and humidities were usually estimated rather than measured. Data for films which were known to have been stored under more than one set of conditions were not included in the tabulations for storage conditions.

On the basis of these considerations, it is believed that two reported severity scores should not be considered significantly different unless their difference is 1 or more.

The significance of comparisons of fractions defective depends on the number of rolls in the sample and the fractions involved. The standard deviation s of a fraction defective f in a random sample containing n rolls is given in table I. The fractions defective in two different classes may be considered significantly different if the difference between the fractions exceeds twice the sum of the standard deviations of the fractions.

When the results were first tabulated, the fraction of rolls blemished in agencies 15 and 16 was so high that these agencies were visited and the conditions there were carefully reviewed. All of the defective films were processed by a particular type of processing machine that had small tanks, inadequate provision for removal of solutions from the film between baths, and inadequate washing capability. It was customary to load dry chemicals into the tanks rather than to dissolve them first, as is usually done. The machine is no longer on the market. In one agency, this type of processor was replaced years ago, by a machine with better washing and drying and the film processed by the new machine has not become blemished. In view of this apparent explanation of the consistently high incidence of blemishes at agencies 15 and 16 and the overriding influence that these data had on the analysis, many of the computations were done a second time, omitting the data from these agencies.

Finally, due to the inherent nature of this type of data, one should be cautioned not to draw conclusions concerning the causes of blemishes solely on the basis of the statistical significance of the data. The tabulations point out possible causes for the redox blemishes, but they must be interpreted in the light of technical knowledge of microfilms and, whenever possible, backed up by laboratory experience.

TABLE I. *Standard deviation* s *of a fraction defective* f *in a sample of* n *rolls*

n	$f=0.1$ or 0.9	0.3 or 0.7	0.5
25	0.06	0.09	0.10
50	.04	.06	.07
100	.03	.04	.05
200	.02	.03	.04
500	.01	.02	.03
1000	.01	.01	.02

Values not tabulated can be computed, using the relationship:

$$s^2=f(1-f)/n.$$

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5. Results

The statistical results are summarized and discussed in this section. For what value they may have for further study, all of the tables of numerical results are given in the appendix. The discussions of results in this section are given the same numbers as the corresponding tables in the appendix. Not all tables in the appendix are discussed here.

To facilitate encoding the data for the computer, a number was assigned to each reporting government agency, inspector, processing facility, and film supplier. The agency identification was a valuable aid in further studies but the data were obtained with the understanding that agencies would not be identified in published reports. The identity of inspectors was of little interest except for a detailed analysis of the statistical nature of the data, for which purpose the numerical identification is even more convenient than names. It is not our policy to publish comparisons of the merits of commercial products and services; therefore, we would not, without some compelling reason, identify the processing service facilities or film suppliers in a comparative study such as this. The statistics refer almost entirely to films manufactured in this country. Thus, to avoid misunderstanding or misuse of data, several of the factors are identified by number only.

To conserve space in the tables in which the results were classified by agency, agencies reporting no blemishes were not listed, although the data relative to these agencies were used in the analysis, where appropriate.

1. Agency. Two agencies, 15 and 16, reported an incidence of blemishes far in excess of all others. Both had used a processing machine which left chemicals on the film. After installation of a different type of machine in one of these agencies, all subsequently processed films were free of blemishes.

Of 36 agencies, 20 found no blemishes on information areas, 13 of the 20 having inspected 25 rolls or more; and 17 found no blemishes on leaders, 13 of these having inspected 25 rolls or more.

2. Agency and Inspector. Agencies 31, 40, 52, and 92 each had enough inspections made by different inspectors to permit statistical comparison among inspectors. The reporting within these agencies was consistent, indicating, in all probability, adequate training, good coordination of criteria of judgment, and careful exercise of observation and judgement.

3. Processing Facility. Two agencies, 15 and 16, which processed their own films (processors 47 and 14, respectively), had over 90 percent blemished films. Film from three facilities had 25 to 52 percent, four had 10 to 24 percent, and two had 1 to 10 percent. Of 42 processing facilities, 25 had processed films with no blemishes on leaders and 26 had none on information areas.

4. Agency and Processing Facility. Known unsatisfactory characteristics of the processing machines at agencies 15 and 16 account for the high incidence of blemishes reported there. Agency 31 reported very high incidence and high severity on 1499 films processed at facility 20, but only half the incidence and less severity on films processed by facility 41. Since these films were stored and handled alike, there is a clear indication that processing conditions can be important determinants of blemish-forming potential.

5. Film Manufacturer. This section and the associated table in the appendix are entitled "Film Manufacturer" because that was the information requested in the survey. However, the data actually refer to *brand names*, since they were what were known to the inspectors. In some cases one manufacturer's product might be known by two names. We know that two of the brands (6 and 10) considered in the present analysis were manufactured by the same company and there may be other such cases. Both the frequency and severity of blemishes reported for these two brands of film were substantially different, indicating that variables other than the kind of film made the difference. This example illustrates very well the need for caution in the interpretation of the statistics.

6. Agency and Film Manufacturer. In an experiment designed to test films, the film brands would be equally distributed among all the other pertinent variables, but in practical experience we expect that certain combinations of films and processors would be sold by the same dealers and would be used together. There would be some tendency for one agency to continue to use the same brand, reordering from the same dealer as long as the price and quality were satisfactory. Then all the processing, handling, and storage conditions associated with that agency would be correlated with that film brand. The consistently bad results at agencies 15 and 16 were associated with 5 different brands of film. The consistently good results at agency 81 were associated with 4 brands. Under good conditions, all films were good; under bad conditions, they were all bad. Thus, we find no basis for ranking the various brands of film on the basis of their tendency to withstand the formation of blemishes. Agencies reporting no blemishes are not included in table 6.

7. Year of Purchase. The frequency of observed blemishes increased with the time since the film was purchased. This accounts in part for the fact that microfilms were in use for many years before redox blemishes were discovered. There was no distinct trend of severity with time.

8. Year Processed. Since films were usually processed soon after they were purchased, the statistics are similar for time since purchase and time since processing.

9. Frequency of Use. The incidence of blemishes and their severity are both inversely related to the frequency of use. This suggests that the stagnant atmosphere associated with disuse promotes blemish formation, while the ventilation associated with use is beneficial.

10. Type of Container. One-third of all films stored in cans were at agencies 15 and 16. At these agencies practically all films were blemished, so these agencies account for almost all blemished film found in cans. With these agencies omitted, the blemish frequency

on the leaders of film stored in cardboard containers was twelve times that on films stored in cans. The frequency of blemishes on the information sections of films stored in cardboard containers was 3.2 times that of films stored in cans. The severity on films stored in cardboard containers was about twice as bad as that on films in cans. In most cases, there was no way of knowing whether or not films had always been stored in the containers in which they were found at the time of inspection.

11. Type of Reel. Cardboard reels were associated with substantially more blemishes than were other types of reels. The severity was also substantially higher for these reels on information areas but not on leaders.

12. Temperature. There was a significant but not monotonic increase in blemish frequency and severity with increasing maximum temperature. There was a significant increase in blemish frequency and severity with increasing minimum temperature.

13. Relative Humidity. Aside from agencies 15 and 16, the effect of humidity on blemish incidence was quite pronounced. When the maximum humidity was 51 to 60 percent, there were 11 times as many blemished leaders and 19 times as many blemished information sections as there were when the maximum humidity was 20 to 50 percent. The 55 rolls stored at humidities ranging as high as 71 to 80 percent had been in storage only a short time. Among 526 rolls of film for which the minimum storage humidity was less than 40 percent, there was only 1 blemished leader and no blemished information frames, whereas among the 1472 rolls for which the minimum humidity was over 40 percent, there were 477 blemished leaders and 283 films with blemished information areas.

In the arid southwestern part of the United States, Wiley observed a collection of films, including several brands processed in many places over a twenty-five year period and stored in cans or paper boxes. The storage temperature was thought to exceed 100 °F frequently but the humidity was always low. No redox blemishes were found on these films.

14. Air Conditioning. Aside from agencies 15 and 16, films stored in nonair-conditioned spaces had 8 times as many blemished leaders and twice as many blemished information sections. The severity was also substantially greater, being nearly twice as severe for information sections.

15. Storage Location. Office storage was associated with substantially fewer blemished leaders and less severely affected leaders than any other type of storage area listed. On the other hand, this advantage was not observed with respect to blemishes on information sections of the films.

16. Humidification Trays. Unfortunately, the question asked in the survey did not elicit the required information. Respondents indicated the current practice but said nothing about usage in the past. About three fourths of the positive answers were with reference to films stored in metal cans which would nearly nullify the effects of humidifying the cabinets. The validity of any inferences drawn from these data would be questionable.

17. Type of Leader. The eight reports of blemishes on plastic leaders must be erroneous, but they were not considered of sufficient interest to investigate. The number of reports of clear-and-plastic leaders was too small for valid statistical inference. The films without leaders had a higher incidence of blemishes on information sections than films with leaders, the criterion of significance of the difference being barely exceeded. The incidence of blemishes on the leader varied from one type of leader to another by a factor of 49 with a corresponding change by a factor of only 1.2 in the incidence on information frames. Thus a leader appears beneficial and it seems to make little difference which of these kinds is used.

18. Length of Leader. Films without leaders had a blemish incidence rate 2 to 3 times that for films with leaders. Films with leaders more than 5 ft. long had a little lower incidence than those with shorter leaders.

19 and 20. Number of Splices. The combined statistics for agencies other than 15 and 16 indicate very low incidence on information areas when more than 5 splices were made. The statistical analysis was, however, dominated by the very numerous splices on unblemished film at agency 52. When the data were analyzed by agency, out of 8 agencies that had many splices and some blemishes, 6 displayed an increase in incidence on information areas with increasing number of splices. More splicing implies more handling and, in most cases, more fingerprinting and other contamination. In agency 52, films were spliced carefully and handled with gloves. At agency 52, the incidence decreased with the number of splices. This suggests, as did the data on Frequency of Use and Storage Location, that more active files benefit from better ventilation. Table 20 lists only those agencies reporting some blemishes.

21. Type of Splice. Rolls with overlap splices had 2 to 3 times the blemish rate of rolls with butt splices and higher severity.

22. Type of Band. Most of the films examined had no string, paper, rubber or other band to hold the coil tight. The slight differences observed when bands were employed are not significant because of the small number of such cases.

23. Chemical Residues. At agencies 15 and 16, practically all films had blemishes and chemical residues but elsewhere the incidence of blemishes was independent of such residues.

24. Silvery Sheen on Leaders. The incidence and severity of blemishes on leaders and information areas were significantly greater when a silvery sheen appeared on the leader.

25. Silvery Sheen on Dense Areas. Where a silvery sheen appeared on dense areas of the information section, the incidence and severity of blemishes on information areas increased greatly.

26. Discoloration or Fading. Apart from agencies 15 and 16 where many films were discolored and faded, this defect was so infrequent that correlations are not significant.

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27. Water Spots. Reports of water spots were associated with an increased incidence of blemishes on information areas, however, on the leaders the trend was in the opposite direction.

28. Other Blemishes. When agencies 15 and 16 were included, reports of other kinds of blemishes were associated with considerable increases in the incidence of redox blemishes on both leaders and information areas. Without agencies 15 and 16, the trend was opposite.

6. Summary

Clean and uniform processing conditions, including adequate washing, have always been considered essential to the preparation of permanent record films. The data emphasize this point. More emphasis must now be placed on cool and dry storage in containers that do not evolve chemicals that cause blemish formation. Ventilation appeared desirable, but this factor probably would not have been important were it not for the widespread use of cardboard containers for the storage of microfilm.

The authors are grateful to the administrators of the many agencies which set up programs to cooperate with us in this survey, to the many records officers and others who conducted the actual inspections, to the personnel of the Bureau of the Census who encoded all of the information on punched cards, and to the personnel of NBS who provided computer services.

7. Appendix

The following symbols are used in the tables in this appendix:

n number of rolls of film inspected
k number of rolls of film with blemishes
f fraction of films with blemishes (expressed in decimal notation)
$\bar{x}$ average, over k rolls, of the total severity score.

Agencies, inspectors, processing facilities, and film suppliers are identified by number only and the identities are not available for publication.

TABLE 1. *Summary of results classified by agency*

Agency	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
10	1	0	0.	.....	0	0.	.....
11	60	0	0.	.....	0	0.	.....
12	54	0	0.	.....	0	0.	.....
13	28	0	0.	.....	0	0.	.....
14	501	0	0.	.....	0	0.	.....
15	142	116	.82	1.72	116	.82	3.51
16	246	221	.90	3.67	243	.99	8.59
17	34	0	0.	.....	0	0.	.....
18	99	0	0.	.....	0	0.	.....
19	123	0	0.	.....	0	0.	.....
20	25	0	0.	.....	0	0.	.....
21	94	0	0.	.....	0	0.	.....
22	200	0	0.	.....	0	0.	.....
31	1668	870	.52	4.69	472	.28	7.51
40	301	20	.07	1.15	15	.05	3.67
51	209	59	.28	5.19	109	.52	2.63
52	1545	384	.25	5.97	98	.06	5.32
61	628	87	.14	3.41	103	.16	2.84
62	116	16	.14	3.88	15	.13	6.13
63	405	37	.09	3.76	70	.17	3.71
71	100	27	.27	3.44	23	.23	3.35
72	35	0	0.	.....	0	0.	.....
73	65	11	.17	2.00	10	.15	3.30
81	13	2	.15	2.00	0	0.	.....
82	9	1	.11	4.00	0	0.	.....
83	11	1	.09	3.00	0	0.	.....
84	31	0	0.	.....	0	0.	.....
86	6	0	0.	.....	0	0.	.....
87	3	0	0.	.....	0	0.	.....
91	102	0	0.	.....	0	0.	.....
92	159	3	.02	3.00	11	.07	4.27
101	10	4	.40	5.00	6	.60	4.67
102	6	1	.17	5.00	0	0.	.....
103	82	12	.15	2.24	7	.09	2.45
111	299	34	.11	2.88	146	.49	4.43
121	1	0	0.	.....	1	1.00	3.00

TABLE 2. *Summary of results classified by agency and inspector*

Agency	Inspector	n	Leader			Information section		
			k	f	$\bar{x}$	k	f	$\bar{x}$
15								
	231	142	116	0.82	1.72	116	0.82	3.51
16								
	230	245	220	.90	3.66	242	.99	8.57
	232	1	1	1.00	6.00	1	1.00	12.00
31								
	10	34	27	.79	4.48	4	.12	7.25
	140	622	320	.51	4.62	155	.25	7.44
	141	1	0	0.	.....	0	0.	.....
	161	419	227	.54	4.89	148	.35	8.02
	233	592	296	.50	4.62	165	.28	7.12
40								
	110	101	2	.02	1.50	10	.10	3.20
	194	100	2	.02	1.00	0	0.	.....
	300	100	16	.16	1.12	5	.05	4.60
51								
	20	1	0	0.	.....	0	0.	.....
	30	208	59	.28	5.19	109	.52	2.63
52								
	25	398	92	.23	5.59	29	.07	5.38
	111	339	84	.25	6.05	23	.07	4.13
	200	372	96	.26	6.00	22	.06	5.59
	260	370	108	.29	6.36	22	.06	6.59
61								
	20	628	87	.14	3.41	103	.16	2.84
62								
	20	116	16	.14	3.88	15	.13	6.13
63								
	20	405	37	.09	3.76	70	.17	3.71
71								
	21	100	27	.27	3.44	23	.23	3.35
73								
	130	65	11	.17	2.00	10	.15	3.30
81								
	20	13	2	.15	2.00	0	0.	.....
82								
	20	9	1	.11	4.00	0	0.	.....
83								
	20	11	1	.09	3.00	0	0.	.....
92								
	31	48	3	.06	3.00	6	.13	4.67
	150	110	0	0.	.....	5	.05	3.80
	180	1	0	0.	.....	0	0.	.....
101								
	50	3	2	.67	7.50	3	1.00	6.00
	120	7	2	.29	2.50	3	.43	3.33
102								
	120	6	1	.17	5.00	0	0.	.....
103								
	20	6	0	0.	.....	0	0.	.....
	120	82	12	.15	2.08	7	.09	2.29
111								
	190	299	34	.11	2.88	146	.49	4.43

TABLE 3. *Summary of results classified by processing facility*

Processor	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
1	26	0	0.	.....	0	0.	.....
2	4	0	0.	.....	0	0.	.....
3	3	0	0.	.....	0	0.	.....
4	60	0	0.	.....	0	0.	.....
5	100	0	0.	.....	0	0.	.....
6	88	0	0.	.....	0	0.	.....
7	290	19	.07	1.16	14	.05	3.79
8	2	0	0.	.....	0	0.	.....
9	1	0	0.	.....	0	0.	.....
10	5	1	.20	5.00	1	.20	4.00
11	26	0	0.	.....	0	0.	.....
12	9	1	.11	4.00	0	0.	.....
13	26	0	0.	.....	0	0.	.....
14	232	209	.90	3.62	230	.99	8.71
15	91	0	0.	.....	0	0.	.....
16	7	0	0.	.....	0	0.	.....
17	40	7	.17	2.14	9	.22	3.44
18	235	25	.11	3.20	122	.52	4.44
19	158	3	.02	3.00	11	.07	4.27
20	1720	832	.48	4.68	451	.26	7.54
21	34	0	0.	.....	0	0.	.....
22	1	0	0.	.....	0	0.	.....
23	17	0	0.	.....	0	0.	.....
24	328	35	.11	3.86	64	.20	3.78
25	1903	444	.23	5.76	195	.10	4.12
26	1	0	0.	.....	1	1.00	3.00
27	13	3	.23	2.00	1	.08	4.00
28	11	0	0.	.....	0	0.	.....
29	1	0	0.	.....	0	0.	.....
30	4	2	.50	2.00	1	.25	4.00
31	1	0	0.	.....	0	0.	.....
32	1	1	1.00	6.00	1	1.00	3.00
33	1	0	0.	.....	0	0.	.....
34	32	0	0.	.....	0	0.	.....
40	277	0	0.	.....	0	0.	.....
41	173	47	.27	4.32	25	.14	6.12
42	5	1	.20	8.00	0	0.	.....
43	4	0	0.	.....	0	0.	.....
44	83	0	0.	.....	0	0.	.....
45	171	0	0.	.....	0	0.	.....
46	1	1	1.00	2.00	1	1.00	4.00
47	114	114	1.00	1.72	114	1.00	3.50

TABLE 4. *Summary of results classified by agency and processing facility*

Agency	Processor	n	Leader			Information section		
			k	f	$\bar{x}$	k	f	$\bar{x}$
15								
	46	1	1	1.00	2.00	1	1.00	4.00
	47	114	114	1.00	1.72	114	1.00	3.50
16								
	14	232	209	.90	3.62	230	.99	8.71
31								
	10	1	1	1.00	5.00	1	1.00	4.00
	20	1499	824	.55	4.70	446	.30	7.59
	41	167	45	.27	4.42	25	.15	6.12
40								
	7	290	19	.07	1.16	14	.05	3.79
51								
	25	103	28	.27	6.11	59	.57	2.61
52								
	20	1	1	1.00	6.00	0	0.	.....
	25	1539	382	.25	5.97	98	.06	5.32
61								
	20	2	0	0.	.....	1	.50	3.00
	25	73	0	0.	.....	2	.03	2.50
62								
	25	6	5	.83	3.20	3	.50	3.00
	32	1	1	1.00	6.00	1	1.00	3.00
63								
	20	9	0	0.	.....	3	.33	2.67
	24	328	35	.11	3.86	64	.20	3.78
71								
	25	84	19	.23	2.74	23	.27	3.35
	42	1	1	1.00	8.00	0	0.	.....
73								
	25	20	0	0.	.....	0	0.	.....
	27	13	3	.23	2.00	1	.08	4.00
	30	4	2	.50	2.00	1	.25	4.00
81								
	20	2	0	0.	.....	0	0.	.....
	41	6	2	.33	2.00	0	0.	.....
82								
	12	9	1	.11	4.00	0	0.	.....
83								
	10	4	0	0.	.....	0	0.	.....
	25	3	1	.33	3.00	0	0.	.....
	42	4	0	0.	.....	0	0.	.....
92								
	19	158	3	.02	3.00	11	.07	4.27
101								
	25	10	4	.40	5.00	6	.60	4.67
102								
	25	6	1	.17	5.00	0	0.	.....
103								
	20	10	7	.70	2.29	1	.10	3.00
	25	28	4	.14	1.75	4	.14	2.50
111								
	17	40	7	.17	2.14	9	.22	3.44
	18	235	25	.11	3.20	122	.52	4.44
121								
	26	1	0	0.	.....	1	1.00	3.00

TABLE 5. *Summary of results classified by manufacturer*

Manufacturer	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
1	177	117	0.66	3.24	104	0.59	7.52
2	107	6	.06	1.50	7	.07	2.43
3	97	3	.03	3.33	7	.07	8.86
4	1093	297	.27	3.17	298	.27	5.98
5	2	0	0.	.....	0	0.	.....
6	5238	1453	.28	4.86	989	.19	5.56
8	7	0	0.	.....	0	0.	.....
9	70	0	0.	.....	0	0.	.....
10	391	0	0.	.....	1	0.	3.00
11	94	0	0.	.....	0	0.	.....

TABLE 5A. *Summary of results classified by manufacturer*
Agencies 15 and 16 omitted

Manufacturer	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
1	110	62	0.56	3.5	39	0.35	5.0
2	102	1	.01	2.0	2	.02	2.5
3	90	0	0.	.....	0	0.	.....
4	853	63	.07	4.2	58	.07	4.9
5	2	0	0.	.....	0	0.	.....
6	5189	1432	.28	4.9	967	.19	5.5
8	7	0	0.	.....	0	0.	.....
9	70	0	0.	.....	0	0.	.....
10	391	0	0.	.....	1	0.	3.0
11	94	0	0.	.....	0	0.	.....

TABLE 6. *Summary of results classified by Agency and film manufacturer*

Agency	Film manufacturer	n	Leader			Information section		
			k	f	$\bar{x}$	k	f	$\bar{x}$
15								
	4	116	116	1.00	1.72	116	1.00	3.51
	6	26	0	0.	.....	0	0.	.....
16								
	1	67	55	.82	3.00	65	.97	9.03
	2	5	5	1.00	1.40	5	1.00	2.40
	3	7	3	.43	3.33	7	1.00	8.86
	4	124	118	.95	4.02	124	1.00	8.78
	6	23	21	.91	4.19	22	.96	6.82

TABLE 6. *Summary of results classified by Agency and film manufacturer* — Continued

Agency	Film manufacturer	n	Leader			Information section		
			k	f	$\bar{x}$	k	f	$\bar{x}$
31								
	4	169	46	.27	4.39	26	.15	6.27
	6	1498	823	.55	4.70	446	.30	7.58
40								
	1	49	18	.37	1.11	3	.06	3.33
	4	129	2	.02	1.50	8	.06	3.12
	6	94	0	0.	.....	2	.02	8.50
	10	19	0	0.	.....	0	0.	.....
51								
	4	3	2	.67	4.50	3	1.00	2.00
	6	203	56	.28	5.29	103	.51	2.68
52								
	4	1	0	0.	.....	0	0.	.....
	6	1541	384	.25	5.97	98	.06	5.32
	8	2	0	0.	.....	0	0.	.....
61								
	1	48	35	.73	4.49	27	.56	4.00
	4	73	2	.03	2.00	1	.01	2.00
	6	501	49	.10	2.67	73	.15	2.41
62								
	1	10	9	.90	4.11	9	.90	8.56
	2	7	0	0.	.....	0	0.	.....
	4	21	1	.05	3.00	2	.10	1.50
	5	2	0	0.	.....	0	0.	.....
	6	68	6	.09	3.67	4	.06	3.00
	8	1	0	0.	.....	0	0.	.....
63								
	4	19	0	0.	.....	0	0.	.....
	6	386	37	.10	3.76	70	.18	3.71
71								
	4	17	8	.47	5.12	0	0.	.....
	6	83	19	.23	2.74	23	.28	3.35
73								
	6	40	4	.10	2.00	5	.13	3.80
81								
	1	2	0	0.	.....	0	0.	.....
	2	3	0	0.	.....	0	0.	.....
	4	4	2	.50	2.00	0	0.	.....
	6	2	0	0.	.....	0	0.	.....
82								
	6	9	1	.11	4.00	0	0.	.....
83								
	2	4	0	0.	.....	0	0.	.....
	4	5	0	0.	.....	0	0.	.....
	6	2	1	.50	3.00	0	0.	.....
92								
	3	31	0	0.	.....	0	0.	.....
	6	127	3	.02	3.00	11	.09	4.27
	10	1	0	0.	.....	0	0.	.....
101								
	6	10	4	.40	5.00	6	.60	4.67
102								
	6	6	1	.17	5.00	0	0.	.....
103								
	2	2	1	.50	2.00	1	.50	2.00
	4	1	0	0.	.....	1	1.00	1.00
	6	44	11	.25	2.09	5	.11	2.60
111								
	1	1	0	0.	.....	0	0.	.....
	2	1	0	0.	.....	1	1.00	3.00
	3	1	0	0.	.....	0	0.	.....
	4	20	0	0.	.....	17	.85	5.00
	6	261	33	.13	2.88	121	.46	4.29
121								
	10	1	0	0.	.....	1	1.00	3.00

TABLE 7. *Summary of results classified by year of purchase*

Years	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
1901–1945	346	137	0.40	4.66	181	0.52	6.03
1946–1950	1203	478	.40	4.64	300	.25	6.08
1951–1955	1640	472	.29	4.69	256	.16	4.60
1956–1960	1487	420	.28	4.52	349	.23	6.52
1961–1965	513	110	.21	3.26	67	.13	6.76

TABLE 7A. *Summary of results classified by year of purchase*
Agencies 15 and 16 omitted

Years	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
1901–1945	346	137	0.40	4.7	181	0.52	6.0
1946–1950	1142	417	.37	5.0	239	.21	6.2
1951–1955	1555	392	.25	5.2	172	.11	4.3
1956–1960	1381	326	.24	4.8	247	.18	6.1
1961–1965	438	65	.15	3.7	16	.04	3.8

TABLE 8. *Summary of results classified by year processed*

Years	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
1901–1945	361	69	0.19	4.20	111	0.31	3.76
1946–1950	1610	646	.40	4.65	455	.28	6.25
1951–1955	1836	507	.28	4.64	249	.14	4.69
1956–1960	1856	417	.22	4.51	381	.21	6.42
1961–1965	801	127	.16	3.37	78	.10	6.68

TABLE 8A. *Summary of results classified by year processed*
Agencies 15 and 16 omitted

Years	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
1901–1945	361	69	0.19	4.2	111	0.31	3.8
1946–1950	1549	585	.38	4.9	394	.25	6.3
1951–1955	1754	430	.25	5.1	168	.10	4.4
1956–1960	1748	321	.18	4.8	277	.16	6.0
1961–1965	726	82	.11	3.8	27	.04	4.7

TABLE 9. *Summary of results classified by frequency of use*

Frequency of use	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Daily	127	4	0.03	1.50	3	0.02	2.67
Frequently	1002	94	.09	3.80	187	.19	3.06
Infrequently	2540	479	.19	4.52	371	.15	5.54
Dead storage	3730	1328	.36	4.48	881	.24	6.53

TABLE 9A. *Summary of results classified by frequency of use*
Agencies 15 and 16 omitted

Frequency of use	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Daily	127	4	0.03	1.5	3	0.02	2.7
Frequently	1002	94	.09	3.8	187	.19	3.1
Infrequently	2415	362	.15	4.8	246	.10	4.2
Dead storage	3467	1108	.32	4.8	647	.19	6.6

TABLE 10. *Summary of results classified by type of container*

Type of container	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Metal can	519	166	0.32	3.66	191	0.37	8.35
Cardboard container	6643	1645	.25	4.62	1149	.17	5.38
Other	65	49	.75	3.45	57	.88	7.47
Metal can cardboard container	175	44	.25	2.30	46	.26	3.98

TABLE 10A. *Summary of results classified by type of container*
Agencies 15 and 16 omitted

Type of container	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Metal can	347	8	0.02	2.9	19	0.05	2.7
Cardboard container	6528	1558	.24	4.8	1061	.16	5.5
Other	7	0	0.	.....	1	.14	4.0
Metal can cardboard container	134	3	.02	7.3	5	.04	4.4

TABLE 11. *Summary of results classified by type of reel*

Type of reel	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Metal	3965	1163	0.29	4.41	840	0.21	5.74
Plastic	2353	521	.22	4.63	411	.17	5.49
Core only	618	51	.08	4.51	27	.04	6.63
Other	112	59	.53	3.41	76	.68	6.45
Cardboard	218	88	.40	4.50	65	.30	7.09
Metal and plastic	67	0	0.	.....	0	0.	.....

TABLE 11A. *Summary of results classified by type of reel*
Agencies 15 and 16 omitted

Type of reel	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Metal	3676	888	0.24	4.9	551	0.15	5.1
Plastic	2317	511	.22	4.6	402	.17	5.5
Core only	618	51	.08	4.5	27	.04	6.6
Other	52	10	.19	3.7	18	.35	2.7
Cardboard	218	88	.40	4.5	65	.30	7.1
Metal and plastic	67	0	0.	.....	0	0.	.....

TABLE 12–1. *Summary of results classified by maximum temperature*

Temperature (°F)	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
61–70	59	7	0.12	2.00	5	0.08	2.80
71–75	231	5	.02	2.20	44	.19	4.59
76–80	1325	287	.22	3.67	315	.24	7.49
81–85	841	423	.50	4.45	169	.20	7.88

TABLE 12–2. *Summary of results classified by minimum temperature*

Temperature (°F)	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
40–55	88	0	0.	.....	0	0.	.....
56–65	321	23	.07	1.39	10	.03	3.70
66–75	2047	699	.34	4.19	523	.26	7.40

TABLE 12A–1. *Summary of results classified by maximum temperature*
Agencies 15 and 16 omitted

Temperature (°F)	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
61–70	59	7	0.12	2.0	5	0.08	2.8
71–75	231	5	.02	2.2	44	.19	4.6
76–80	1056	67	.06	3.7	75	.07	4.0
81–85	841	423	.50	4.4	169	.20	7.9

TABLE 12A–2. *Summary of results classified by minimum temperature*
Agencies 15 and 16 omitted

Temperature (°F)	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
40–55	62	0	0.	.....	0	0.	.....
56–65	321	23	.07	1.4	10	.03	3.7
66–75	1804	479	.27	4.4	283	.16	6.4

TABLE 13–1. *Summary of results classified by maximum humidity*

Relative humidity (%)	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
20–50	776	230	0.30	3.9	235	0.30	8.5
51–60	1513	478	.32	4.3	283	.19	6.3
61–70	0	.....	.....	.....	.....	.....	.....
71–80	55	0	0.	.....	0	0.	.....
81–95	1	0	0.	.....	0	0.	.....

TABLE 13–2. *Summary of results classified by minimum humidity*

Relative humidity (%)	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
1–30	691	194	0.28	3.8	205	0.30	8.7
31–40	93	18	.19	2.3	24	.26	7.6
> 40	1472	477	.32	4.3	283	.19	6.3

TABLE 13A–1. *Summary of results classified by maximum humidity*
Agencies 15 and 16 omitted

Relative humidity (%)	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
20–50	544	19	0.03	5.5	6	0.01	5.8
51–60	1487	478	.32	4.3	283	.19	6.3
61–70	0	.....	.....	.....	.....	.....	.....
71–80	55	0	0.	.....	0	0.	.....
81–95	1	0	0.	.....	0	0.	.....

TABLE 13A–2. *Summary of results classified by minimum humidity*
Agencies 15 and 16 omitted

Relative humidity (%)	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
1–30	485	1	0.	4.0	0	0.	.....
31–40	41	0	0.	.....	0	0.	.....
> 40	1472	477	.32	4.3	283	0.19	6.3

TABLE 14. *Summary of results classified by use of air conditioning*

Air conditioning used?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	1508	278	0.18	3.51	356	0.24	7.13
No	1132	450	.40	4.46	184	.16	7.59

TABLE 14A. *Summary of results classified by use of air conditioning*
Agencies 15 and 16 omitted

Air conditioning used?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	1266	59	0.05	3.0	117	0.09	4.2
No	1106	449	.41	4.5	183	.17	7.6

TABLE 15. *Summary of results classified by storage location*

Storage location	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Vault	1688	655	0.39	4.10	408	0.24	8.22
Office	830	55	.07	3.44	123	.15	4.21
Basement	10	1	.10	5.00	1	.10	1.00
Other	22	0	0.	.....	0	0.	.....
Underground or mine	141	26	.18	4.58	11	.08	4.46

TABLE 15A. *Summary of results classified by storage location*
Agencies 15 and 16 omitted

Storage location	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Vault	1425	440	0.31	4.3	174	0.12	7.8
Office	827	52	.06	3.4	120	.15	4.0
Basement	10	1	.10	5.0	1	.10	1.0
Other	22	0	0.	.....	0	0.	.....
Underground or mine	141	26	.18	4.6	11	.08	4.5

TABLE 16. *Summary of results classified by use of humidification trays*

Humidification trays?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	78	6	0.08	4.83	6	0.08	4.67
No	2532	721	.28	4.10	529	.21	7.36

TABLE 16A. *Summary of results classified by use of humidification trays*
Agencies 15 and 16 omitted

Humidification trays?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	78	6	0.08	4.8	6	0.08	4.7
No	2264	501	.22	4.3	289	.13	6.3

TABLE 17. *Summary of results classified by type of leader*

Type of leader	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Fogged	923	274	0.30	3.52	239	0.26	7.10
Clear	3427	187	.05	2.49	648	.19	5.26
Plastic	68	8	.12	3.75	11	.16	5.64
Fogged and clear	2913	1428	.49	4.89	522	.18	5.99
No leader	38	.....	.....	.....	13	.34	2.38
Clear and plastic	4	1	.25	10.00	2	.50	2.00

TABLE 17A. *Summary of results classified by type of leader*
Agencies 15 and 16 omitted

Type of leader	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Fogged	758	117	0.15	3.5	75	0.10	4.9
Clear	3220	19	.01	2.7	469	.15	5.1
Plastic	65	5	.08	2.0	8	.12	2.9
Fogged and clear	2907	1424	.49	4.9	516	.18	6.0
No leader	38	0	0.	.....	13	.34	2.4
Clear and plastic	4	1	.25	10.0	2	.50	2.0

TABLE 18. *Summary of results classified by length of leader*

Length (ft)	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
0	38	.....	.....	.....	13	0.34	2.38
1–2	2295	184	0.08	3.53	438	.19	4.98
3–5	3733	1326	.36	4.38	773	.21	5.93
> 5	1024	377	.37	5.21	194	.19	7.34

TABLE 18A. *Summary of results classified by length of leader*
Agencies 15 and 16 omitted

Length (ft)	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
0	38	.....	.....	.....	13	0.34	2.38
1–2	2203	102	0.05	3.7	348	.16	4.2
3–5	3517	1144	.33	4.7	583	.17	6.1
> 5	958	316	.33	5.5	128	.13	6.2

TABLE 19. *Summary of results classified by number of splices*

Number of splices	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
None	3902	1175	0.30	4.27	859	0.22	5.55
1–5	2176	577	.27	4.74	480	.22	6.22
6–10	344	52	.15	5.58	25	.07	5.48
> 10	548	55	.10	4.76	35	.06	5.43

TABLE 19A. *Summary of results classified by number of splices*
Agencies 15 and 16 omitted

Number of splices	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
None	3577	900	0.25	4.7	563	0.16	5.1
1–5	2140	541	.25	4.8	444	.21	6.0
6–10	342	50	.15	5.5	23	.07	5.0
> 10	548	55	.10	4.8	35	.06	5.4

TABLE 20. *Summary of results classified by agency and number of splices*

Agency	Number of splices	n	Leader			Information section		
			k	f	$\bar{x}$	k	f	$\bar{x}$
15	0	137	111	0.81	1.7	111	0.81	3.5
	1 to 5	5	5	1.00	1.4	5	1.00	2.8
16	0	188	164	.87	3.5	185	.98	8.3
	1 to 5	31	31	1.00	4.1	31	1.00	10.5
	6 to 10	2	2	1.00	6.5	2	1.00	10.5
31	0	800	429	.54	4.6	204	.25	7.1
	1 to 5	813	419	.52	4.8	256	.31	7.7
	6 to 10	21	7	.33	5.0	4	.19	11.2
	>10	6	1	.17	4.0	3	.50	11.7
40	0	212	15	.07	1.1	4	.02	2.2
	1 to 5	60	2	.03	1.0	5	.08	5.4
	6 to 10	12	0	0.	.....	2	.17	1.5
	> 10	12	2	.17	1.5	4	.33	4.0
51	0	157	46	.29	5.1	67	.43	2.6
	1 to 5	40	9	.22	4.8	35	.88	2.7
	6 to 10	1	1	1.00	10.0	1	1.00	2.0
	> 10	1	1	1.00	5.0	1	1.00	2.0
52	0	334	228	.68	6.2	29	.09	5.8
	1 to 5	478	62	.13	6.3	36	.08	4.9
	6 to 10	217	42	.19	5.5	10	.05	5.0
	>10	511	51	.10	4.9	23	.05	5.5
61	0	394	77	.20	3.5	67	.17	3.2
	1 to 5	192	7	.04	3.3	23	.12	2.3
	6 to 10	14	0	0.	.....	4	.29	2.5
	>10	10	0	0.	.....	4	.40	2.5
62	0	93	15	.16	3.9	14	.15	6.5
	1 to 5	16	1	.06	3.0	1	.06	1.0
	6 to 10	1	0	0.	.....	0	0.	.....
63	0	206	16	.08	3.8	46	.22	3.8
	1 to 5	195	20	.10	3.7	22	.11	3.5
71	0	32	15	.47	3.7	3	.09	3.3
	1 to 5	68	12	.18	3.1	20	.29	3.4
73	0	54	6	.11	2.0	6	.11	3.8
	1 to 5	9	5	.56	2.0	4	.44	2.5
	6 to 10	1	0	0.	.....	0	0.	.....
81	0	11	2	.18	2.0	0	0.	.....
	1 to 5	1	0	0.	.....	0	0.	.....
	6 to 10	0	.....	.....	.....	.....	.....	.....
	> 10	1	0	0.	.....	0	0.	.....
82	0	4	1	.25	4.0	0	0.	.....
	1 to 5	5	0	0.	.....	0	0.	.....
83	0	8	0	0.	.....	0	0.	.....
	1 to 5	3	1	.33	3.0	0	0.	.....
92	0	128	3	.02	3.0	8	.06	4.2
	1 to 5	12	0	0.	.....	0	0.	.....
101	0	7	3	.43	6.0	3	.43	3.7
	1 to 5	3	1	.33	2.0	3	1.00	5.7
102	0	6	1	.17	5.0	0	0.	.....
103	0	16	11	.69	2.1	6	.38	2.2
	1 to 5	7	1	.14	2.0	1	.14	3.0
111	0	236	32	.14	2.9	105	.44	4.6
	1 to 5	56	1	.02	3.0	38	.68	4.0
	6 to 10	4	0	0.	.....	2	.50	3.0
	> 10	1	0	0.	.....	0	0.	.....
121	0	1	0	0.	.....	1	1.00	3.0

TABLE 21. *Summary of results classified by type of splice*

Type of splice	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Overlap	1491	487	0.33	4.87	350	0.23	6.45
Butt	1221	149	.12	4.69	139	.11	4.51
Other	67	2	.03	6.00	4	.06	2.50
Overlap and butt	189	27	.14	4.63	25	.13	8.60
Overlap and other	6	0	0.	.....	0	0.	.....
Butt and other	26	4	.15	4.25	4	.15	3.25

TABLE 21A. *Summary of results classified by type of splice*
Agencies 15 and 16 omitted

Type of splice	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Overlap	1481	477	0.32	4.9	340	0.23	6.5
Butt	1215	143	.12	4.8	133	.11	4.4
Other	67	2	.03	6.0	4	.06	2.5
Overlap and butt	189	27	.14	4.6	25	.13	8.6
Overlap and other	6	0	0.	.....	0	0.	.....
Butt and other	26	4	.15	4.2	4	.15	3.2

TABLE 22. *Summary of results classified by type of band*

Type of band	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
None	6877	1703	0.25	4.61	1209	0.18	5.72
String	16	0	0.	.....	0	0.	.....
Rubber band	348	161	.46	3.24	177	.51	6.46
Other	45	29	.64	2.17	35	.78	7.34
Paper	15	2	.13	2.50	1	.07	7.00

TABLE 22A. *Summary of results classified by type of band*
Agencies 15 and 16 omitted

Type of band	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
None	6679	1541	0.23	4.8	1037	0.16	5.6
String	16	0	0.	.....	0	0.	.....
Rubber band	195	15	.08	2.7	25	.13	2.3
Other	9	1	.11	1.0	1	.11	2.0
Paper	15	2	.13	2.5	1	.07	7.0

TABLE 23. *Summary of results classified by presence or absence of chemical residues*

Chemical residue?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	500	298	0.60	3.49	304	0.61	7.34
No	6495	1554	.24	4.67	1081	.17	5.49

TABLE 23A. *Summary of results classified by presence or absence of chemical residues*

Agencies 15 and 16 omitted

Chemical residue?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	229	50	0.22	4.1	37	0.16	3.8
No	6383	1468	.23	4.8	994	.16	5.6

TABLE 24. *Summary of results classified by presence or absence of silvery sheen on leaders*

Sheen on leader?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	1042	791	0.76	5.33	397	0.38	7.74
No	5912	1054	.18	3.86	970	.16	5.08

TABLE 24A. *Summary of results classified by presence or absence of silvery sheen on leaders*

Agencies 15 and 16 omitted

Sheen on leader?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	874	629	0.72	5.6	230	0.26	6.5
No	5710	888	.16	4.2	796	.14	5.2

TABLE 25. *Summary of results classified by presence or absence of silvery sheen on dense area*

Sheen on dense area?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	284	158	0.56	4.50	192	0.68	10.56
No	6705	1691	.25	4.50	1183	.18	5.10

TABLE 25A. *Summary of results classified by presence or absence of silvery sheen on dense area*

Agencies 15 and 16 omitted

Sheen on dense area?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	168	50	0.30	5.5	76	0.45	11.2
No	6449	1471	.23	4.8	956	.15	5.0

TABLE 26. *Summary of results classified by presence or absence of discoloration or fading*

Discoloration or fading?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	192	112	0.58	3.58	125	0.65	8.10
No	6798	1736	.26	4.55	1255	.18	5.62

TABLE 26A. *Summary of results classified by presence or absence of discoloration or fading*

Agencies 15 and 16 omitted

Discoloration or fading?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	83	14	0.17	4.6	17	0.20	8.1
No	6535	1507	.23	4.8	1019	.16	5.5

TABLE 27. *Summary of results classified by presence or absence of water spots*

Water spots?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	718	180	0.25	2.24	291	0.41	4.52
No	6297	1663	.26	4.74	1077	.17	6.18

TABLE 27A. *Summary of results classified by presence or absence of water spots*

Agencies 15 and 16 omitted

Water spots?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	590	57	0.10	2.9	165	0.28	4.4
No	6062	1467	.24	4.9	869	.14	5.7

TABLE 28. *Summary of results classified by presence or absence of other blemishes*

Other blemishes?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	281	136	0.48	4.02	150	0.53	9.01
No	6241	1629	.26	4.58	1109	.18	5.70

TABLE 28A. *Summary of results classified by presence or absence of other blemishes*

Agencies 15 and 16 omitted

Other blemishes?	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Yes	149	16	0.11	3.6	18	0.12	5.6
No	6036	1437	.24	4.9	913	.15	5.8

TABLE 29. *Summary of results classified by agency and type of leader*

Agency	Type of leader	n	Leader			Information section		
			k	f	$\bar{x}$	k	f	$\bar{x}$
15	Fogged	33	33	1.00	1.7	33	1.00	3.4
	Clear	107	81	.76	1.8	81	.76	3.6
	Fogged and clear	1	1	1.00	1.0	1	1.00	2.0
16	Fogged	132	124	.94	4.0	131	.99	9.3
	Clear	100	87	.87	3.1	98	.98	7.5
	Plastic	3	3	1.00	6.7	3	1.00	13.0
	Fogged and clear	5	3	.60	3.3	5	1.00	7.2
31	Fogged	11	6	.55	4.7	4	.36	11.8
	Clear	376	4	.01	2.5	130	.35	8.8
	Fogged and clear	1281	860	.67	4.7	338	.26	7.0
40	Fogged	99	16	.16	1.1	4	.04	4.8
	Clear	162	0	0.		6	.04	2.8
	Fogged and clear	38	4	.11	1.2	4	.11	2.8
51	Fogged	5	5	1.00	4.4	5	1.00	3.6
	Clear	120	3	.02	3.0	71	.59	2.6
	Plastic	1	0	0.		0	0.	
	Fogged and clear	69	48	.70	5.3	23	.33	2.6
	No leader	8				7	.88	2.6
	Clear and plastic	2	1	.50	10.0	1	.50	2.0
52	Fogged	62	28	.45	5.6	14	.23	6.4
	Clear	609	2	.00	4.5	15	.02	5.2
	Plastic	21	0	0.		0	0.	
	Fogged and clear	841	354	.42	6.0	69	.08	5.1
	No leader	6				0	0.	
	Clear and plastic	1	0	0.		0	0.	
61	Fogged	14	3	.21	3.3	3	.21	2.3
	Clear	299	3	.01	2.3	44	.15	2.3
	Fogged and clear	306	81	.26	3.5	55	.18	3.3
	No leader	7				1	.14	2.0
62	Fogged	4	2	.50	3.5	2	.50	3.5
	Clear	65	1	.02	4.0	4	.06	5.5
	Fogged and clear	37	13	.35	3.9	9	.24	7.0
	No leader	4				0	0.	
63	Clear	310	1	.00	3.0	59	.19	3.8
	Fogged and clear	93	35	.38	3.8	10	.11	3.4
71	Fogged	8	6	.75	4.0	0	0.	
	Clear	36	0	0.		18	.50	3.1
	Fogged and clear	56	21	.38	3.3	5	.09	4.4
73	Fogged	4	3	.75	2.0	2	.50	4.0
	Clear	29	3	.10	2.0	4	.14	3.8
	Plastic	29	5	.17	2.0	4	.14	2.5
81	Fogged	2	0	0.		0	0.	
	Clear	4	0	0.		0	0.	
	Fogged and clear	7	2	.29	2.0	0	0.	
82	Fogged	1	0	0.		0	0.	
	Clear	6	0	0.		0	0.	
	Fogged and clear	2	1	.50	4.0	0	0.	
83	Fogged	1	0	0.		0	0.	
	Clear	7	0	0.		0	0.	
	Fogged and clear	3	1	.33	3.0	0	0.	
92	Fogged	71	1	.01	3.0	2	.03	3.0
	Clear	61	0	0.		7	.11	4.6
	Plastic	1	0	0.		0	0.	
	Fogged and clear	25	2	.08	3.0	2	.08	4.5
101	Fogged	4	4	1.00	5.0	4	1.00	3.2
	Clear	2	0	0.		2	1.00	7.5
	Fogged and clear	4	0	0.		0	0.	
102	Fogged and clear	6	1	.17	5.0	0	0.	
103	Fogged	38	11	.29	2.1	4	.11	2.5
	Clear	48	0	0.		2	.04	1.5
	Fogged and clear	2	1	.50	2.0	1	.50	3.0
111	Fogged	90	32	.36	2.9	31	.34	4.5
	Clear	194	2	.01	2.0	106	.55	4.6
	Plastic	7	0	0.		4	.57	3.2
	No leader	7				4	.57	2.0
	Clear and plastic	1	0	0.		1	1.00	2.0

TABLE 30. *Summary of results classified by type of leader and length of leader*

Type of leader	Length	n	Leader			Information section		
			k	f	$\bar{x}$	k	f	$\bar{x}$
Fogged	1 to 2 ft	262	53	0.20	3.92	50	0.19	6.10
	3 to 5 ft	450	144	.32	3.11	109	.24	6.52
	> 5 ft	160	70	.44	3.90	13	.46	8.44
Clear	1 to 2 ft	1780	71	.04	3.04	342	.19	4.96
	3 to 5 ft	1284	102	.08	2.13	271	.21	5.58
	> 5 ft	236	5	.02	2.20	20	.08	6.45
Plastic	1 to 2 ft	44	6	.14	3.50	9	.20	5.11
	3 to 5 ft	14	1	.07	7.00	1	.07	14.00
	> 5 ft	6	0	0.	.....	0	0.	.....
Fogged and clear.	1 to 2 ft	203	53	.26	3.85	35	.17	3.66
	3 to 5 ft	1972	1075	.55	4.76	388	.20	6.01
	> 5 ft	617	300	.49	5.55	99	.16	6.74
Clear and plastic.	1 to 2 ft	1	0	0.	.....	1	1.00	2.00
	3 to 5 ft	2	0	0.	.....	0	0.	.....
	> 5 ft	1	1	1.00	10.0	1	1.00	2.00

TABLE 31. *Summary of results classified by agency and type of splice*

Agency	Type of splice	n	Leader			Information section		
			k	f	$\bar{x}$	k	f	$\bar{x}$
15	Overlap	5	5	1.00	1.4	5	1.00	2.8
16	Overlap	5	5	1.00	3.4	5	1.00	10.2
	Butt	6	6	1.00	3.2	6	1.00	8.0
31	Overlap	711	380	.53	4.9	226	.32	7.5
	Butt	86	45	.52	4.4	24	.28	9.2
	Overlap and butt	58	11	.19	4.8	18	.31	10.3
40	Overlap	10	1	.10	1.0	2	.20	8.5
	Butt	58	1	.02	1.0	6	.10	3.3
	Other	3	0	0.	.....	1	.33	3.0
	Overlap and other	1	0	0.	.....	0	0.	.....
	Butt and other	10	1	.10	2.0	2	.20	3.0
51	Overlap	3	0	0.	.....	3	1.00	3.7
	Butt	37	9	.24	4.8	32	.86	2.8
	Other	2	1	.50	10.0	2	1.00	2.0
52	Overlap	324	71	.22	6.1	46	.14	5.8
	Butt	714	69	.10	5.4	16	.02	3.6
	Other	12	0	0.	.....	0	0.	.....
	Overlap and butt	128	16	.13	4.5	6	.05	4.7
	Overlap and other	1	0	0.	.....	0	0.	.....
61	Overlap	150	5	.03	2.6	21	.14	2.4
	Butt	39	0	0.	.....	8	.21	2.1
	Other	18	1	.06	2.0	0	0.	.....

TABLE 31. *Summary of results classified by agency and type of splice*—Continued

Agency	Type of splice	n	Leader			Information section		
			k	f	$\bar{x}$	k	f	$\bar{x}$
61—Con.	Overlap and butt	2	0	0.	.....	1	0.50	1.0
	Overlap and other	4	0	0.	.....	0	0.	.....
	Butt and other	1	1	1.00	8.0	1	1.00	5.0
62	Overlap	7	1	.14	3.0	0	0.	.....
	Butt	7	0	0.	.....	1	.14	1.0
	Other	3	0	0.	.....	0	0.	.....
63	Overlap	13	0	0.	.....	3	.23	3.0
	Butt	162	17	.10	3.8	17	.10	3.6
	Other	4	0	0.	.....	1	.25	3.0
	Butt and other	15	2	.13	3.5	1	.07	2.0
71	Overlap	67	12	.18	3.1	20	.30	3.4
	Other	1	0	0.	.....	0	0.	.....
73	Overlap	10	5	.50	2.0	4	.40	2.5
81	Overlap	1	0	0.	.....	0	0.	.....
	Other	1	0	0.	.....	0	0.	.....
82	Overlap	5	0	0.	.....	0	0.	.....
83	Overlap	1	1	1.00	3.0	0	0.	.....
	Other	2	0	0.	.....	0	0.	.....
92	Overlap	11	0	0.	.....	0	0.	.....
	Butt	1	0	0.	.....	0	0.	.....
101	Overlap	3	1	.33	2.0	3	1.00	5.7
103	Butt	7	1	.14	2.0	1	.14	3.0
111	Overlap	26	0	0.	.....	12	.46	4.2
	Butt	36	1	.03	3.0	28	.78	3.8

TABLE 32. *Summary of results classified by agency and type of band*

Agency	Type of band	n	Leader			Information section		
			k	f	$\bar{x}$	k	f	$\bar{x}$
15	None	100	74	0.74	1.6	74	0.74	3.3
	Rubber band	42	42	1.00	1.9	42	1.00	3.9
16	None	98	88	.90	3.9	98	1.00	9.2
	Rubber band	111	104	.94	3.8	110	.99	8.4
	Other	36	28	.78	2.2	34	.94	7.5
31	None	1666	868	.52	4.7	472	.28	7.5
40	None	280	20	.07	1.2	14	.05	3.8
	Rubber band	15	0	0.	.....	0	0.	.....
	Other	3	0	0.	.....	1	.33	2.0
51	None	185	52	.28	5.4	92	.50	2.8
	Rubber band	18	3	.17	2.3	16	.89	1.9
	Other	3	1	.33	1.0	0	0.	.....
	Paper	2	2	1.00	2.5	0	0.	.....
52	None	1545	384	.25	6.0	98	.06	5.3
61	None	595	81	.14	3.4	86	.14	3.0
	Rubber band	4	1	.25	3.0	1	.25	2.0
62	None	81	10	.12	4.3	11	.14	7.5
	Rubber band	24	5	.21	3.2	4	.17	2.5
	Paper	2	0	0.	.....	0	0.	.....
63	None	399	36	.09	3.8	67	.17	3.7
	Other	1	0	0.	.....	0	0.	.....
71	None	100	27	.27	3.4	23	.23	3.3
73	None	58	9	.16	2.0	8	.14	3.6
	Rubber band	6	2	.33	2.0	2	.33	2.0
81	None	7	2	.29	2.0	0	0.	.....
	Rubber band	6	0	0.	.....	0	0.	.....
82	None	4	0	0.	.....	0	0.	.....
	Rubber band	5	1	.20	4.0	0	0.	.....
83	Rubber band	11	1	.09	3.0	0	0.	.....
92	None	120	3	.02	3.0	10	.08	4.2
	Rubber band	37	0	0.	.....	1	.03	5.0
101	None	10	4	.40	5.0	6	.60	4.7
102	None	6	1	.17	5.0	0	0.	.....
103	None	41	11	.27	2.2	7	.17	2.3
	Rubber band	1	1	1.00	1.0	0	0.	.....
	Other	1	0	0.	.....	0	0.	.....
	Paper	4	0	0.	.....	0	0.	.....
111	None	294	33	.11	2.9	143	.49	4.4
	Rubber band	1	1	1.00	3.0	1	1.00	5.0
	Paper	2	0	0.	.....	1	.50	7.0

TABLE 33. *Summary of results classified by storage location and year of purchase*

Agencies 15 and 16 omitted

Storage and year of purchase	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Vault							
1901–1945	232	111	0.48	4.6	143	0.62	6.6
1946–1950	655	341	.52	4.9	186	.28	6.9
1951–1955	571	157	.27	4.6	68	.12	5.1
1956–1960	555	226	.41	4.4	128	.23	8.2
1961–1965	281	49	.17	3.5	5	.02	2.6
Office							
1901–1945	56	12	.21	2.9	22	.39	3.5
1946–1950	69	6	.09	2.8	6	.09	5.3
1951–1955	314	23	.07	3.0	66	.21	3.9
1956–1960	380	24	.06	3.6	48	.13	3.8
1961–1965	57	1	.02	2.0	0	0.	.....
Basement							
1901–1945	18	9	.50	4.7	0	0.	.....
1946–1950	53	13	.25	3.2	23	.43	3.3
1951–1955	2	0	0.	.....	0	0.	.....
1956–1960	3	2	.67	10.0	1	.33	1.0
1961–1965	17	3	.18	4.3	3	.18	2.3
Underground or mine							
1901–1945	188	53	.28	5.2	53	.28	5.3
1946–1950	342	56	.16	6.1	10	.03	3.7
1951–1955	531	208	.39	6.0	13	.02	2.9
1956–1960	373	59	.16	6.7	18	.05	7.6
1961–1965	60	11	.18	4.3	6	.10	6.0
Other							
1901–1945	2	0	0.	.....	1	.50	4.0
1946–1950	8	0	0.	.....	1	.13	2.0
1951–1955	114	0	0.	.....	8	.07	5.9
1956–1960	11	0	0.	.....	0	0.	.....
1961–1965	18	0	0.	.....	0	0.	.....

TABLE 34. *Summary of results classified by type of container and maximum humidity*

Agencies 15 and 16 omitted

Container and maximum humidity	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Metal can—Percent:							
20–50	13	0	0.	.....	0	0.	.....
51–60	41	0	0.	.....	0	0.	.....
Cardboard container—Percent:							
20–50	488	19	.04	5.5	6	.01	5.8
51–60	1443	478	.33	4.3	282	.20	6.3
61–70	0	.....	.....	.....	.....	.....	.....
71–80	55	0	0.	.....	0	0.	.....
Metal can and cardboard container—Percent:							
20–50	37	0	0.	.....	0	0.	.....
51–60	3	0	0.	.....	1	.33	4.0
Other—Percent:							
20–50	6	0	0.	.....	0	0.	.....

TABLE 35. *Summary of results classified by type of container and maximum temperature*

Agencies 15 and 16 omitted

Container and maximum temperature	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Metal can—Percent:							
61–70	6	0	0.	.....	0	0.	.....
71–75	8	0	0.	.....	0	0.	.....
76–80	101	0	0.	.....	0	0.	.....
Cardboard container—Percent:							
61–70	47	7	.15	2.0	5	.11	2.8
71–75	221	5	.02	2.2	44	.20	4.6
76–80	954	67	.07	3.7	74	.08	4.0
81–85	804	423	.53	4.4	169	.21	7.9
Metal can and cardboard container—Percent:							
61–70	0	0	0.	.....	0	0.	.....
71–75	2	0	0.	.....	0	0.	.....
76–80	1	0	0.	.....	1	1.00	4.00
81–85	37	0	0.	.....	0	0.	.....
Other—Percent:							
71–75	6	0	0.	.....	0	0.	.....

TABLE 36. *Summary of results classified by manufacturer and processor*

Manufacturer	Processor	n	Leader			Information section		
			k	f	$\bar{x}$	k	f	$\bar{x}$
1	7	47	17	0.36	1.1	3	0.06	3.3
	14	67	55	.82	3.0	65	.97	9.0
	18	1	0	0.	.....	0	0.	.....
2	14	5	5	1.00	1.4	5	1.00	2.4
	18	1	0	0.	.....	1	1.00	3.0
	25	1	1	1.00	2.0	0	0.	.....
	41	3	0	0.	.....	0	0.	.....
	42	4	0	0.	.....	0	0.	.....
3	14	7	3	.43	3.3	7	1.00	8.9
	18	1	0	0.	.....	0	0.	.....
	19	31	0	0.	.....	0	0.	.....
4	7	126	2	.02	1.5	7	.06	3.3
	10	4	0	0.	.....	0	0.	.....
	14	124	118	.95	4.0	124	1.00	8.8
	18	16	0	0.	.....	13	.81	4.4
	20	1	1	1.00	3.0	1	1.00	10.0
	25	3	0	0.	.....	0	0.	.....
	41	170	47	.28	4.3	25	.15	6.1
	42	1	1	1.00	8.0	0	0.	.....
	46	1	1	1.00	2.0	1	1.00	4.0
	47	114	114	1.00	1.7	114	1.00	3.5
6	7	88	0	0.	.....	2	.02	8.5
	10	1	1	1.00	5.0	1	1.00	4.0
	12	9	1	.11	4.0	0	0.	.....
	14	10	9	.90	3.8	10	1.00	7.3
	17	39	7	.18	2.1	9	.23	3.4
	18	203	24	.12	3.2	102	.50	4.4
	19	126	3	.02	3.0	11	.09	4.3
	20	1534	830	.54	4.7	450	.29	7.5
	24	328	35	.11	3.9	64	.20	3.8
	25	1886	443	.23	5.8	193	.10	4.2
	27	9	1	.11	2.0	0	0.	.....
	32	1	1	1.00	6.0	1	1.00	3.0
8	25	2	0	0.	.....	0	0.	.....
10	7	19	0	0.	.....	0	0.	.....
	19	1	0	0.	.....	0	0.	.....
	20	183	0	0.	.....	0	0.	.....
	26	1	0	0.	.....	1	1.00	3.0

TABLE 37. *Summary of results classified by activity of use and year of purchase*

Agencies 15 and 16 omitted

Activity and year of purchase	n	Leader			Information section		
		k	f	$\bar{x}$	k	f	$\bar{x}$
Daily							
1901–1945	8	3	0.38	1.0	2	0.25	1.0
1946–1950	11	1	.09	3.0	1	.09	6.0
1951–1955	20	0	0.	.....	0	0.	.....
1956–1960	21	0	0.	.....	0	0.	.....
1961–1965	7	0	0.	.....	0	0.	.....
Frequently							
1901–1945	25	4	.16	4.5	8	.32	4.2
1946–1950	102	10	.10	4.6	19	.19	3.6
1951–1955	84	7	.08	4.1	19	.23	2.4
1956–1960	216	18	.08	5.4	56	.26	2.8
1961–1965	50	4	.08	3.8	3	.06	1.7
Infrequently							
1901–1945	171	35	.20	4.4	45	.26	5.6
1946–1950	168	17	.10	4.4	7	.04	4.7
1951–1955	837	200	.24	5.8	80	.10	4.0
1956–1960	629	45	.07	2.7	49	.08	3.8
1961–1965	145	4	.03	2.8	2	.01	3.0
Dead storage							
1901–1945	296	143	.48	4.8	166	.56	6.2
1946–1950	860	389	.45	5.0	211	.25	6.5
1951–1955	612	185	.30	4.6	73	.12	5.0
1956–1960	512	262	.51	5.1	141	.28	8.2
1961–1965	236	57	.24	3.7	11	.05	4.5

8. References

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[5] McCamy, C. S., and Pope, C. I., Current research on preservation of archival records on silver-gelatin type microfilm in roll form, J. Res. NBS **69A** (Phys. and Chem.), No. 5, 385 (1965).

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[8] Pope, C. I., Blemish formation in processed microfilm, J. Res. NBS, **72A** (Phys. and Chem.), No. 3, 251 (1968).

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NOTE: The General Services Administration forms 1990A and 1990 are shown on the following pages.

GENERAL SERVICES ADMINISTRATION

MICROFILM BLEMISH INSPECTION WORKSHEET

PAGE OF PAGES

INSTRUCTIONS.-Prepare a separate worksheet for each roll of microfilm selected for inspection. *(See GSA Form 1990, Report on Microfilm Blemishes, for instructions concerning stratum and sample selection.)* Number worksheets in consecutive order within each stratum inspected. SUBMIT ALL WORKSHEETS WITH REPORT.

NAME

1. DEPARTMENT OR AGENCY

2. BUREAU OR SERVICE

ROLL IDENTIFICATION

3. COLLECTION TITLE

4. SERIES

5. ROLL NO.

6. STRATUM *(Name or number)*

FILM DATA

7. FILM SIZE
☐ a. 16MM ☐ b. 35MM ☐ c. OTHER *(Specify)*

8. NAME OF MANUFACTURER

9. BRAND NAME OF FILM

10. YEAR OF MANUFACTURE OR PURCHASE

11. FILM PROCESSED BY *(Name, city and State)*

YEAR PROCESSED

STORAGE AND USE DATA

12. ACTIVITY OF STRATUM
☐ a. DAILY ☐ b. FREQUENTLY ☐ c. INFREQUENTLY ☐ d. DEAD STORAGE

13. TYPE OF CONTAINER
☐ a. METAL CAN ☐ b. CARDBOARD CONTAINER ☐ c. OTHER *(Specify)*

14. TYPE OF REEL
☐ a. METAL ☐ b. PLASTIC ☐ c. CORE ONLY ☐ d. OTHER *(Specify)*

15. STORAGE CONDITIONS

	(1) MAX.	(2) MIN.
a. TEMPERATURE		
b. HUMIDITY	(1) MAX.	(2) MIN.
c. AIRCONDITIONED	☐ (1) YES	☐ (2) NO

16. STORAGE LOCATION
☐ a. VAULT ☐ b. OFFICE SPACE ☐ c. BASEMENT ☐ d. OTHER *(Specify)*

17. ARE HUMIDIFICATION TRAYS STILL USED?
☐ a. YES ☐ b. NO

18. DO THE DATA RECORDED IN ITEMS 12 THOUGH 17 REPRESENT CONDITIONS UNDER WHICH FILM HAS BEEN MAINTAINED SINCE IT WAS PROCESSED?
☐ a. YES ☐ b. NO *(If "NO," describe significant deviations on reverse)*

INSPECTION DATA

19. TYPE OF LEADER
☐ a. FOGGED FILM ☐ b. CLEAR FILM ☐ c. PLASTIC

20. LENGTH OF LEADER *(Feet)*

21. NUMBER OF SPLICES
☐ a. NONE ☐ b. 1-5 ☐ c. 6-10 ☐ d. 11 OR MORE

22. PURPOSE OF SPLICES
☐ a. REPAIR ☐ b. ADD ON

23. TYPE OF SPLICE
☐ a. OVERLAP ☐ b. BUTT ☐ c. OTHER *(Specify)*

24. TYPE OF BAND USED ON ROLL
☐ a. NONE ☐ b. STRING ☐ c. RUBBER BAND ☐ d. OTHER *(Specify)*

25. SPOT AND CHARACTER-ASSOCIATED BLEMISHES FOUND

a. LEADER				b. FRAMES NEXT TO LEADER				c. CENTER FRAMES			
TYPE	SEVERITY	TYPE	SEVERITY	TYPE	SEVERITY	TYPE	SEVERITY	TYPE	SEVERITY	TYPE	SEVERITY
☐ 1				☐ 1		☐ 2		☐ 1		☐ 2	
☐ 3		☐ 4		☐ 3		☐ 4		☐ 3		☐ 4	
		☐ 6		☐ 5		☐ 6		☐ 5		☐ 6	

26. OTHER BLEMISHES AND IMPERFECTIONS FOUND

a. CHEMICAL RESIDUE ☐ (1) YES ☐ (2) NO

b. SILVERY SHEEN ON LEADER ☐ (1) YES ☐ (2) NO

c. SILVERY SHEEN ON DENSE AREAS ☐ (1) YES ☐ (2) NO

d. DISCOLORATION OR FADING ☐ (1) YES ☐ (2) NO

e. WATER SPOTS ☐ (1) YES ☐ (2) NO

f. OTHER ☐ (1) YES *(Explain on reverse)* ☐ (2) NO

27. ARE THERE ANY APPARENT CAUSES FOR THE BLEMISHES FOUND ON THIS ROLL?
☐ a. YES *(Explain on reverse)* ☐ b. NO

INSPECTED BY

28. NAME AND TITLE

TELEPHONE NO.

DATE

GENERAL SERVICES ADMINISTRATION

REPORT ON MICROFILM BLEMISHES

REPORT NO.

INSTRUCTIONS.-Prepare a separate report summarizing worksheet data for each stratum of microfilm inspected. Before inspection, divide microfilm holdings into separate homogenous groups (stratum) which are distinguished by photographically significant differences, such as processing date or place, storage conditions, film size, and film make. Inspections should be on a sample basis. The sample should be 1/1000 of the stratum but not less than 100 rolls. Inspect complete stratum if less than 100 rolls.

NAME

1. DEPARTMENT OR AGENCY

2. BUREAU OR SERVICE

3. COLLECTION TITLE

4. SERIES

5. STRATUM *(Name or no.)*

6. NUMBER OF ROLLS IN STRATUM

7. NUMBER OF ROLLS IN SAMPLE

IDENTIFICATION OF FILM INSPECTED

8. CHARACTERISTICS OF THE STRATUM

SUMMARY OF BLEMISHES FOUND

9. BLEMISHES FOUND IN STRATUM

TYPE (1)	(a) LEADER		(b) FRAMES NEXT TO LEADER		(c) CENTER FRAMES	
	NUMBER OF ROLLS (2)	% OF SAMPLE (COL. (2) ÷ ITEM 7) (3)	NUMBER OF ROLLS (4)	% OF SAMPLE (COL. (4) ÷ ITEM 7) (5)	NUMBER OF ROLLS (6)	% OF SAMPLE (COL. (6) ÷ ITEM 7) (7)
1						
2						
3						
4						
5						
6						

10. SUMMARIZE ON REVERSE SIDE, APPARENT CAUSES FOR BLEMISHES AS REPORTED IN ITEM 26 OF THE MICROFILM BLEMISH INSPECTION WORKSHEET (GSA FORM 1990A) FOR THIS STRATUM.

PREPARED BY

11. NAME | TITLE | TELEPHONE NO. | DATE

GSA DC 64-9750

GSA FORM JAN 64 1990