LABORATORY PROFICIENCY TESTING PROGRAM

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PROFICIENCY TESTING

THE FORENSIC SCIENCES FOUNDATION, INC.

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LABORATORY PROFICIENCY TESTING PROGRAM

REPORT NO.3

BLOOD ANALYSIS

PROJECT STAFF

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Prepared for the Department of Justice, Law Enforcement Assistance Administration, National Institute of Law Enforcement and Criminal Justice, under Grant 74-NI-99-0048.

FOREWORD

The analysis summarized in this report is the third of a series that will be made in conjunction with this proficiency testing research project.

In the course of this testing program participating laboratories will have analyzed and identified ten different samples of physical evidence similar in nature to the types of evidence normally submitted to them for analysis.

The results of Test Number Three are reflected in the charts and graphs which follow.

The citing of any product or method in this report is done solely for reporting purposes and does not constitute an endorsement by the project sponsors.

Comments or suggestions relating to any portion of this report or of the program in general will be appreciated.

June 1975

TABLE OF CONTENTS

BACKGROUND

This laboratory proficiency testing research project, one phase of which is summarized in this report, was initiated in the fall of 1974.

This is a research study of how to prepare and distribute specific samples; how to analyze laboratory results; and how to report those results in a meaningful manner. The research will be conducted in two cycles, each of which will include five samples: a controlled substance; firearms evidence; blood; glass, and paint.

Participation in the program is voluntary. Accordingly, invitations have been extended to 235 laboratories to share in the research. It is recognized that all laboratories do not perform analyses of all possible types of physical evidence. Thus, in the data summaries included in this report, space opposite some Code Numbers (representing specific laboratories) may be blank, or marked "No Data Returned."

A final project report will be prepared at the conclusion of Cycle II.

The Project is under the direct control of the Project Advisory Committee whose members' names are listed on the Title Page. Each is a nationally known criminalistic laboratory authority.

Supporting the Project Advisory Committee in their efforts is the Forensic Sciences Foundation with additional support from the National Bureau of Standards in the areas of sample evaluation and data analysis and interpretation.

SUMMARY

Test Sample #3 consisted of a swatch of material with a dried human blood stain, packaged in a glassine envelope. The samples were mailed on March 12, 1975 with instructions to handle the sample in a manner similar to like evidence and submitted for analysis.

Test Sample #3 was sent to all the laboratories on the basic list of 235. Three of those laboratories served as referees, reducing the actual number to 232.

In the accompanying data summaries, 154 laboratories responded with completed data sheets, 39 laboratories responded that they did not do blood analysis and no response was received from 39 laboratories. This represents a participation rate of 80%.

No effort was made in this report to highlight areas wherin laboratory improvements might be instigated.

LAB CODE A-_____

☐ CHECK HERE (AND RETURN) IF YOU DO NOT PERFORM BLOOD ANALYSIS

DATE RECEIVED IN LAB_____

DATE PROCESSED IN LAB_____

DATA SHEET

PROFICIENCY TESTING PROGRAM

TEST #3

HUMAN BLOOD ANALYSIS

The sample is a human blood stain, therefore we ask that you supply only the methodology you would use in answering questions 1 and 2. It is not necessary to perform the actual tests. This applies to questions 1 and 2 only.

1. Indicate the methods you would normally use to ascertain that the sample is blood.

   Method(s):

2. Indicate the methods you would normally use to ascertain that the blood is from human species.

   Method(s):

Examine according to your normal laboratory procedures and complete portion(s) which comply with your laboratory policy.

3. a. What is the ABO factor? _____

   b. Indicate method(s) used:

4. If your laboratory has the capabilities to perform any other grouping or sub-grouping procedures (such as MN, Rh, or isoenzymes, etc.) run any or all of them and report your findings here. (For each grouping or subgrouping identified, please indicate the methods used. Attach additional sheets if necessary.)

   Group:

   Method(s):

   Group:

   Method(s):

ANNEX A
FIGURE 1.

ANNEX B

National Bureau of Standards Analysis

LABORATORY PROFICIENCY TESTING PROGRAM

Test No. 3 - Blood Analysis

A sample consisting of several drops of human blood on a swatch of cloth was sent to each of 232 laboratories throughout the United States for identification. A detailed analysis of the blood as described by the provider of the sample is given in Table 1. The verification of these results by three referee laboratories is given in Table 2.

Of the 232 laboratories receiving samples, 154 returned data. A summary of the responses to the question concerning the ABO factor is given below; a tabulation of the ABO factor found by each laboratory is given in Table 7.

148 laboratories reported type B
2 laboratories reported type AB
2 laboratories reported type O
1 laboratory reported no A, B, or H substance detected
1 laboratory misunderstood the question

Of the 154 laboratories returning ABO factor data, 58 also reported data on one or more additional groups and subgroups. These test results are summarized below; a tabulation of the subgroups found by each laboratory is given in Table 9.

blood group	number of laboratories	results and (number of laboratories)
AK (adenylate kinase)	3	type 1 (3)
EAP (erythrocyte acid phosphotase)	15	type A (15)
EsD (esterase D)	2	type 1 (1), type 2-1 (1)
Hb (hemoglobin)	10	type A normal (10)
Hp (haptoglobin)	2	type 2-1 (2)
LDH (lactic dehydrogenase)	1	type normal venous blood
MN	25	type MN (15), type M (9), type M-N- (1)
PGM (phosphoglucomutase)	20	type 2-1 (18), type 1-1 (2)
Rh (Rheumatoid Arthritis Factor)	24	due to the large variation in the symbols used to report Rh, the reader is directed to Table 9
Rheumatoid Arthritis Factor	1	negative (1)

The participants were also asked to identify the test methods normally used by their laboratories. Summaries of the methods utilized are given in Tables 3 to 6. Tabulations of the methods reported by each laboratory are given in Tables 8 and 9.

This annex was prepared by the Law Enforcement Standards Laboratory of NBS in conjunction with the NBS Laboratory Evaluation Technology Section (LETS). The anonymous test results reported by the participating forensic laboratories were analyzed and tabulated by Jeffrey Horlick and Charles G. Leete of LETS. This work was supported by National Institute of Law Enforcement and Criminal Justice, Department of Justice.

TABLE 1

SUPPLIER'S CHARACTERIZATION OF THE HUMAN BLOOD STAIN

ABO factor: group B

AK: type 1

EAP: type A

Hb: type A

Hp: type 2-1

MN: type MN

PGM: type 2-1

Rh: Positive, Cc D Ee

Rheumatoid Arthritis Factor: negative

TABLE 2

REFEREE LABORATORY RESULTS

Lab 1

Question 1: Benzidine in conjunction with precipitin test. Takayama in lieu of precipitin.
Question 2: Immunoelectrophoretic precipitin or tube precipitin.
Question 3: Group B. Absorption elution-rapid method using ammonia. Crust test.
Question 4: Rh positive Cc D Ee. Method: absorption elution per Pereira.
PGM type 2-1. Method: thin starch gel electrophoresis per Culliford.
EAP type A. Method: starch gel electrophoresis per Culliford.

Lab 2 (This laboratory also included experimental details for the methods used in Question 3.)

Question 1: The modified phenolphthalein test is used as a screening technique for indications of blood.
Confirmatory test used as a routine is the hemochromogen crystal (Takayama) test.
We also selectively use the pupillary spectroscope for the identification of hemoglobin.
Question 2: Routine technique used is the ring test using capillary tubes - extracts of rabbit blood 1:100 and human blood 1:1000 are run as controls.
Selective use of immunodiffusion technique (Ouchterlony).
Question 3: Group B. Absorption elution using plastic well slides. "Cross match" (reverse grouping).
Question 4: MN type M. Method: absorption elution procedure used is similar to that described for the ABO system.
Anti Sera - commercial Anti M and Anti N serums screened for specificity and reactivity on stains.
Controls - M and N blood stains plus portions of unstained area of cloth bearing "unknown stain."
AK type 1. Method: Starch gel electrophoresis in accordance with Culliford et al.
PGM type 2-1. Method: Starch gel electrophoresis in accordance with Culliford et al.
EAP type A. Method: Starch gel electrophoresis in accordance with Culliford et al.

Lab 3 (This laboratory also included details for all tests performed.)

Question 1: Takayama micro crystal test.
Question 2: Double diffusion - (Immunodiffusion technique).
Question 3: Group B. Absorption elution (agglutinogen detection). Lattes Crust technique (agglutinin detection).
Question 4: MN type MN. Method: MN grouping.
PGM type 2-1. Method: Technique per Culliford - Modified by Marone.
EAP type A. Method: Technique per Bryan Wraxall - unpublished.
AK type 1. Method: Technique per Culliford - Modified by Marone.
Gm type 1-2. Method: Technique per Shaler - unpublished (Research).
Rh-Hr typing attempted, however unsuccessfully.

TABLE 3

METHODS FOR DETERMINING THAT SAMPLE IS BLOOD

This table gives the number of laboratories indicating their normal use of each test method for determining that a sample is blood (Question 1). Note that laboratories were not requested to actually perform this analysis. Since many laboratories indicated more than one method, the total number is greater than the total number of laboratories reporting.

Number of Laboratories	Test Method
1	A absorption elution
	B Color Tests
110	1. benzidine
1	2. benzylidine dimethylaniline
20	3. hematest (commercial)
2	4. Kastle-Mayer reagent
14	5. leucomalachite green
4	6. luminol spray (commercial)
19	7. ortho-tolidine
45	8. phenolphthalein
	C Crystal Tests
1	1. hematoporphyrin
2	2. hemin crystals
2	3. hemochromogen
41	4. Takayama
7	5. Teichmann
2	D electrophoresis
1	E gel diffusion precipitin reaction
8	F macroscopic examination
13	G microscopic examination
3	H precipitin tests
1	I spectrophotometric method
1	J ultraviolet method
1	K Wright-Giemse method

TABLE 4

METHODS FOR DETERMINING THAT SAMPLE IS HUMAN BLOOD

This table gives the number of laboratories indicating their normal use of each test method for determining that a sample is human blood (Question 2). Note that laboratories were not requested to actually perform this analysis. Since many laboratories indicated more than one method, the total number is greater than the total number of laboratories reporting.

Number of Laboratories	Test Method
1	A agglutination test
1	B an experimental technique using sensitized latex particles
34	C electrophoretic tests
1	D microscopic examination
136	E precipitin tests (agar, gel, or liquid phase)

TABLE 5

METHODS FOR DETERMINING ABO FACTOR OF HUMAN BLOOD

This table gives the number of laboratories indicating each test method used for determining the ABO factor of human blood (Question 3). Since many laboratories used more than one method, the total number is greater than the total number of laboratories reporting.

Number of Laboratories	Test Method
142	A absorption elution
20	B absorption inhibition
1	C acacia method for isoagglutinogens
1	D agglutinin absorption test of Weiner
1	E extraction
1	F extraction test tube method for isoagglutinins
1	G forward grouping
77	H Lattes crust test (direct method, reverse typing)
4	I mixed agglutination method

TABLE 6

METHODS FOR DETERMINING ADDITIONAL BLOOD SUBGROUPS

This table gives the number of laboratories indicating each method used for the determination of additional groups and subgroups (Question 4). Since some laboratories used more than one method, the total number is greater than the total number of laboratories reporting such tests.

Number of Laboratories		Test Method
3	A	electrophoresis test for AK
15	B	electrophoresis test for EAP
2	C	starch gel electrophoresis test for EsD
4	D	electrophoresis test for Hb
6	E	cellulose acetate or membrane strip electrophoresis test for Hb
2	F	electrophoresis test for Hp
1	G	electrophoresis test for LDH
24	H	absorption elution test for MN
1	I	absorption inhibition test for MN
20	J	gel electrophoresis test for PGM
1	K	cellulose acetate or membrane strip electrophoresis test for PGM
23	L	absorption elution test for Rh
1	M	absorption inhibition test for Rh
1	N	Leister & Kirk test for Rheumatoid Arthritis Factor

TABLE 7

ABO FACTOR REPORTED BY EACH LABORATORY

This table gives the ABO blood group reported by each laboratory. Where no ABO group data is given, the laboratory either did not return data or does not do blood analysis. An * indicates that the laboratory detected H activity.

LAB CODE	ABO GROUP	LAB CODE	ABO GROUP	LAB CODE	ABO GROUP
A703		A736		A766	B
A705	B	A737		A767	
A706	B	A738	B	A768	B
A707		A739	B	A769	B
A708		A740	B	A770	
A709	B	A741		A772	
A710	B	A742	B	A773	
A711	B	A743		A774	
A712	B	A744	B	A775	
A713	A-B	A745	B	A777	B
A714		A746	A-B	A778	B
A715	B	A747	B	A779	B
A717	B	A748	B	A780	
A718	B	A749	B	A781	B
A719	B	A750	B	A782	
A720	B	A751	B	A783	B
A721		A752	B	A784	B
A722	B	A753	B	A785	B*
A723		A754	B	A786	B
A724		A755	B	A787	Note 1
A726	B	A756	B	A788	B
A727	B	A757	B	A789	B
A728		A758		A790	B*
A728	B	A759	B	A791	
A730	0	A760	B	A792	
A731	B	A761	B	A793	
A732		A762	B	A794	B
A733		A763	B	A795	B
A734		A764		A796	Note 2
A735	B	A765	B	A797	B

Note:1: This laboratory apparently misunderstood the question and did not give an ABO group.

Note 2: This laboratory reported no A, B, or H substance detected.

TABLE 7
CONTINUED

LAB CODE	ABO GROUP	LAB CODE	ABO GROUP	LAB CODE	ABO GROUP
A798		A841	B	A880	B
A799	B	A842	B	A884	B
A802		A843	B	A885	B
A805	B	A844		A886	B
A806	B	A845	B	A887	
A807		A847	B	A888	B
A809	B	A848	B	A889	B
A810		A849		A891	B
A811	B	A850	B	A892	B
A812		A852		A894	B
A813	B	A853	B	A895	
A815	B	A854		A896	B
A816		A855	B	A897	B
A817		A856	B	A898	
A818	B	A858		A899	B
A820	B	A859	B	A900	
A821	B*	A860	B	A902	B
A822		A861	B	A903	
A823	B	A862		A904	B
A824		A863	B	A905	
A825	B	A864		A907	B
A826		A865		A908	B*
A827	B*	A866	B	A912	
A828		A867		A913	
A829	O	A868	B	A914	B
A830	B	A869	B	A915	B
A831	B	A870	B	A917	
A832	B	A871		A918	B
A833	B	A872	B	A920	B
A834		A873	B	A921	B
A835	B	A874	B	A923	B
A836		A875		A924	B
A837	B	A876	B	A925	B
A838	B	A877	B	A926	B
A839	B	A879		A927	

TABLE 7
CONTINUED

LAB CODE	ABO GROUP
A931	B
A932	
A935	
A937	
A938	B
A942	
A944	B*
A946	B
A948	B
A950	
A951	B
A953	
A958	B
A960	B
A961	B*
A964	
A966	
A969	
A970	
A972	
A973	
A974	
A975	B
A978	B
A979	B
A980	B
A983	B
A984	B
A985	B
A986	B
A987	B
A988	
A989	B
A992	
A994	B
A998	B
A999	B

TABLE 8

METHODS USED BY EACH LABORATORY

Q1 gives the methods indicated by each laboratory as normally used to determine if a sample is blood (Question 1). Notations are defined in Table 3 (e.g., B1 is benzidine).

Q2 gives the methods indicated by each laboratory as normally used to determine if a sample is human blood (Question 2). Notations are defined in Table 4.

Q3 gives the methods indicated by each laboratory as used to determine the ABO factor of human blood (Question 3). Notations are defined in Table 5.

LAB CODE	Q1	Q2	Q3
A703	no data returned		
A705	B1;B8	E	A
A706	B1;C4	C;E	A;H
A707	do not do blood analysis		
A708	no data returned		
A709	B1	E	A
A710	B1;C4	E	A;H
A711	B1;B8;C4	C	A;H
A712	B1;G	E	A
A713	B1	E	A
A714	no data returned		
A715	B1	E	A;H
A717	B1;F;G	A;E	A;H
A718	B6;B7	C	A;H
A719	B1;B8;C2;C3	E	A;H
A720	B1	E	A;H
A721	do not do blood analysis		
A722	B1;B5	E	B
A723	no data returned		
A724	no data returned		
A726	B1;B5;B8	E	A
A727	B1	E	A;H
A728	no data returned		
A729	B1;B8	E	H
A730	B3;I;K	E	C;H

TABLE 8
CONTINUED

LAB CODE	Q1	Q2	Q3
A731	B3;C4	E	A;H
A732	no data returned		
A733	no data returned		
A734	do not do blood analysis		
A735	B8;C4	C;E	A;H
A736	no data returned		
A737	no data returned		
A738	B1;H	E	A
A739	B1	E	A
A740	B3;C5	C	A
A741	do not do blood analysis		
A742	B1	C;E	A;B;H
A743	do not do blood analysis		
A744	B3;B7;C4	E	A
A745	B1;G	E	A
A746	B5	E	A
A747	B1;B8	E	A
A748	B1	E	A
A749	B1;C4	E	A;H
A750	B1;B8;C5;D;J	E	A;H
A751	B1	C	A;H
A752	B1;B5;G	C;E	A;H
A753	B1;C4	C	A;H
A754	B1;B7;G	C;E	A;H
A755	B1;B7;E	E	A;H
A756	B1;B7;B8;C4	C;E	A;H
A757	B7;H	E	A
A758	do not do blood analysis		
A759	B1	E	A
A760	B7;B8;C4	E	A;H
A761	B1;C4;G	D;E	A;H
A762	B1;B8;C5	E	A
A763	B1	E	A;H
A764	do not do blood analysis		
A765	B1;C3	C;E	B

TABLE 8
CONTINUED

LAB CODE	Q1	Q2	Q3
A766	B1;B3	E	A;H
A767	do not do blood analysis		
A768	B7;B8	C	A;H
A769	B1;D	C	A;H
A770	do not do blood analysis		
A772	B1;B8;C4	E	A;H
A773	no data returned		
A774	no data returned		
A775	do not do blood analysis		
A777	B1	E	A
A778	B1;B8;F;G	E	A
A779	B1;C4	E	B
A780	no data returned		
A781	B7;G	E	A;H
A782	no data returned		
A783	B1;B6;B7	E	A;H
A784	B1;B8	E	A
A785	B1;C4	E	B
A786	B1;C5	E	B;E
A787	B1;B3	E	H
A788	C4	C;E	A;H
A789	B7	E	A;H
A790	B1;B8	E	A
A791	do not do blood analysis		
A792	do not do blood analysis		
A793	do not do blood analysis		
A794	B7;C4	E	A
A795	B1	E	A
A796	B7	C	D;F
A797	B1;G	E	A
A798	do not do blood analysis		
A799	B7;B8;C4;C5	C	A;H
A802	no data returned		
A805	B1	E	A
A806	B1	C;E	A;H

TABLE 8
CONTINUED

LAB CODE	Q1	Q2	Q3
A807	do not do blood analysis		
A809	B1	E	A;H
A810	do not do blood analysis		
A811	B1;B8	E	A
A812	do not do blood analysis		
A813	B3;B5	B;C	A
A815	B5;C4	E	A;B;H
A816	no data returned		
A817	no data returned		
A818	B7,B8,G	C;E	A;H
A820	B3;C4	E	A
A821	B1;F	E	A;H
A822	do not do blood analysis		
A823	B8;C4	C;E	A
A824	do not do blood analysis		
A825	B1;B8	E	B
A826	do not do blood analysis		
A827	B3;B8	E	A;H
A828	do not do blood analysis		
A829	B5;C4	E	A
A830	B5	E	A;B
A831	B7;H	E	A
A832	B1	E	B
A833	B1;C4	E	A
A834	do not do blood analysis		
A835	B1;C4	E	A;H
A836	no data returned		
A837	C4	E	A
A838	B6;B7;B8;F;G	C;E	A;B;H
A839	A	E	A
A841	B1;B8	E	A
A842	B8;C5	E	A
A843	B1;F	C	A
A844	do not do blood analysis		
A845	B5;C4	E	A;B;H

TABLE 8
CONTINUED

LAB CODE	Q1	Q2	Q3
A847	do not do blood analysis		
A848	B1	C	A
A849	B1	E	A;H
A850	no data returned		
A851	B1;F	E	A
A853	B1	E	A;H
A854	no data returned		
A855	B1;B5	E	A
A856	B1	E	A;B;H
A858	no data returned		
A859	B1;B8;C4	E	A
A860	B1;C4	E	A;B;H
A861	B5;C5	C;E	A
A862	no data returned		
A863	B1	E	A;H
A864	no data returned		
A865	do not do blood analysis		
A866	B1	E	A;H
A867	no data returned		
A868	C4	C	A;H
A869	B1	E	A
A870	B1;B8	C	A
A871	no data returned		
A872	B1	E	A;B;H
A873	B1	E	A
A874	B1;B7;C5	E	A;H
A875	do not do blood analysis		
A876	B1	E	A;G
A877	B1;B8	E	A;H
A879	no data returned		
A880	B1	E	A;H
A884	B1;B3	E	A;H
A885	B1;B8	E	A;I
A886	B1;B8;C4	E	A;H
A887	no data returned		

TABLE 8
CONTINUED

LAB CODE	Q1	Q2	Q3
A888	B1;C4	E	A;H
A889	B1;F	E	A
A891	B1;C4	E	A
A892	B1;B8;C4	E	A;H
A894	B3;B8	E	A;H
A895	no data returned		
A896	B1;B8;C4	E	A;H
A897	B1	C	A
A898	no data returned		
A899	B3;B4	E	A
A900	no data returned		
A902	B3	E	A
A903	do not do blood analysis		
A904	B1	E	A
A905	no data returned		
A907	B1;B8	E	A
A908	B1;B3;C4	E	A
A912	no data returned		
A913	do not do blood analysis		
A914	B4	C	A
A915	B1;B5	E	A;B;H
A917	no data returned		
A918	B1	E	A
A920	B1;B8;C4	C;E	A;H
A921	B1	E	A;H
A923	B1;B8	E	A
A924	B1;B3	E	A;H
A925	B2	C	A;H;I
A926	B1;B3	E	A;H
A927	do not do blood analysis		
A931	B1;C4	E	A;B;H
A932	do not do blood analysis		
A935	do not do blood analysis		
A937	do not do blood analysis		
A938	B1	E	A;B;H;I

TABLE 8
CONTINUED

LAB CODE	Q1	Q2	Q3
A942	no data returned		
A944	B3;C4	E	A
A946	B8	E	A
A948	B5	E	A
A950	do not do blood analysis		
A951	C4	E	I
A953	do not do blood analysis		
A958	B1	E	A;H
A960	B1;B8	C	A
A961	B3;B8;C4	E	A;H
A964	no data returned		
A966	no data returned		
A969	no data returned		
A970	do not do blood analysis		
A972	no data returned		
A973	no data returned		
A974	do not do blood analysis		
A975	B1;B8;C4	E	A
A978	B7;B8	E	A
A979	B3	E	A;H
A980	B1;B8;C1;F	E	B
A983	B1	E	A
A984	B1;G	E	A
A985	B3;B6;G	C;E	A;H
A986	B1	E	A;H
A987	B1;C2	E	A
A988	no data returned		
A989	B1;C4	C	A;H
A992	do not do blood analysis		
A994	B1;B8	E	A;B;H
A998	B1;B8	E	A
A999	B1;B8	E	A;H

TABLE 9

DETERMINATION OF BLOOD GROUPS AND SUBGROUPS
BY EACH LABORATORY: METHODS AND RESULTS

This table gives the blood groups and subgroups found by each laboratory, with the methods used given in square brackets. Notations are defined in Table 6. Only those laboratories that reported one or more groups or subgroups appear in this table.

LAB CODE	AK	EAP	EsD	Hb	Hp	LDH	MN	PGM	Rh	Rheumatoid Arthritis Factor
A705							MN [H]		Rh+ [L]	
A709							MN [H]		D [L]	
A715									Rh+,DCce [L]	
A717							MN [H]			
A718								2-1 [J]		
A727							M-,N- [H]		D+,C-,c+,Ee inconclusive [L]	
A729		A [B]						2-1 [J]		
A740		A [B]		A [D]				2-1 [J]		
A742									hr'(c)+,Rh_o(D)+ [L]	
A745		AA [B]								
A747		A [B]						2-1 [J]		
A750				A [E]						
A751		A [B]						2-1 [J]	R_1r [L]	
A752							M [H]		$D\bar{C}CE \oplus e(-)$ [L]	
A753	1 [A]	A [B]					M [H]	2-1 [J]		
A754									Rh_o (D)+ [L]	
A755								weak 1-1 [J]		
A756							MN [H]			
A757								2-1 [J]		
A760				A [E]				weak 1-1 [J,K]		
A765				A [E]						
A788				normal adult [D]		normal venous blood. [G]				
A790								2-1 [J]		
A794								2-1 [J]		
A797				A [D]			M [H]		Rh_1Rh_2(CcDEe) [L]	

TABLE 9
CONTINUED

LAB CODE	AK	EAP	EsD	Hb	Hp	LDH	MN	PGM	Rh	Rheumatoid Arthritis Factor
A799		A [B]						2-1 [J]		
A818		A [B]	1 [C]					2-1 [J]	D/Cc/ee [L]	
A820								2-1 [J]		
A823		A [B]		Al normal adult [D]			MN [H]			negative [N]
A825									Rh_o(D)+ possible [M]	
A827							MN [H]	2-1 [J]		
A832							M (N not tested [I]			
A833									$\bar{c}$,D,e [L]	
A835		A [B]						2-1 [J]		
A839							M+N- [H]			
A848		A [B]						inconclusive [J]		
A859		A [B]								
A860							MN [H]		DC$\bar{c}$E$\bar{e}$ [L]	
A870				Hb-A [E]						
A877									Rh+ [L]	
A888							MN [H]		D+,E+,others inconclusive [L]	
A896		A [B]					MN [H]	2-1 [J]	$C^+D^+E^+\bar{c}^+e^+$ [L]	
A897				A [E]			M [H]		Rh+ Rh_o (D) [L]	
A899					2-1 [F]			2-1 [J]		
A907							MN [H]			
A908							MN [H]			
A915	1 [A]	A [B]			2-1 [F]				CDE, with Ce inconclusive [L]	
A925							M+N+ [H]		Rh_o(D)+,rh'(C)+,hr'(c)+,rh"(E)+,hr"($\bar{e}$)+ [L]	
A938							M+N- [H]		Rh D+C+E+$\bar{c}$-$\bar{e}$- [L]	
A944							MN [H]		D,C,c,one possibly missed [L]	
A946		A [B]							DEce [L]	
A958									D,C,E,c,e [L]	
A960	1 [A]		2-1 [C]				M [H]	2-1 [J]	D+C+E+C+e-,Type $R_1R_2(R_zR_2)$ [L]	
A987							MM [H]			
A989								2-1 [J]		
A994							MN [H]			
A998				A [E]						
A999							MN [H]			

END