LABORATORY PROFICIENCY TESTING PROGRAM

REPORT NO. 8

BLOOD ANALYSIS

THE FORENSIC SCIENCES FOUNDATION, INC.
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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.

Points of view or opinions stated in this document are those of the authors and do not necessarily represent the official position or policies of the U.S. Department of Justice.

FOREWORD

The analysis summarized in this report is the eighth 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 Eight 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.

February 1976

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BACKGROUND

This laboratory proficiency testing research project, one phase 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."

Additional evaluations of individual tests will be published in a separate report.

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 #8 consisted of two dried blood stains on cotton swatches. The samples were mailed on August 1, 1975 with instructions to handle the sample in a manner similar to like evidence submitted for analysis.

The basic roster of 192 labs was reduced to 187 by removing those laboratories who previously indicated that they do not do blood analysis. Three of the 192 laboratories who received Test Sample #8 served as referees, reducing the number to 184.

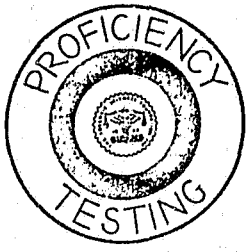
In the accompanying data summaries, 128 laboratories responded with completed data sheets, 5 laboratories responded that they did not do blood analysis and no response was received from 59 laboratories. This represents a participation rate of 69%.

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

ANNEX A

FIGURE 1

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 #8

BLOOD ANALYSIS

Please examine samples according to your normal laboratory procedures and complete portion(s) which comply with your laboratory policy. The checklists are intended as a convenience in filling out the report; they are not intended to suggest any specific test or battery of tests. Please add any additional information you consider pertinent to your response.

1. Have the stains been confirmed as blood?

	Item A	Item B
Yes	☐	☐
No	☐	☐
Inconclusive	☐	☐

Methods Used:

- ☐ Color test (Specify)_____
- ☐ Crystal test (Specify)_____
- ☐ Macroscopic
- ☐ Microscopic
- ☐ Precipitin
- ☐ Other (Specify)_____

Comments: _____

_____

_____

_____

2. Have the stains been confirmed as <u>human</u> blood?

	Item A	Item B
Yes	☐	☐
No	☐	☐
Inconclusive	☐	☐

Methods Used:

- ☐ Electrophoresis
- ☐ Precipitin
- ☐ Other (Specify)_____

Comments: _____

_____

_____

_____

3. Could Item A and Item B have originated from the same source?

☐ Yes ☐ No ☐ Inconclusive

4. What information did you develop to arrive at your conclusion in Question 3? (Attach additional sheets if necessary.) The table is provided for your convenience. It is not intended to suggest any particular test or battery of tests.

Grouping	Item A Type	Item B Type	Methods Used:
ABO			
AK (adenylate kinase)			
Amylase			
EAP (erythrocyte acid phosphatase)			
EsD (esterase D)			
Hb (hemoglobin)			
Hp (haptoglobin)			
LDH (lactic dehydrogenase)			
MN			
PGM (phosphoglucomutase)			
Rh			
Rheumatoid Arthritis factor			
S			
Other (Specify)			

DATA SHEETS MUST BE RECEIVED IN THE FOUNDATION OFFICE BY SEPTEMBER 5, 1975.

ANNEX B

National Bureau of Standards Analysis

LABORATORY TESTING PROGRAM

Test No. 8 - Blood

Two samples, each consisting of several drops of blood on a swatch of cloth, were sent to 192 laboratories for analysis. The participants were asked four questions: Question 1: Have the stains been confirmed as blood? Question 2: Have the stains been confirmed as human blood?, Question 3: Could Item A and Item B have originated from the same source?, Question 4: What information did you develop to arrive at your conclusion in Question 3?

Of the 192 laboratories receiving the two blood samples, 128 returned data; 5 reported they do not do blood analysis, and 59 did not respond. A tabulation of the codes for laboratories in each of the last two categories is given in Table 1.

Table 2 shows the sample supplier's characterization of the blood samples A and B. Referee laboratory results are shown in Table 3. Tables 4, 4a, and 4b list methods used to determine the answer to Question 1. Table 5 lists methods used to determine the answer to Question 2. Table 6 shows the response and frequency of responses to Question 3. Tables 7 and 8 show the number of methods used to conclude the response to Question 3 and the frequency of use of the grouping methods used to conclude the response to Question 3. Table 9 lists grouping tests and frequency of use for Question 4. Table 10 and 10a list the results of the grouping tests most frequently used. Table 11 lists the methods used for the grouping tests most frequently used.

Tables 12 and 13 give responses to Questions 1 and 2 (Table 12) and Questions 3 and 4 (Table 13) by lab code numbers. In Table 12, the designations listed under Methods Used refer to Tables 4, 4a, and 4b for Question 1, and to Table 5 for Question 2.

This annex was prepared by the Law Enforcement Standards Laboratory (LESL) of NBS. The test results anonymously reported by participating forensic laboratories were analyzed and tabulated by James McLeod, Research Associate in the Laboratory Evaluation Technology Section and Alvin Lewis of the Hazards Analysis Section, NBS. This work was supported by the National Institute of Law Enforcement and Criminal Justice, Department of Justice.

Table 1

Code Numbers of Non-responding Laboratories

THE FOLLOWING LABS INDICATED THEY DO NOT DO BLOOD ANALYSIS:

736
780
816
891
938

Total Labs = 5

THE FOLLOWING LABS DID NOT RESPOND:

703	735	789	861	898	964
708	737	795	862	902	966
710	744	796	867	905	969
713	748	811	869	912	972
722	761	817	871	914	973
723	772	829	874	917	979
728	773	836	879	931	984
731	774	842	884	944	988
732	779	850	887	946	999
733	782	858	889	951	

Total labs = 59

Note: Laboratories reporting they do not do blood analysis in Report No. 3 were not sent samples for Test No. 8.

Table 2

Supplier's Characterization of Samples

According to the supplier, the blood samples can be characterized as follows:

	ITEM A (Yellow Cloth)	ITEM B (Blue-White Cloth)
A B	- - (Type O)	- - (Type O)
D	+	+
C	+	-
E	-	+
c	+	+
e	+	+
M	-	+
N	+	-
S	+	+
s	+	+
Kell	-	-
Duffy	-	-
Kidd	-	-
ADA	1-1	1-1
AK	1-1	1-1
6-GPD	A-A	A-A
Gm (a)	+	+
Gm (x)	-	+
Gm (f_1)	+	+
Gm(b^1)	+	+
Inv 1	-	+
EAP	AB	AA
PGM	2-1	2-1
H_p	2-1	1-1
EsD	1-1	1-1
Gc	2-1	2-1
$Amylase_2$	B	A

Table 3

Results of the Three Referee Laboratories

	LAB 1		LAB 2		LAB 3	
	Item A	Item B	Item A	Item B	Item A	Item B
Question 1: Have the stains been confirmed as blood?	No[1]	No[1]	Yes[2]	Yes[2]	Yes[3]	Yes[3]
Methods Used	Benzidine Color Test Macroscopic Exam		Takayama Crystal Test		Benzidine Color Test	
Question 2: Have the stains been confirmed as human blood?	Yes	Yes	Yes	Yes	Yes[4]	Yes[4]
Methods Used	Precipitin (Double Diffusion)		Precipitin		Precipitin	
Question 3: Could Item A and Item B have originated from the same source?	No		No		No	

Footnotes

[1]At this stage of analysis, blood has been presumed by virtue of the stains' color and benzidine reaction.

[2](Weak activities in all systems examined) stains appear to be deteriorated.

[3]The combination of benzidine pptn (human) and numerous electrophoresis systems (mainly hemoglobin) verify the sample as blood.

[4]The electrophoretic patterns are compatible with polymorphic enzyme patterns found in human blood.

Table 3 continued

Question 4: What information did you develop to arrive at your conclusion in Question 3?

Grouping	Results and Method Used					
	LAB 1		LAB 2		LAB 3	
	Item A	Item B	Item A	Item B	Item A	Item B
ABO	O(H) Absorption-elution	O(H)	0 Lattes Crust Test; Absorption-elution	0	0 Absorption-elution Lattes Crust Test	0
EAP	BA or BB Thin-gel	AA	BA Electrophoresis	A	BA Electrophoresis	A
PGM	2-1 Thin-gel	2-1	2-1 Electrophoresis	2-1	2-1 Electrophoresis	2-1
Rh	c,D Absorption-elution	c,D,E	c,C,D,e Absorption-elution	c,D,e	Inconclusive Absorption-elution	c,D,E
Hb	A Electrophoresis	A			A Electorphoresis	A
S	S+ Absorption-elution	S+				
AK					1 Electrophoresis	1
EsD					1 Electrophoresis	1
ADA					1 Electorphoresis	1
GPD					B Electrophoresis	B
Pep A					Inconclusive Electrophoresis	1
CA II					Inconclusive Electrophoresis	Inconclusive
PGD					A Electrophoresis	A

Table 4

Frequencies of the Reported Methods for Question 1

Question 1: Have the stains been conformed as blood?

	Instruments or Methods Used	Number of Laboratories	% of total labs (total=128)
1.	Color tests	115	89.8
2.	Crystal tests	43	33.6
3.	Macroscopic	23	18.0
4.	Precipitin	19	14.8
5.	Microscopic	17	13.3
6.	Electrophoresis	2	1.6
7.	Gel diffusion	2	1.6
8.	Suds when wet	1	.8
9.	Hematoporphyrin Fluorescence	1	.8
10.	Spectrophotometric Method	1	.8

Since most laboratories indicated use of more than one method, the total number is greater than the total number of laboratories reporting.

Table 4a

Frequencies of Reported Color Tests for Question 1

Question 1: Have the stains been confirmed as blood?

	Instruments or Methods Used	Number of Laboratories	%of reporting labs (total = 115)
a.	Benzidine	83	72.2
b.	Phenolphthalin (Kastle-Meyer reagent)	33	28.7
c.	Ortho-tolidine	15	13.0
d.	Hematest (commercial)	14	12.2
e.	Leucomalachite green	5	4.3
f.	Spectrophotometer	1	.9
g.	Luminol spray (commercial)	1	.9
h.	Benzylidine Dimethylaniline	1	.9
i.	Miscellaneous	1	.9

Table 4b

Relative Frequencies of Reported Crystal Tests for Question 1

	Instruments or Methods Used	Number of Laboratories	% of reporting labs (total = 43)
a.	Takayama	41	95.3
b.	Teichmann	6	14.0

Since many laboratories indicated use of more than one method, the total number is greater than the total number of laboratories reporting.

Table 5

Frequencies of the Reported Methods for Question 2

Question 2: Have the stains been confirmed as human blood?

Instruments or Methods Used	Number of Laboratories	% of total labs (total = 128)
1. Precipitin	115	89.8
2. Electrophoretic tests	26	20.3
3. Absorption elution	19	14.8
4. Immunoelectrophoresis	2	1.6

Since many laboratories reported use of more than one method, the total number is greater than the total number of laboratories reporting.

Table 6

Frequencies of Responses to Question 3

Question 3: Could Item A and Item B have originated from the same source?	Number of Laboratories	% of total labs (total = 128)
Yes	49	38.3
No	49	38.3
Inconclusive	26	20.3
No Response	4	3.1

Table 7

Number of Grouping Methods Used for Each Response to Question 3

Response to Question 3	Number of Methods Used							
	1	2	3	4	5	6	7	8
No	6	9	14	10	4	3	1	1
Yes	35	7	2	4	0	1	0	0
INCONCLUSIVE	18	3	1	2	0	0	0	0

Table 8

Frequencies of Use of Grouping Methods for Question 3

Grouping Method Used	Response to Question 3		
	NO	YES	INCONCLUSIVE
ABO	46	49	24
EAP	28	3	2
PGM	23	6	2
MN	24	5	1
Rh	13	6	1
Hb	7	3	3
EsD	5	2	1
AK	6	1	0

Table 9

Frequencies of Grouping Tests Reported for Question 4

Grouping	Number of Laboratories	% of total labs (total = 128)
ABO	123	96.1
EAP	33	25.8
PGM	33	25.8
MN	30	23.4
Rh	20	15.6
Hb	15	11.7
EsD	8	6.3
AK	7	5.5
Hp	2	1.6
LDH	1	.8
Rheumatoid Arthritis Factor	1	.8
S	1	.8
6-GPD	1	.8
PCE_2	1	.8
Miscellaneous	3	2.3

Since most laboratories indicated use of more than one grouping, the total number is greater than the total number of laboratories reporting.

Table 10

Results for the Most Frequently Reported Grouping Tests

Grouping	Response	Item A	Item B
ABO	Type O	113	109
	Inconclusive	4	8
	No Response	4	4
	B,O	1	1
	√	1	1
EAP	A (or AA)	1	27
	B	3	1
	AB (or BA)	22	0
	Inconclusive	4	3
	Different	2	1
	No Response	1	1
PGM	1 (or 1-1)	1	2
	2 (or 2-2)	1	0
	2-1 (or 1-2)	27	26
	Probably 2-1	1	2
	Diffuse bands	1	1
	Inconclusive	2	2
MN	M (or M+)	0	22
	M- (or not M)	2	0
	MM (or MN-,M+N-)	1	3
	MN	2	3
	N (or N+)	21	1
	NN	2	0
	No agglutination	1	0
	Inconclusive	1	1
Hb	A (or AA,A/A, A1, Normal Adult)	13	13
	S	1	1
	Inconclusive	1	1
EsD	1-1	2	3
	1-2	1	1
	Same	1	1
	Not detected	1	1
	Inconclusive	3	2
AK	1 (or 1-1)	6	6
	2 (or 2-1)	1	1

Table 10a

Tabulation of Responses for Rh Grouping Method

LAB CODE	Item A c	C	D	e	E	Item B c	C	D	e	E
705			+					+		
715			+					+		
727	+					+				
742			+					+		
752	+	+	+	+	inc*	+	+	+	+	inc*
756	+		+			+		+		
814	+		+	+	-	+	-	+	+	
821		inconclusive					inconclusive			
825	+	-	+		-	+	-	+		-
827		very weak agglutination				+		+	+	+
833	+		+			+		+		
859			+					+		
860	+		+		+	+		+		+
888	+	+	+	+	-	+	-	+	+	-
896	+		+	+		+		+		
925	+	-	+	+	+	+	-	+	-	+
926	+	+	+	+	-	+	-	+	-	+
975	+	-	+	-	+	+	-	+	inc*	inc*

Supplier's Characterization of Samples (from Table 2)

Item A c	C	D	e	E	Item B c	C	D	e	E
+	+	+	+	-	+	-	+	+	+

*Note: inconclusive

Table 11

Methods Reported for Grouping Tests

Grouping	Method Used	Number of Laboratories	% of Laboratories Reporting Use
ABO	Absorption-elution	113	91.9
	Lattes Crust Test	65	52.8
	Reverse Grouping	12	9.8
	Absorption-inhibition	7	5.7
	Tube agglutination	3	2.4
	Iso-agglutinin enhancement	1	.8
	Modified Plate technique	1	.8
	Forward grouping-modified	1	.8
	Direct Test	1	.8
	No Response	3	2.4
EAP	Electrophoresis	31	93.9
	No Response	2	6.0
PGM	Electrophoresis	28	84.8
	No Response	5	15.2
MN	Absorption-elution	26	86.7
	No Response	4	13.3
Rh	Absorption-elution	15	75.0
	Papain-sensitized cells	1	5.0
	Modified RCMP thread method	1	5.0
	No Response	4	20.0
Hb	Electrophoresis	12	80.0
	Cellulose Acetate Membrane	2	13.3
	No Response	1	6.7
EsD	Electrophoresis	6	75.0
	Parkins & Adams	1	12.5
	No Response	1	12.5
AK	Electrophoresis	7	100.0

In all cases, the total number may be greater than the number of laboratories reporting since more than one method may be used.

Table 12

Tabulation of Responses to Question 1 and Question 2

Numbers and letters listed under Methods Used refer to Tables 4, 4a, and 4b for Question 1 and Table 5 for Question 2.

	Question 1: Have the stains been confirmed as blood?			Question 2: Have the stains been confirmed as human blood?		
Lab Code	Item A	Item B	Methods Used	Item A	Item B	Methods Used
A705	Yes	Yes	1a;3;4;5	Yes	Yes	1
A706	Yes	Yes	1a;2a;3	Yes	Yes	2
A709	Yes	Yes	1a	Yes	Yes	1
A711	Yes	Yes	1a,b;2a	Yes	Yes	2
A712	Yes	Yes	1a;4;5	Yes	Yes	1
A715	Yes	Yes	1a	Yes	Yes	1
A717	Yes	Yes	1a;3;8	Yes	Yes	1
A718	Yes	Yes	1c;6	Yes	Yes	2
A719	Yes	Yes	1a,b;2a,c;3;5	Yes	Yes	1
A720	Yes	Yes	1a	Yes	Yes	3
A724	Yes	Yes	1f;2a	Yes	Yes	1
A726	Yes	Yes	1b;2a	Yes	Yes	1
A727	Yes	Yes	1a	Yes	Yes	1
A729	Yes	Yes	1a,b	Yes	Yes	2
A730	Yes	Yes	1d,g;3;5	Yes	Yes	3
A738	Yes	Yes	1a,h;3;4;5	Yes	Yes	1
A739	Yes	Yes	1a	Yes	Yes	1
A740	Yes	Yes	1d;3	Yes	Yes	2
A742	Yes	Yes	1a;4	Yes	Yes	1,2
A745	Yes	Yes	1a;2a;5	Yes	No*	1
A746	Yes	Yes	1e	Yes	NR	1
A747	Yes	Yes	1a,b	Yes	Yes	3
A749	Yes	Yes	1a;2a	Yes	Yes	1
A750	Yes	Yes	1a;3;4	Yes	Yes	1
A751	Yes	Yes	1a;3;4;5	Yes	Yes	2
A752	Yes	Yes	1a;3	Yes	Yes	1,2
A753	Yes	Yes	1a;2a	Yes	Yes	1

*response inconsistent with supplier's characteristics

Table 12 Continued

Lab Code	Item A	Item B	Methods Used	Item A	Item B	Methods Used
A754	Yes	Yes	1a;2b;3;4;5	Yes	Yes	1
A755	Yes	Yes	1c;7	Yes	Yes	3
A756	Yes	Yes	1a,b,c;2a;4	Yes	Yes	1
A757	Yes	Yes	1c;7	Yes	Yes	3
A759	Yes	Yes	1a	Yes	Yes	1
A760	Yes	Yes	1b,c	Yes	Yes	1
A762	Yes	Yes	1a,b;2b	Yes	Yes	1
A763	Yes	Yes	1a	Yes	Yes	1
A765	Yes	Yes	1a,f	Yes	Yes	4
A766	Yes	Yes	1a,d	Yes	Yes	1
A768	Yes	Yes	1b,c,f;4;7	Yes	Yes	1,2
A769	Yes	Yes	1a	Yes	Yes	1,2
A777	Yes	Yes	1a	Yes	Yes	1
A778	Yes	Yes	1a;3;4;5	Yes	Yes	1
A781	Yes	Yes	1c;5	Yes	No*	1
A783	NR	NR	1c	Yes	Yes	1
A784	Yes	Yes	1a,b	Yes	Yes	1
A785	Yes	Yes	1a,i;2a	Yes	Yes	1
A786	Yes	Yes	1a;2b,d	Yes	Yes	1
A787	Yes	Yes	1d	Yes	Yes	1
A788	Yes	Yes	2a	Yes	Yes	2
A790	Yes	Yes	1a,b	Yes	Yes	1
A794	Yes	Yes	1c;2a	Yes	Yes	1
A799	Yes	Yes	1b,c;2b;4;5	Yes	Yes	2
A805	Yes	Yes	1a	Yes	Yes	1
A806	Yes	Yes	1a	Yes	Yes	2
A809	Yes	Yes	1a	Yes	No*	1
A813	Yes	Yes	1d	Yes	Yes	3
A814	Yes	Yes	1a	Yes	Yes	1
A815	Yes	Yes	1e;2a	Yes	Yes	1
A818	Yes	Yes	1b,c	Yes	Yes	1
A820	Yes	Yes	1d;2a;5	Yes	Yes	2

*response inconsistent with supplier's characteristics

Table 12 Continued

Lab Code	Item A	Item B	Methods Used	Item A	Item B	Methods Used
A821	Yes	Yes	1a	Yes	Yes	1, 3
A823	Yes	Yes	2a	Yes	Yes	2
A825	Yes	Yes	1a	Yes	Yes	1
A827	Yes	Yes	1b,d;2a;3;4	Yes	Yes	1, 3
A830	Yes	Yes	1e	Yes	Yes	1
A831	Yes	Yes	1c	Yes	Yes	1
A832	Yes	Yes	1a;2a	Yes	Yes	1
A833	Yes	Yes	1a;2;3	Yes	Yes	1
A835	Yes	Yes	1a;2a	Yes	Yes	1
A837	Yes	Yes	2a	Yes	Yes	1
A838	Yes	Yes	1b	Yes	Yes	3
A839	Yes	Yes	1a,b,d;3	Yes	Yes	1, 3
A841	Yes	Yes	1a,b;3	Yes	Yes	1
A843	Yes	Yes	1a;3;4	Yes	No*	1
A845	Yes	Yes	1e	Yes	Yes	1
A848	Yes	Yes	1a	Yes	Yes	2
A849	Yes	Yes	1a;3	Yes	Yes	1
A853	Yes	Yes	1a	Yes	Yes	1
A855	Yes	Yes	1a,e;2a;3;5	Yes	Yes	1
A856	Yes	Yes	1a	Yes	Yes	1, 3
A859	Yes	Yes	1a;2a	Yes	Yes	1
A860	Yes	Yes	1a;2a	Yes	Yes	1
A863	Yes	Yes	1a	Yes	Yes	1
A864	Yes	Yes	1a	Yes	Yes	1
A866	Yes	Yes	1a	Yes	Yes	1
A868	Yes	Yes	2a	Yes	Yes	2
A870	Yes	Yes	1f	Yes	Yes	1,2
A872	Yes	Yes	1a;2a	Yes	Yes	1
A873	Yes	Yes	1a	Yes	Yes	1
A876	Yes	Yes	1a	Yes	Yes	1
A877	Yes	Yes	1a,b;3	Yes	Yes	1
A880	Yes	Yes	1a;2a,b	Yes	Yes	1
A883	Yes	Yes	1b;2a;4	Yes	Yes	1
A885	Yes	Yes	1a,b;2c	Yes	Yes	1

*response inconsistent with supplier's characteristics

Table 12 Continued

Lab Code	Item A	Item B	Methods Used	Item A	Item B	Methods Used
A886	Yes	Yes	1b;2a;4;5	Yes	Yes	1
A888	Yes	Yes	1a;2a;4	Yes	Yes	1
A892	Yes	Yes	1a;2a	Yes	Yes	1
A894	Yes	Yes	1b,d	Yes	Yes	1
A895	Yes	Yes	1c;3;4	Yes	Yes	1
A896	Yes	Yes	1c;5	Yes	Yes	1, 3
A897	Yes	Yes	1a	Yes	Yes	2, 3
A899	Yes	Yes	1b,c	Yes	Yes	2
A904	Yes	Yes	1a	Yes	Yes	3
A907	Yes	Yes	1a,b	Yes	Yes	2
A908	Yes	Yes	1d;2a;4	Yes	Yes	1
A918	Yes	Yes	1a	Yes	Yes	1
A920	Yes	Yes	2a	Yes	Yes	2
A921	Yes	Yes	1a	Yes	Yes	1
A923	Yes	Yes	1a,b	Yes	Yes	3
A924	Yes	Yes	1a,d	Yes	Yes	1
A925	Yes	Yes	1j	Yes	Yes	2
A926	Yes	Yes	1d;3;4	Yes	Yes	1
A942	Yes	Yes	1a;2a	Yes	Yes	3
A948	Yes	Yes	1e	Yes	Yes	1
A958	Yes	Yes	1a	Yes	Yes	1
A960	Yes	Yes	1b	Yes	Yes	1,2
A961	Yes	Yes	1b,d;2a	Yes	Yes	1
A962	Yes	Yes	1a,2a	Yes	No*	1
A975	Yes	Yes	1a	Yes	Yes	1
A978	Yes	Yes	1b,c	Yes	Yes	3
A980	Yes	Yes	1a,b;3;9	Yes	Yes	1
A983	Yes	Yes	1a;5	Yes	Yes	3, 4
A985	Yes	Yes	1d;5	No*	Yes	3
A986	Yes	Yes	1a	Yes	Yes	1
A987	Yes	Yes	1a;10	Yes	Yes	1
A989	Yes	Yes	1a;2a	Yes	Yes	1
A994	Yes	Yes	1a,b	Yes	Yes	1
A995	Yes	Yes	2a;5	Yes	Yes	1
A998	Yes	Yes	1a,b	Yes	Yes	1

*response inconsistent with supplier's characteristics

Table 13

Tabulation of Responses to Question 3 and Question 4

Lab Code	Question 3: Could Item A and Item B originated from the same source?	Question 4: What information did you develop to arrive at your conclusions in No. 3? Grouping	Item A	Item B	Methods Used
A705	No	ABO	O	O	
		MN	N	M	
		Rh	D^+	D^+	
A706	Inconclusive	ABO	Inconclusive	Inconclusive	Absorption-elution
		Hb	A/A	A/A	
A709	No	ABO	O	O	Lattes Crust test; Absorption-elution
		Hb	A	A	Electrophoresis
		MN	MN*	M	Absorption-elution
A711	Inconclusive	ABO	Inconclusive	Inconclusive	Ammonia method; Absorption-elution
A712	Yes*	ABO	O	O	Absorption-elution
A715	Inconclusive	ABO	O	Inconclusive	Lattes Crust test; Absorption-elution
		Rh	Rh pos.	Rh pos.	Absorption-elution
A717	Yes*	ABO	O	O	Absorption-elution; Reverse grouping
		MN	N	MN*	Absorption-elution
A718	Yes*	ABO	O	O	Lattes Crust test; Absorption-elution
		EAP	Inconclusive	Inconclusive	Electrophoresis
		EsD	Inconclusive	Inconclusive	Electrophoresis
		PGM	2-1	2-1	Electrophoresis
A719	Inconclusive	ABO	O	O	Lattes Crust test; Back typing
A720	Inconclusive	ABO	O	O	Absorption-elution
		Hb	A	A	Electrophoresis
		Other	Male	Male	Sex Determination using fluorescent staining of DNA with Quinacrine Dihydrochloride
A724	Inconclusive	ABO	O	O	Absorption-elution
A726	Inconclusive	ABO	O	O	Absorption-elution; Lattes Crust test
A727	No	ABO	O	O	Absorption-elution; Lattes Crust test
		EAP	BA	A	Electrophoresis
		PGM	2-1	2-1	Electrophoresis
		Rh	$\bar{c}$ +	$\bar{c}$ +	Absorption-elution; Papain-sensitized cells

*response inconsistent with supplier's characteristics

Table 13 continued

Lab Code	Question 3: Could Item A and Item B originated from the same source?	Question 4: What information did you develop to arrive at your conclusions in No. 3? Grouping	Item A	Item B	Methods Used
A729	No	ABO	O	O	Lattes Crust test
		EAP	BA	A	Electrophoresis
		PGM	2-1	2-1	Electrophoresis
A730	Yes*	ABO	✓	✓	Lattes Crust test
A738	No	ABO	O	O	Absorption-elution
		MN	N	M	Absorption-elution
A739	Yes*	ABO	O	O	Lattes Crust test
A740	No	ABO	O	probably O	Lattes Crust test; Absorption-elution
		EAP	B/A	probably A	Electrophoresis
		Hb	A	A	Electrophoresis
		PGM	2-1	probably 2-1	Electrophoresis
A742	No	ABO	O	O	Absorption-elution; Lattes Crust test
		EAP	B*	A	Electrophoresis
		MN	M-	M+	Absorption-elution
		Rh	Rh_o(D)+	Rh_o(D)+	Absorption-elution
A745	No	ABO	O	Inconclusive	Absorption-elution; Lattes Crust test
A746	Inconclusive	ABO	O	O	Absorption-elution
A747	No	ABO	O	O	Absorption-elution
		EAP	B or BA	A	
		PGM	Inconclusive	2-1	
A749	Yes*	ABO	O	O	Absorption-elution
A750	Yes*	ABO	O	O	Absorption-elution; Lattes Crust test
		Hb	A-normal	A-normal	Electrophoresis
		PGM	2-1	2-1	Electrophoresis
A751	No	ABO	O	O	Lattes Crust test; Absorption-elution
		EAP	B and C bands detected	A	Electrophoresis
		PGM	2-1	2-1	Electrophoresis
A752	Yes*	ABO	O	O	Absorption-elution; Lattes Crust test
		Rh	$D\bar{C}e$+Einc	$D\bar{C}e$+Einc*	Absorption-elution
A753	No	ABO	O	O	Lattes Crust test
		AK	1	1	Electrophoresis
		EAP	BA	A	Electrophoresis
		MN	N	M	Absorption-elution
		PGM	2-1	2-1	Electrophoresis

*response inconsistent with supplier's characteristics

Table 13 Continued

Lab Code	Question 3: Could Item A and Item B originated from the same source?	Question 4: What information did you develop to arrive at your conclusions in No. 3? Grouping	Item A	Item B	Methods Used
A754	No	ABO	O	O	Lattes Crust test; Absorption-elution
		EAP	BA	A	Electrophoresis
A755	Inconclusive	ABO	O	O	Absorption-elution; Lattes Crust test
		EAP	BA	Inconclusive	Electrophoresis
		EsD	Same	Same	EsD stain developed on EAP plate. (EsD 1-1?
		PGM	2-1	2-1	Electrophoresis
A756	No	ABO	O	O	Lattes Crust test; Absorption-elution
		MN	N	M	Absorption-elution
		Rh	c,D	c,D	Absorption-elution
A757	Yes*	ABO	O	O	Absorption-elution
		EAP	NR	NR	Electrophoresis
		Hb	A	A	Electrophoresis
		PGM	2-1	2-1	Electrophoresis
A759	Yes*	ABO	O	O	Iso-agglutinin enhancement;Absorption-elution Absorption-inhibition
A760	No	ABO	O	O	Lattes Crust test; Absorption-elution
		EAP	BA	A	Electrophoresis
		EsD	2-1 or 1-1	1-1	Electrophoresis
		Hp	No activity	found	Electrophoresis
		LDH	Inconclusive	Inconclusive	Electrophoresis
		PGM	2-1	2-1	Electrophoresis
A762	Yes*	ABO	O	O	Absorption-elution
A763	Inconclusive	ABO	O	Inconclusive	Lattes Crust test; Absorption-elution
A765	Yes*	ABO	O	O	Absorption elution; Absorption inhibition
		PGM	PGM_1 2-1	PGM_1 2-1	Electrophoresis
A766	No	ABO	O	O	Absorption-elution; Lattes Crust test
		MN	N	M	Absorption-elution
A768	NR	ABO	O	O	Lattes Crust test; Absorption-elution
		PGM	2-1	2-1	
A769	No	ABO	O	O	Absorption-elution; Lattes Crust test
		MN	N	M	Absorption-elution

*response inconsistent with supplier's characteristics

Table 13 continued

Lab Code	Question 3: Could Item A and Item B originated from the same source?	Question 4: What information did you develop to arrive at your conclusions in No. 3? Grouping	Item A	Item B	Methods Used
A777	Yes*	ABO	O	O	Absorption-elution; Reverse Crust typing
A778	This lab makes no determinations of origins	ABO	O	O	Absorption-elution;
A781	No	ABO	O	-	Absorption-elution; Lattes Crust test
A783	Yes*	ABO	O	O	Absorption-elution
A784	Yes*	ABO	O	O	Absorption-elution
A785	Yes*	ABO	O	O	Absorption-inhibition; Lattes Crust test
A786	No	ABO	O	O	Absorption-elution; Absorption-inhibition; Lattes Crust test
		MN	N	M	Absorption-elution
A787	Yes*	ABO	O	O	Reverse grouping
A788	Yes*	ABO	O	O	Absorption-elution; Lattes Crust test
A790	Yes*	ABO	O	O	Absorption-elution; modified plate techniqu
A794	No	ABO	O	O	Lattes Crust test; Absorption-elution
		EAP	BA	A	Electrophoresis
		PGM	2-1	2-1	Electrophoresis
A799	Yes*	ABO	O	O	Lattes Crust test; Absorption-elution
		EAP	Inconclusive	Inconclusive	Electrophoresis
		Hb	A (Normal)	A (Normal)	Electrophoresis
		PGM	2-1	2-1	Electrophoresis
A805	Inconclusive	ABO	O	O	Absorption-elution
A806	Inconclusive	ABO	O	O	Absorption-elution; Lattes Crust test
A809	Inconclusive	ABO	O	-	Reverse (crust)typing; Ammoniacal-solution Absorption-elution
A813	Yes*	ABO	O	O	Absorption-elution

*response inconsistent with supplier's characteristics

Table 13 continued

Lab Code	Question 3: Could Item A and Item B originated from the same source?	Question 4: What information did you develop to arrive at your conclusions in No. 3? Grouping	Item A	Item B	Methods Used
A814	No	ABO	O	O	Absorption-elution; Lattes Crust test
		AK	1	1	Electrophoresis
		EAP	BA	A	Electrophoresis
		PGM	2-1	2-1	Electrophoresis
		Rh	pos. c,D,e neg. E	pos. c,D,e neg. C	Absorption-elution
		PCE_2	C_{5-}	C_{5-}	Electrophoresis
A815	No	ABO	O	O	Lattes Crust test; Absorption-elution
		MN	N	M	Classical elution
		PGM	2-1	2-1	Electrophoresis
A818	No	ABO	O	O	Absorption-elution
		EAP	B*	A	
		EsD	Inconclusive	Inconclusive	
		PGM	2-1	2-1	
A820	No	ABO	O	O	Lattes Crust test; Absorption-elution
		EAP	BA	A	Electrophoresis
		PGM	2-1	2-1	Electrophoresis
A821	No	ABO	O	O	Absorption-elution; Antibodies Rx
		MN	N	M	Note; B has some N activity on standing
		PGM	2-1	2-1	
		Rh	Inconclusive	Inconclusive	
A823	No	EAP	AB	A	Electrophoresis
A825	Yes*	ABO	O	O	Absorption-elution
		Hb	A_1	A_1	Electrophoresis
		MN	N	N*	Absorption-elution
		PGM	diffuse bands	diffuse bands	Electrophoresis
		Rh	Rh_o(D)+	Rh_o(D)+	Absorption-elution
		rh'(C)	negative*	negative	
		hr'(C)	positive	positive	
		rh"(E)	negative	negative*	
		Rh_o(D)	positive	positive	
		hr''(e)	not run	not run	
		G-6-PD	no activity observed	no activity observed	Electrophoresis
A827	Yes*	ABO	O	O	Absorption-elution; Lattes Crust test
		MN	no agglutination	M	Absorption-elution
		PGM	2-1	2-1	Electrophoresis
		Rh	very weak agglutination	DcEe	

*response inconsistent with supplier's characteristics

Table 13 continued

Lab Code	Question 3: Could Item A and Item B originated from the same source?	Question 4: What information did you develop to arrive at your conclusions in No. 3? Grouping	Item A	Item B	Methods Used
		Comments:	a) Noted stronger anti-B activity (crust test) in A sample; stronger anti-A activity in B.		
			b) Failed to obtain agglutination in MN grouping of A sample run under same conditions as B sample.		
			c) Weak agglutination in Rh typing of sample A.		
A830	Yes*	ABO	O	O	Absorption-elution; Absorption-inhibition
A831	Inconclusive	ABO	-	O	Absorption-elution
A832	No	ABO	O	O	Lattes Crust test; Absorption-elution
		EAP	different than B	different than A	Electrophoresis
		MN	not M	M	Absorption-elution
A833	Yes*	ABO	O	O	Absorption-elution
		Rh	c D	c D	Absorption-elution
A835	No	ABO	O	O	Absorption-elution; Lattes Crust test
		EAP	BA	A	Electrophoresis
		MN	N	MN*	
		PGM	2-1	2-1	Electrophoresis
A837	Inconclusive				
A838	Yes*	ABO	O	O	Absorption-elution
A839	Inconclusive	ABO	O	O	
		MN	MN-	M+N-	Testing a new procedure
A841	Yes*	ABO	O	O	Absorption-elution
A843	No	ABO	O	-	Absorption-elution; Lattes Crust test
A845	Inconclusive	ABO	NR	NR	Absorption-elution; Absorption inhibition; Lattes Crust test
A848	No	ABO	O	O	Absorption-elution; Lattes Crust test
		EAP	BA	A	Electrophoresis
A849*	Yes	ABO	O	O	Reverse grouping; Absorption-elution

*response inconsistent with supplier's characteristics

Table 13 continued

Lab Code	Question 3: Could Item A and Item B originated from the same source?	Question 4: What information did you develop to arrive at your conclusions in No. 3? Grouping	Item A	Item B	Methods Used
A853	Yes*	ABO	O	O	Reverse grouping (crust type); Absorption-elution
A855	Yes*	ABO	O	O	Absorption-elution; Lattes Crust test
A856	Inconclusive	ABO	O	O	Lattes Crust test; Absorption-elution
A859	No	ABO	O	O	Absorption-elution
		MN	N	M	Absorption-elution
		Rh	D^+	D^+	Absorption-elution
A860	No	ABO	O	O	Lattes Crust test Absorption-elution
		MN	N	M	Absorption-elution
		PGM	PGM 2-1	PGM 2-1	Electrophoresis
		Rh	$D\bar{C}E$*	$D\bar{C}E$	Absorption-elution (albumin)
A863	Yes*	ABO	O	O	Absorption-elution; reverse typing
A864	Yes*	ABO	O	O	Lattes Crust test Absorption-elution
A866	Yes*	ABO	O	O	Absorption-elution; reverse typing
868	Yes*	ABO	O	O	Absorption-elution; Lattes Crust test
A870	No	ABO	O	O	Absorption-elution
		EAP	A*	B*	Electrophoresis
		EsD	1-2*	1-2*	Electrophoresis
		Hb	A	A	Electrophoresis
		PGM	2*	1*	Electrophoresis
A872	No	ABO	Outer Edge O Center Crush O	Outer Edge O Center Crust B*	Lattes Crust test; Absorption-inhibition; Absorption-elution
A873	Yes*	ABO	O	O	
A876	Yes*	ABO	O	O	Forward grouping-modified; Lattes Crust test; Tube method; Absorption-elution
A877	Yes*	ABO	O	O	Lattes Crust test; Absorption-elution
		Rh	+	+	Absorption-elution

*response inconsistent with supplier's characteristics

Table 13 continued

Lab Code	Question 3: Could Item A and Item B originated from the same source?	Question 4: What information did you develop to arrive at your conclusions in No. 3? Grouping	Item A	Item B	Methods Used
A880	Inconclusive	ABO	O indicated	Inconclusive	Absorption-elution; Lattes Crust test
A883	No	ABO	O	O	Absorption-elution
		AK	1	1	Electrophoresis
		EAP	BA	A	Electrophoresis
		MN	N	Inconclusive	Absorption-elution
		PGM	2-1	2-1	Electrophoresis
A885	Inconclusive	ABO	O	O	Absorption-elution: reverse typing
A886	Yes*	ABO	O	O	Lattes Crust test; Absorption-elution
		Rheumatoid Arthritis factor	negative	negative	Hyland RA test kit
A888	No	ABO	O	O	Lattes Crust test; Absorption-elution
		MN	N	M	Absorption-elution
		Rh	$C+\bar{c}+D+E-\bar{e}+$	$C-\bar{c}+D+E-\bar{e}+$*	Absorption-elution
A892	Inconclusive	ABO	O	O	Absorption-elution; Lattes Crust test
A894	Yes*	ABO	O	O	Lattes Crust test; Absorption-elution
A895	Inconclusive	TYPING NOT AVAILABLE AT THIS TIME			
A896	No	ABO	O	Inconclusive	Absorption-elution Lattes Crust test
		EAP	AB	A	Electrophoresis
		Hb	Inconclusive	Inconclusive	Cellulose acetate membrane
		Hp	Inconclusive	Inconclusive	Acrylamide Gradient
		MN	N+	M+	Absorption-elution
		PGM	2-1	Inconclusive	Electrophoresis
		Rh	$D+\bar{c}+\bar{e}+$	$D+\bar{c}+$	Modified RCMP thread method
A897	No	ABO	O	O	Absorption-elution
		MN	NN	MM	Absorption-elution
A899	Inconclusive	ABO	O	O	Absorption-elution
		EAP	BA	AA	Electrophoresis
		Hb	A	A	Electrophoresis
		PGM	2-1	2-1	Electrophoresis

*response inconsistent with supplier's characteristics

Table 13 continued

Lab Code	Question 3: Could Item A and Item B originated from the same source?	Question 4: What information did you develop to arrive at your conclusions in No. 3? Grouping	Item A	Item B	Methods Used
A904	Yes*	ABO	O	O	Absorption-elution; Tube Agglutination
A907	Yes*	ABO	O	O	Absorption-elution
A908	No	ABO	O	O	Absorption-elution
		AK	1	1	Electrophoresis
		EAP	B*	A	Electrophoresis
		MN	N	M	Absorption-elution
A918	NR	ABO	O	O	Absorption-elution
A920	NR	ABO	Inconclusive	Inconclusive	Absorption-elution Lattes Crust test
		Hb	Normal Adult	Normal Adult	Electrophoresis
A921	Yes*	ABO	O	O	Absorption-elution; Reverse Grouping
A923	Yes*	ABO	O	O	Lattes Crust test; Absorption-elution
		AK	1	1	Electrophoresis
		EsD	Not detected	Not detected	Electrophoresis
A924	Inconclusive	ABO	O	O	Ammonical extract technique; Lattes Crust test; Direct test
A925	No	ABO	O	O	Absorption-elution; detection of agglutinins
		EAP	AB	AA	Electrophoresis
		EsD	1-1	1-1	Electrophoresis
		Hb	AA	AA	Tris-Boric acid buffer on cellulose acetate
		MN	NN	MM	Absorption-elution
		PGM	1-1*	1-1*	Electrophoresis
		Rh	Rho(D)+rh'(C) neg hr'($\bar{c}$)+rh"(E)+ hr"($\bar{e}$)(+)R_2r	Rho(D)+rh'(C)neg hr'($\bar{c}$)+rh"(E)+ hr"($\bar{e}$)negR_2R_2	
		S	$\frac{}{ss}$	$\frac{}{ss}$	Absorption-elution
A926	No	ABO	O	O	Lattes Crust test; Absorption-elution
		Rh	+C,$\bar{c}$,D,$\bar{e}$ - E	+ $\bar{c}$,D,$\bar{e}$ - C,$\bar{e}$	Absorption-elution
A942	No	ABO	O	O	Absorption-elution
		EAP	not A	A	Electrophoresis
		PGM	appeared to be 2-1	appeared to be 2-1	

*response inconsistent with supplier's characteristics

Table 13 continued

Lab Code	Question 3: Could Item A and Item B originated from the same source?	Question 4: What information did you develop to arrive at your conclusions in No. 3? Grouping	Item A	Item B	Methods Used
A948	Yes*	ABO	O	O	Absorption-elution
A958	Inconclusive	ABO	-	O?	Absorption-elution; reverse typing
A960	No	ABO	B,O*	B,O*	Absorption-elution
		EAP	BA	A	Electrophoresis
A961	No	ABO	O	O	Lattes Crust test with BSA: Absorption-elution
		AK	2*	2*	Electrophoresis
		EAP	AB	A	Electrophoresis
		MN	N	M	Absorption-elution
		PGM	Inconclusive	Inconclusive	Electrophoresis
A962	No	Not as tested			
A975	Yes*	ABO	O	O	Lattes Crust test; Absorption-elution
		MN	MN*	MN*	Absorption-elution
		Rh	D(+)C(-)E(+)* $\bar{c}$(+) $\bar{e}$(-)	D(+)C(-)$\bar{c}$(+) E(inconclusive) $\bar{e}$(inconclusive)	Absorption-elution
A978	Yes*	ABO	O	O	Absorption-elution
A980	Yes*	ABO	O	O	Agglutinins test; Lattes Crust test; Absorption-elution
A983	Inconclusive	ABO	O	O	Absorption-elution
A985	No	ABO	-	O	Absorption-elution
A986	Yes*	ABO	O	O	Lattes Crust test; Absorption-elution
A987	Yes*	ABO	O	O	Lattes Crust test; Absorption-elution
		MN	unable to type	M	Absorption-elution
A989	No	ABO	O	O	Lattes Crust test; Absorption-elution
		EAP	AB	A	Electrophoresis
		Hb	A(normal)	A(normal)	Electrophoresis
		PGM	2-1	2-1	Electrophoresis

*response inconsistent with supplier's characteristics

Table 13 continued

Lab Code	Question 3: Could Item A and Item B originated from the same source?	Question 4: What information did you develop to arrive at your conclusions in No. 3? Grouping	Item A	Item B	Methods Used
A994	No	ABO	O	O	Absorption inhibition; Absorption-elution
		MN	N	M	Absorption-elution
		Rh	+	+	Absorption-elution
A995	No	ABO	Group O	H Antigen (Group O)	Lattes Crust test; Absorption-elution
		AK	1-1	1-1	Absorption-elution
		EAP	BA	A	Electrophoresis
		EsD	1-1	1-1	Parkins & Adams
		MN	N	M	Absorption-elution
		PGM	2-1	2-1	Electrophoresis
A998	No	EAP	AB	A	Electrophoresis
		Hb	S	S	Electrophoresis

*response inconsistent with supplier's characteristics

END