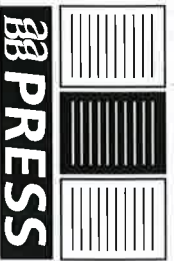


Blood Component Visual Inspection Guide



**American
Red Cross**

Blood Component Visual Inspection Guide

About This Guide

This guide was originally developed by staff at the American Red Cross Biomedical Services Headquarters in 2006. Subsequently, the AABB Clinical Transfusion Medicine Committee reviewed the document and endorsed its content. This reformatted guide is produced by AABB in cooperation with the American Red Cross.

Users should remember that photographs in this guide are for reference purposes only, and that no two components look exactly alike. This guide is not intended to show every condition that may be found in a component. Rather, it is meant to be a bench-top aid that supplements the visual inspection of blood components. Over time, users of the guide will become familiar with what is “normal.” When a unit with an unusual appearance is discovered, the guide may be used in conjunction with appropriate procedures requiring visual inspection.

Contents of This Guide

This guide is organized into several sections as follows:

- Introduction: overview, purpose
- Description of normal components: plasma, platelets, cryoprecipitate, granulocytes, whole blood, red cells
- Description of conditions: hemolysis, lipemia, icterus, particulate matter, clots, fibrin strands, cold agglutinins, discoloration, bacterial contamination, foreign objects
- Additional sample images: red cells and whole blood, plasma, platelets, cryoprecipitate
- Quick reference tables

How to Use This Guide

Users should not depend solely on this guide in determining whether to accept or reject any blood component. A supervisor should be consulted when there is any question. Color photographs that are exposed to sunlight or fluorescent lighting can fade over time. Thus, the color of aged and faded photographs may not match what was originally intended. To make the guide last as long as possible, it should be kept closed when not in use. If the pages become soiled, they may be wiped clean with a paper towel moistened in 10% bleach solution, and then wiped with a paper towel moistened in water.

Blood Component Visual Inspection Guide

Overview

Numerous conditions may affect the Safety, Quality, Identity, Purity, and Potency (SQUIPP) of a final blood component, making it either unsafe for transfusion or unacceptable in appearance to customers. Heat, cold, mishandling, contaminants, manufacturer defects, donor illness, and other factors can cause a blood component to be unsuitable for transfusion.

Some of the conditions that can occur that make a component unsafe for transfusion or cause hospital staff, patients, or their families to question the safety include, but are not limited to:

- Hemolysis
- Lipemia
- Icterus
- Particulate Matter
- Discoloration
- Bacterial Contamination
- Foreign Objects



Purpose

The purpose of this guide is to assist staff who handle blood components to identify components that have an unusual appearance. The guide provides definitions and causes of these conditions.



Blood Component Visual Inspection Guide

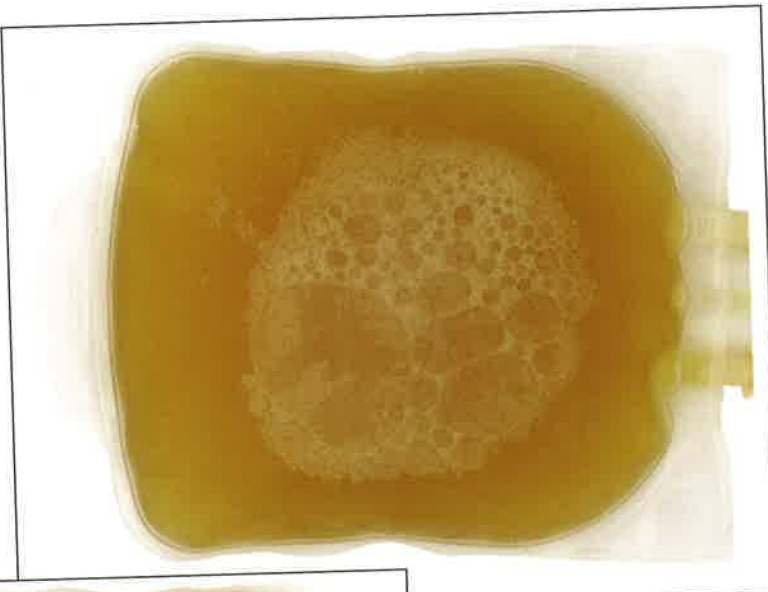
Description of Normal Components



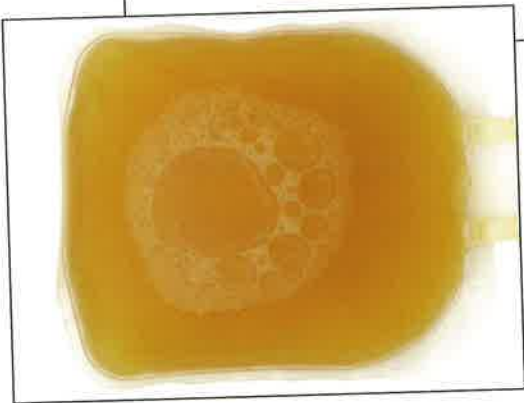
Plasma

Plasma is the non-cellular portion of blood, which contains various proteins and clotting factors. The component is liquid without cellular elements or excessive visible particles. The appearance of the component varies based on specific donor conditions, but generally liquid plasma is clear to semi-opaque while frozen plasma is opaque.

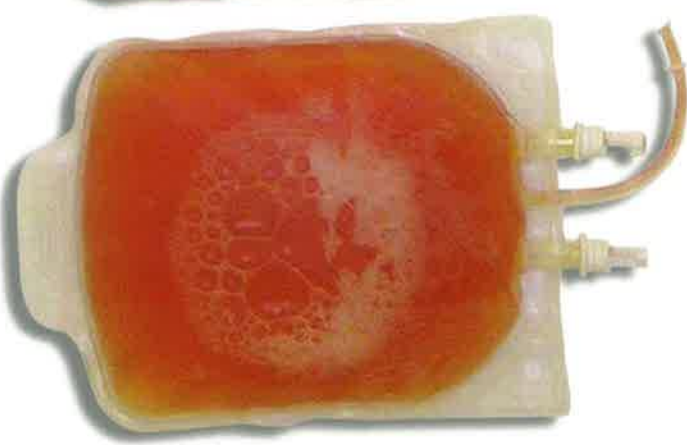
Normal colors range from pale to dark yellow and/or slightly green-tinged.



Normal plasma



Normal plasma



Blood Component Visual Inspection Guide

Platelets



Platelets are a cellular component of blood that function as part of the clotting or coagulation process. During the manufacturing process, a light centrifugation speed is used to separate the lighter platelets from the heavier red blood cells. This “platelet-rich” plasma will have the range of colors generally seen with plasma but be slightly more opaque than plasma due to the presence of the cellular platelets. Following a second, harder centrifugation process, the platelets will separate from the plasma and will appear as a white mass at the bottom of the bag.

After removing most of the supernatant plasma, the platelet mass is re-suspended in the residual plasma. Apheresis platelets are collected from a single donor using continuous centrifugation as opposed to the two-step process used for whole blood derived platelets. The product volume of apheresis platelets is much larger, but the appearance is very similar to platelets produced from whole blood.

Due to the presence of the plasma, platelet components will generally be in the same color range as plasma components, but may contain varying amounts of red blood cells. Depending on the red blood cell content, the components may range in color from light pink, to salmon to bright red. The presence of red blood cells may cause the component to turn darker and appear brownish in color the longer the product is stored.

Although the individual platelet cells are too small to be seen by the naked eye, microscopically the platelet cells have a unique discoid shape. When the re-suspended platelets are rotated under a light source, the discoid-shaped platelets produce a shimmering opalescence or “swirling” effect. In addition to the re-suspended platelets and red blood cells, the platelet components may normally contain varying amounts of other small aggregates.



**Normal
platelets**

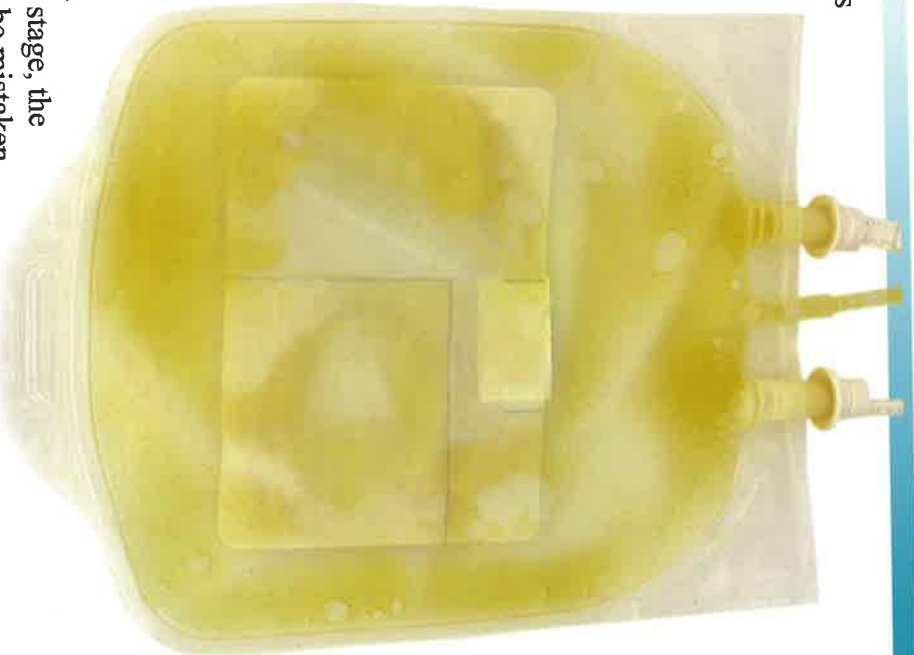


Blood Component Visual Inspection Guide

Cryoprecipitate

Cryoprecipitate is produced by the concentration of certain coagulation factors following the freezing and controlled thawing of plasma.

Following cold centrifugation of the thawed plasma, a cold (cryo) precipitate is concentrated at the bottom of the bag. The cryoprecipitate which remains after removal of the supernatant plasma will appear thick, opaque, whitish and “paste-like.” At this stage, the cryoprecipitate may be mistaken in appearance for a fibrin clot. Upon freezing and re-thawing cryoprecipitate at 35-37 degrees C, the cryoprecipitate mass will dissolve and re-suspend in the small amount of residual plasma and appear as an even, thick, whitish liquid.



Granulocytes

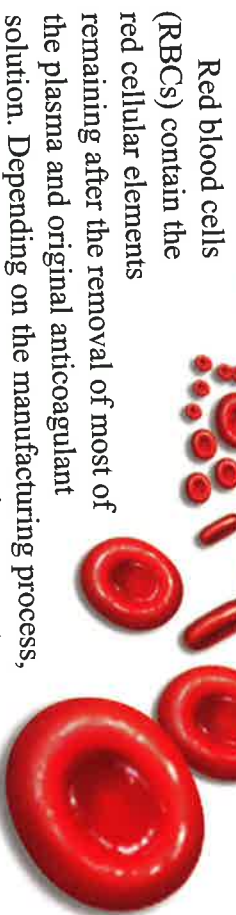
Granulocytes are the white blood cell elements of whole blood. Although the granulocyte cells are visually white in appearance, the collection and manufacturing process used to prepare this component results in a component that also contains a significant amount of red blood cells. The visual appearance of a granulocyte component is similar to a red blood cell component.

Whole Blood

Whole blood (WB) consists of the cellular (red blood cells, white blood cells, and platelets) and plasma elements of blood suspended in an anticoagulant solution. The component is an even, liquid suspension of the cellular elements and plasma elements and ranges in color from bright cherry red to very dark burgundy. Upon resting (or following centrifugation) the cellular elements, being heavier, will settle or layer to the lowest points of the storage bag. The component will then contain an upper layer of plasma (various shades of yellow) with a lower layer of cells in various shades of red. Depending on the method of separation, a narrow layer of white blood cells and platelets may appear between the red cell mass and plasma and will be white in color.

Blood Component Visual Inspection Guide

Red Blood Cells



Red blood cells (RBCs) contain the red cellular elements remaining after the removal of most of the plasma and original anticoagulant solution. Depending on the manufacturing process, the component may also contain varying amounts of white blood cells and platelets. Many RBC components contain an additional preservative/additive solution, which is added to the concentrated red blood cells after the removal of plasma/platelets and/or white blood cells. The component is an even, liquid suspension of the red blood cells in the remaining plasma and additive solution. RBC components without an additive solution will appear “thicker” than components containing an additive solution. The RBC components can be various shades of red in color.

A brighter cherry red color may be seen with components that have fewer total red blood cells (for example, a component from a donor with a lower hematocrit), and/or a component prepared by filtration that includes a sterile air-venting process.

A darker red, burgundy, or very dark burgundy color may be seen with components having a higher total red blood cell content (for example, a component from a donor with a higher hematocrit) or a non-additive RBC component.



Normal red cells

Blood Component Visual Inspection Guide

Description of Conditions

Hemolysis



Definition

Hemolysis (hemo - blood, lysis - dissolution) is the destruction of red blood cells, in which the pigment carrying protein, hemoglobin, is freed from the cells and discolors the surrounding plasma (fluid portion of the blood). Hemolysis can be partial, in which some of the red blood cells are destroyed, or complete, when all of the red blood cells are destroyed.

Effects

Component	Appearance
WB/RBC	<ul style="list-style-type: none"> • dark purple – black • less opaque • sheen
Plasma	<ul style="list-style-type: none"> • pink to red in color • liquid state – translucent • frozen state – opaque
Platelets	<ul style="list-style-type: none"> • pink to red in color • translucent

Causes of hemolysis

This list is not all-inclusive.

- a traumatic venipuncture
- incompatible solutions
- temperature extremes (too hot or too cold)
- over-centrifugation
- excessive pressure during leukoreduction
- stripping
- bacterial contamination
- normal aging process
- small bore or kinked tubing
- heat sealers

Criteria for acceptability

Based on the standard of the Council on European Standards the Red Cross has chosen to adopt less than 0.8% at the end of storage as the upper limit for hemolysis. The Red Cross uses a visual (qualitative) evaluation to determine acceptability.



(Photograph for illustrative purposes only)

Blood Component Visual Inspection Guide

Lipemia

Definition

Lipemia is an excessive amount of fatty substances in the blood, including cholesterol.

Causes of gross lipemia

Lipemia can be

- temporary and normal (following a high-fat meal), or
- chronic, and associated with a disease state, such as hypercholesterolemia.

Effects

Component	Appearance
WB/RBC	A grossly lipemic WB/RBC will appear similar to a strawberry milkshake.
Plasma	Opaque (milky) appearance
Platelets	Opaque (milky) appearance

Criteria for acceptability

Lipemia itself does not affect the safety of a product but might interfere with the ability to perform viral marker tests. Donor samples used in performing infectious disease testing are visually evaluated for excessive lipemia. The acceptability level for lipemia is derived from the sample requirements in the industry's testing methods.



Lipemic Plasma

Blood Component Visual Inspection Guide

Icterus

Definition

Icterus is a condition in which excessive amounts of bile pigments produced by the liver, such as bilirubin, are present in the plasma.

Causes of Icterus

There are several conditions that can lead to icteric plasma, such as

- in vivo (inside the human body) hemolysis
- obstruction of the bile duct, and
- liver disease.

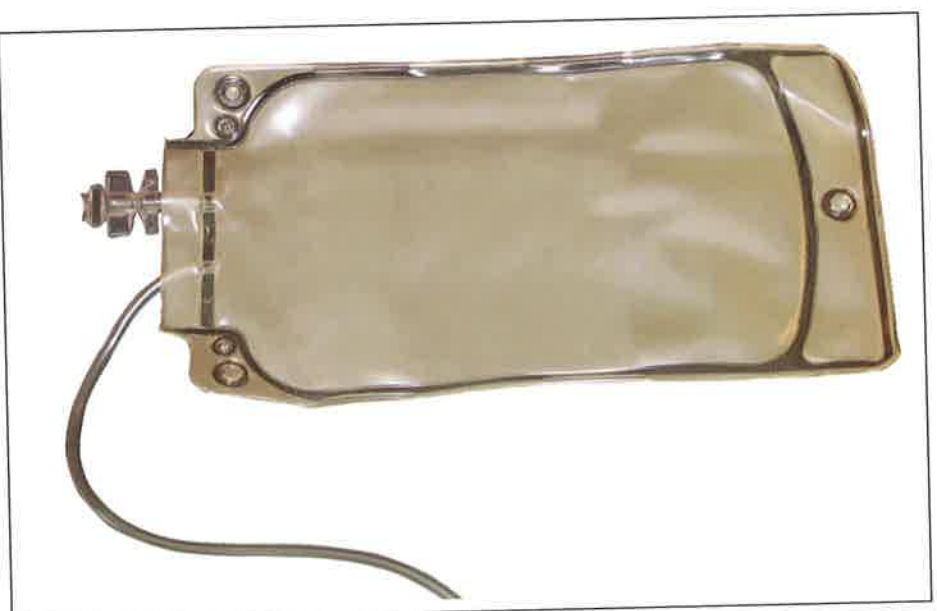
Effects

Component	Appearance
WB/RBC (Difficult to see except in separated plasma or segments)	Bright neon yellow to brown
Plasma	Bright neon yellow to brown
Platelets	Bright neon yellow to brown

Criteria for acceptability

Donors with jaundice are not usually eligible to donate blood.

Evaluating for icterus is not a required test to determine acceptability for component release.



Readers are asked to submit a photo of Icterus for inclusion when encountered.

Blood Component Visual Inspection Guide

Particulate Matter

Particulate matter consists of various blood elements that are formed in the routine processes of collection, manufacturing, and storage. The particulate matter can consist of red blood cells, white blood cells, platelets, coagulation factors, protein materials, tissue plugs, or fatty substances. These particles may increase in quantity and size during storage. All blood components must be transfused through a filter designed to remove particles of a size larger than the pores in the filter.

Particulate matter can be further classified into:

- clots
- fibrin strands
- aggregates
- white particulate matter
- flocculent material
- cold agglutinins



White Particulate Matter

Blood Component Visual Inspection Guide

Clots

Causes

Clots are formed in blood from the interaction of a series of proteins created in the liver (called coagulation factors), and may also include platelets. Anticoagulants are used in the collection and manufacturing process to prevent or minimize clotting. Clots may develop due to conditions such as the following:

- traumatic venipuncture
- insufficient mixing of component with anticoagulant, including inadequate stripping
- insufficient volume of anticoagulant
- bacterial contamination

Effects

Component	Appearance
WB/RBC	Dark purple to very dark burgundy masses that do not disperse easily by gentle manipulation or change in temperature
WB/RBC Segments	Red to black stringy mass that does not disperse easily by gentle manipulation or change in temperature. May appear as red, ribbon-like curls

Component	Appearance
Plasma (liquid phase) Thawed Cryoprecipitated AHF	A thick, whitish, opaque mass that does not disperse easily by gentle manipulation or change in temperature
Platelets	Thick, whitish, opaque masses that do not disperse easily by gentle manipulation or change in temperature

Criteria for acceptability

Visible clots must not be present in the component at time of distribution.

All blood components must be transfused through a filter designed to remove clots and aggregates. (*Circular of Information for the Use of Human Blood and Blood Components*, AABB, America's Blood Centers, American Red Cross, Armed Services Blood Program, 2009.)



Blood Component Visual Inspection Guide

Fibrin Strands

Causes

Fibrin strands are formed through partial activation of coagulation factors that occur in the plasma portion of a component. Fibrin strands do not contain cellular elements. They may develop due to conditions such as the following:

- traumatic venipuncture
- insufficient mixing of component with anticoagulant, including inadequate stripping
- insufficient volume of anticoagulant
- bacterial contamination

Effects

Component	Appearance
Any component, including segments	Thin, whitish, thread-like strands that do not disperse easily by gentle manipulation or change in temperature

Criteria for acceptability

All blood components must be transfused through a filter designed to remove clots and aggregates. (*Circular of Information for the Use of Human Blood and Blood Components*, AABB, America's Blood Centers, American Red Cross, Armed Services Blood Program, 2009.)

Aggregates

Causes

Aggregates, which are intact cells and/or cellular debris that have become entrapped by fibrin strands, may occur during the manufacturing or storage process forming small masses. These small masses may come together to form compact masses or clumps.

White particulate matter (p. 13) commonly seen in platelets may be mistaken for aggregates. Further evaluation may be required to differentiate.

Aggregates generally follow platelet activation and may be reversible or irreversible. Aggregates develop due to conditions such as the following:

- inappropriate storage conditions including resting, temperature, or agitation
 - mechanical manipulation
 - bacterial contamination
- Aggregates may also be seen in red blood cells.

Effects

Component	Appearance
Platelets	Visible, small, whitish masses, some of which may appear waxy and plaque-like
Red Blood Cells	See White Particulate Matter

Criteria for acceptability

Products which do not contain clumps are acceptable.

Reference: 1. Devine, D. V., et al. *Transfusion*, Volume 39, p. 724. July 1999.
2. 21 CFR 640.24 (c)

Blood Component Visual Inspection Guide

White Particulate Matter

Causes

The formation of visually detectable white particulate matter in blood components is associated with the

- absence of leukocyte reduction
- use of higher g-forces in centrifugation to make components
- normal manufacturing and production processes
- normal storage process

Effect

Component	Appearance
WB/RBC or segments and Platelets	Generally described as one of the following: <ul style="list-style-type: none"> • crystalline material • fatty material • tissue • waxy appearing globs • white specks

Criteria for Acceptability

White particulate matter is an acceptable aggregate, based on numerous studies and FDA guidance. These components are suitable for release.

(FDA Update on Particulate Matter in Blood Bags, October 31, 2003)
See Note under **Flocculent Material***

Flocculent Material

Causes

Flocculent material is sometimes formed following the freezing and then thawing of plasma components.

Effect

Component	Appearance
Plasma (liquid phase)	A “cloudy,” “fuzzy,” or “fluffy” white precipitate that may have a tissue paper-like appearance. This material disperses easily by gentle manipulation or increase in temperature.

Criteria for Acceptability

Flocculent material is an acceptable precipitate. Components containing flocculent material are suitable for release.

See Note Below*

***Note:** All blood components must be transfused through a filter designed to remove clots and aggregates. (*Circular of Information for the Use of Human Blood and Blood Components*, AABB, America’s Blood Centers, American Red Cross, Armed Services Blood Program, 2009.)

Blood Component Visual Inspection Guide

Cold Agglutinins

Causes

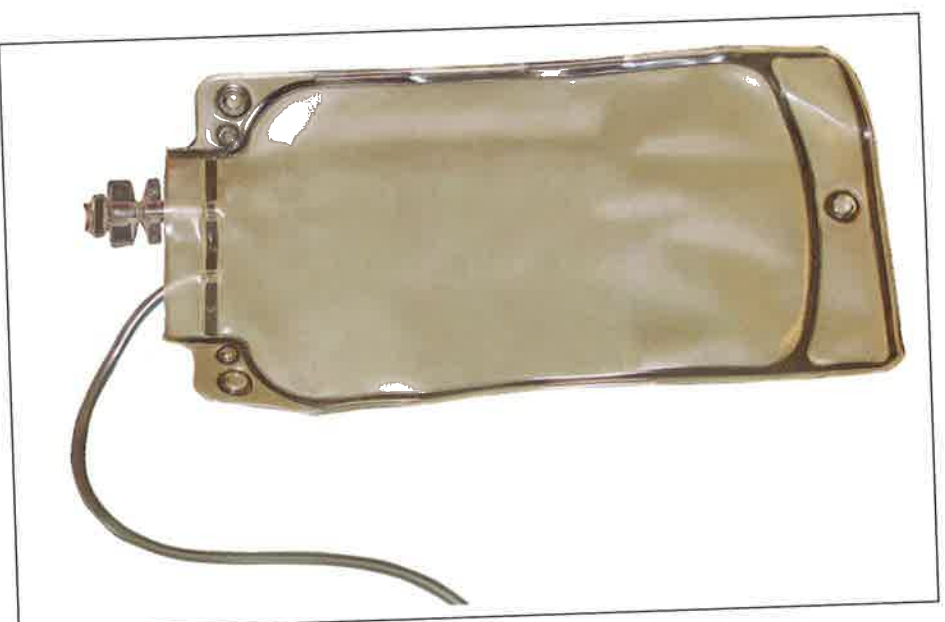
The blood of some individuals contains a protein substance (antibody) which can react with the individual's own red blood cells resulting in clumping, or agglutination of the red blood cells. This condition is generally benign since the antibody is only present in low levels and only reacts at temperatures well below normal body temperature (37 degrees C). If the antibody is present in high amounts and/or reacts at temperatures close to body temperature, the antibody may be associated with a disease process.

Effect

This cold-reactive auto-agglutinin (cold agglutinin, cold auto-antibody) may give the initial appearance that a red cell or whole blood unit is clotted. If the component is examined or inverted after it has cooled (for example, when removed from the refrigerator) the entire red cell mass may move within the component bag as one large "clump." This motion may appear similar to the action of the lava in a lava lamp. As the component gradually warms, the red cell mass will begin to disperse and may appear granular, similar to coffee grounds. As the temperature increases further, the granules may completely disperse and an even suspension of red blood cells may be seen. By contrast, when a blood component is clotted there will generally be many stringy masses or clumps of varying sizes rather than one complete solid mass. The appearance of a clot does not change by varying the temperature and the solid masses are not dispersed by warming or gentle manipulation.

Criteria for Acceptability

Not acceptable for release unless authorized through medical approval.



Readers are asked to submit a photo of Cold Agglutinins for inclusion when encountered.

Blood Component Visual Inspection Guide

Discoloration

Definition

Discoloration refers to unusual color in blood components generally seen due to various metabolic conditions and rarely associated with contamination. A wide range of colors and shades are typical and expected.

Causes

The following may cause discoloration in blood components:

- medications, such as oral contraceptives
- vitamins
- copper metabolism defect
- bacterial contamination (see Bacterial Contamination section)
- incorrect preparation or equipment failure

Effects

Discoloration effects are most apparent in the plasma portion of blood or blood components.

Appearance	Possible Cause
Pale green	Oral contraceptive
Dark greenish brown	Icterus
Bright or fluorescent green	Drug therapy or possible bacterial contamination
Bright yellow to orange	Vitamins
Reddish	The presence of red blood cells or hemoglobin

Criteria for acceptability

Generally, liquid plasma is clear to semi-opaque and frozen plasma is opaque. Normal colors range from pale to dark yellow and/or slightly green-tinged.

If the final platelet apheresis product contains more than 2 mL of red blood cells, a sample of donor blood should be attached to the container for compatibility testing.

If bacterial contamination is suspected, further investigation is required.

Blood Component Visual Inspection Guide

Bacterial Contamination

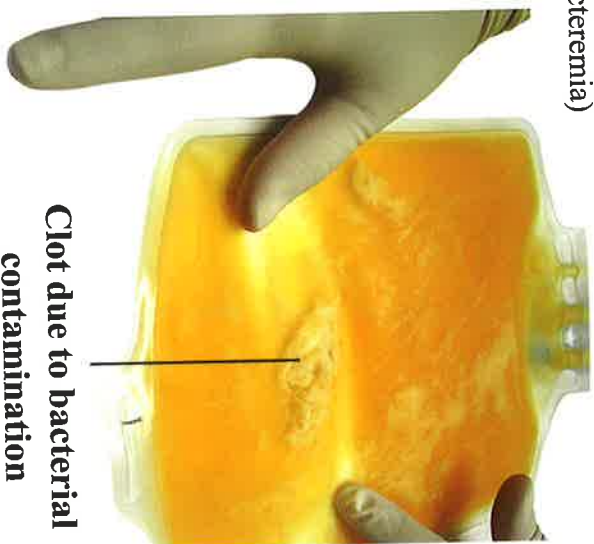
Definition

Bacterial contamination is the presence and growth of bacteria in a blood component. Blood and blood components provide a rich source of nutrients for bacteria. Normally, human blood is free of bacteria and manufacturing processes are designed to maintain sterility.

Causes

Bacterial contamination may be caused when bacteria begin to grow and multiply in the component bags due to any of the following:

- a donor has bacteria already present in his or her blood (a condition known as bacteremia)
- the skin is not cleaned properly prior to phlebotomy, or
- the sterility of the collection set is compromised (because of, for example, a pinhole leak or manufacturing defects).



Clot due to bacterial contamination

Effects

Components that are contaminated often have an unusual appearance and contain clots and/or hemolysis. It is vital to recognize this in a component.

Component	Appearance
WB/RBC (Difficult to see except in separated plasma or segments)	<ul style="list-style-type: none"> • product appears darker than the segments • unusual color, for example, purplish in color • unusual gas bubbles • a zone of hemolysis above the red cell mass • plasma or supernatant is murky, purple, brown or red • clots • fibrin strands
Plasma	<ul style="list-style-type: none"> • clots • fibrin strands • murky
Platelets	<ul style="list-style-type: none"> • clots • fibrin strands • unusual color

Criteria for acceptability

Products with unusual appearance are not acceptable for release.

Blood Component Visual Inspection Guide

Foreign Objects

Definition

Foreign objects generally consist of a part of the collection set that has become detached or loose within the component container. On rare occasions, due to manufacturing defects, other foreign objects may be found in bags. See photographic examples.

Causes

- Manufacturer defect
- Operator error
- Handling during transport

Criteria for acceptability

Not acceptable for release. Visible evidence of foreign objects must not be present at the time of release.

**Foreign Object – Piece of
Detached Cannula in Red Cells**



Blood Component Visual Inspection Guide

Red Cells and Whole Blood



Normal Red Cells

Blood Component Visual Inspection Guide

Red Cells and Whole Blood

Hemolysis – Red Cell Segments



Normal

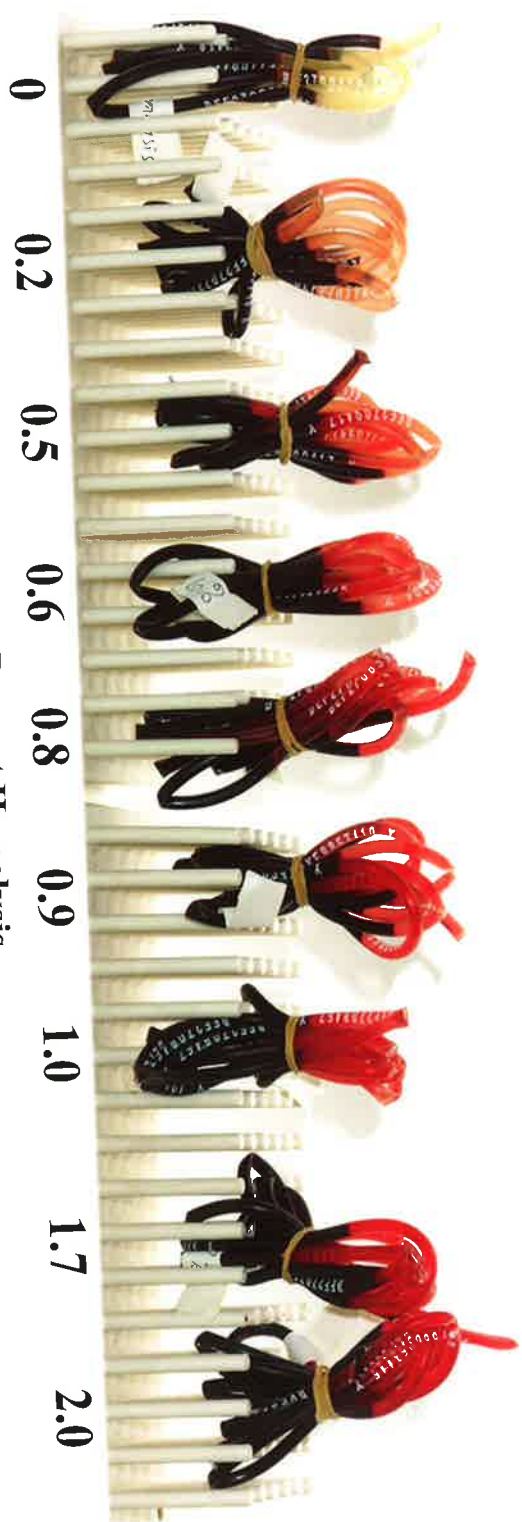
Normal

Hemolysis present

Blood Component Visual Inspection Guide

Red Cells and Whole Blood

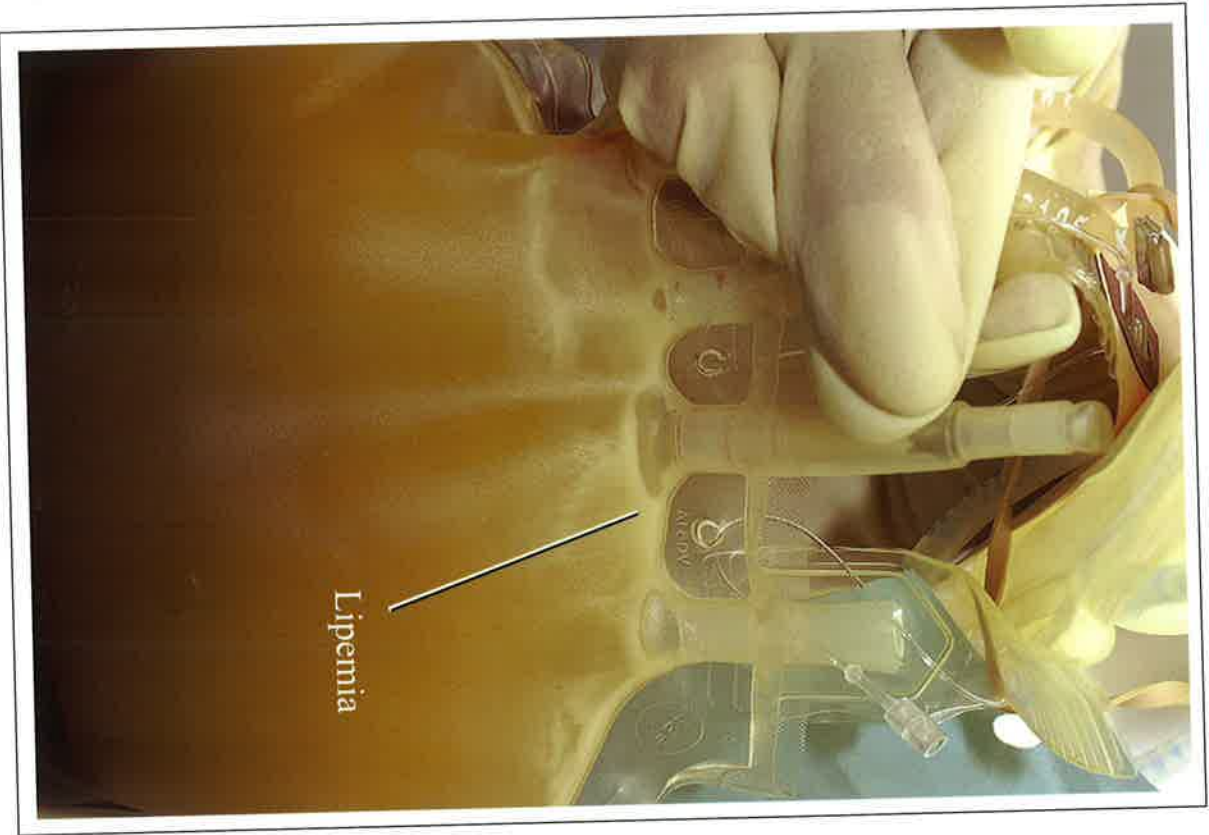
Hemolysis – Red Cell Segments



Percent Hemolysis
(Photograph for illustrative purposes only.
Not for diagnostic purposes)

Blood Component Visual Inspection Guide

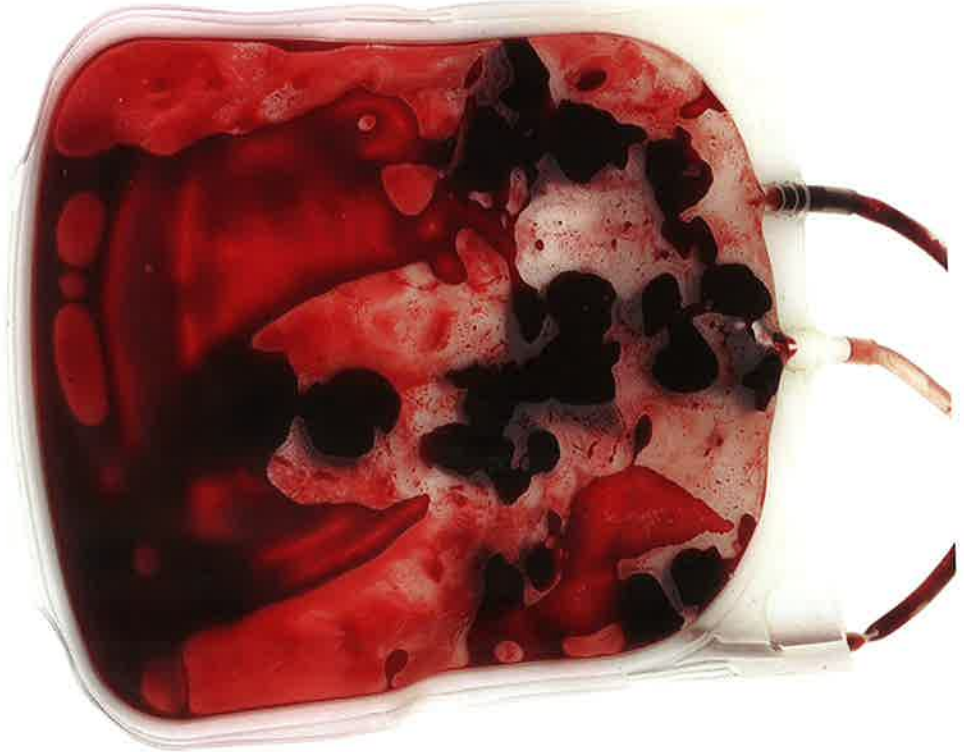
Red Cells and Whole Blood



A layer of lipemia present in a centrifuged Whole Blood

Blood Component Visual Inspection Guide

Red Cells and Whole Blood



Clots remaining in primary bag after filtration

Blood Component Visual Inspection Guide

Red Cells and Whole Blood



White Particulate Matter

White Particulate Matter in Red Cells

Blood Component Visual Inspection Guide

Red Cells and Whole Blood



Foreign Object – Piece of Detached
Cannula in Red Cells

Blood Component Visual Inspection Guide

Plasma



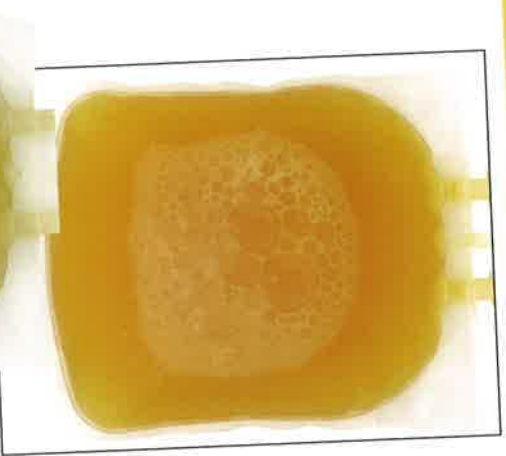
Normal Plasma



Normal Plasma

Blood Component Visual Inspection Guide

Plasma



Normal Plasma



Normal Plasma
- Green Tinged

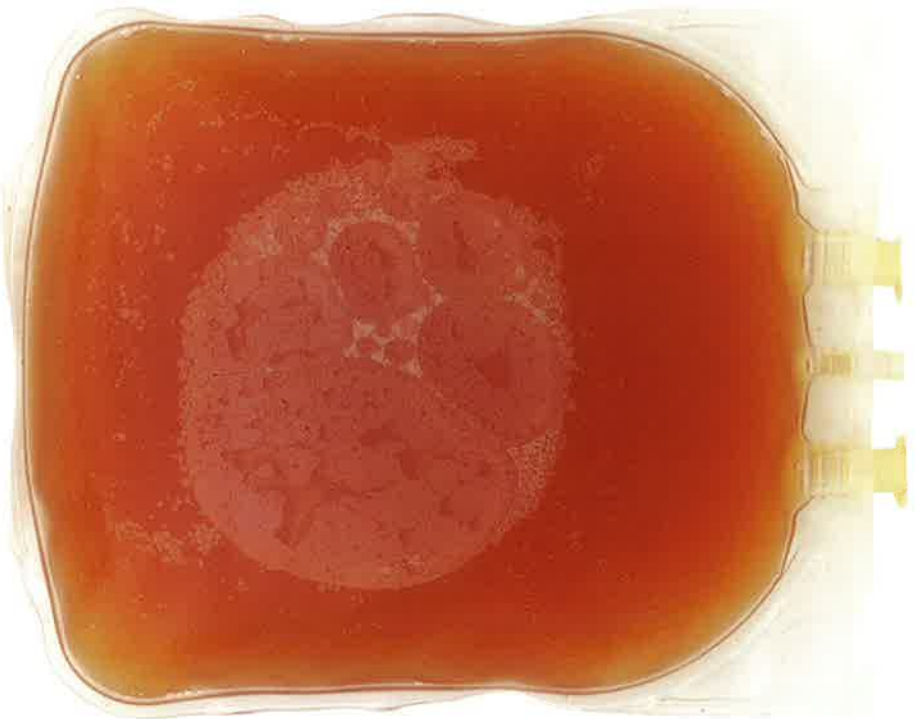


Normal Plasma



Blood Component Visual Inspection Guide

Plasma



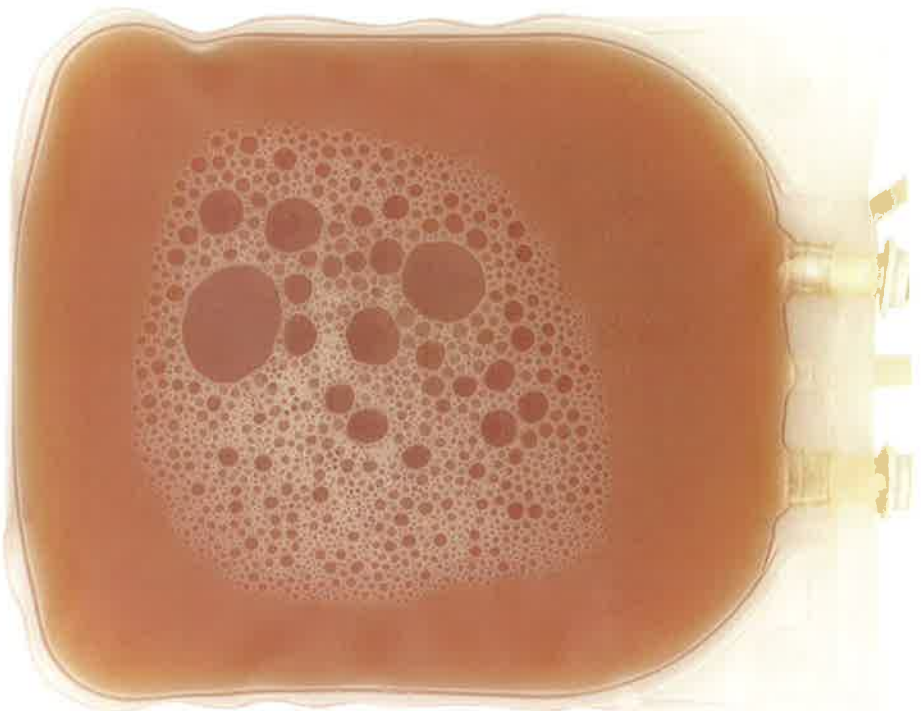
**Normal Plasma containing red
blood cells**



**Normal Plasma containing red
blood cells**

Blood Component Visual Inspection Guide

Plasma



Lipemic – Plasma



Lipemic – Plasma

Blood Component Visual Inspection Guide

Plasma



Lipemic – Plasma



Lipemic – Plasma

Blood Component Visual Inspection Guide

Plasma



**Red Cells in
Centrifuged Plasma**



Yellow Clot in Plasma

Blood Component Visual Inspection Guide

Platelets



Normal Platelets



Normal Apheresis Platelets

Blood Component Visual Inspection Guide

Platelets



Platelets Swirl*

*Please note: The limitations of photography make it difficult to accurately capture the swirling phenomenon.



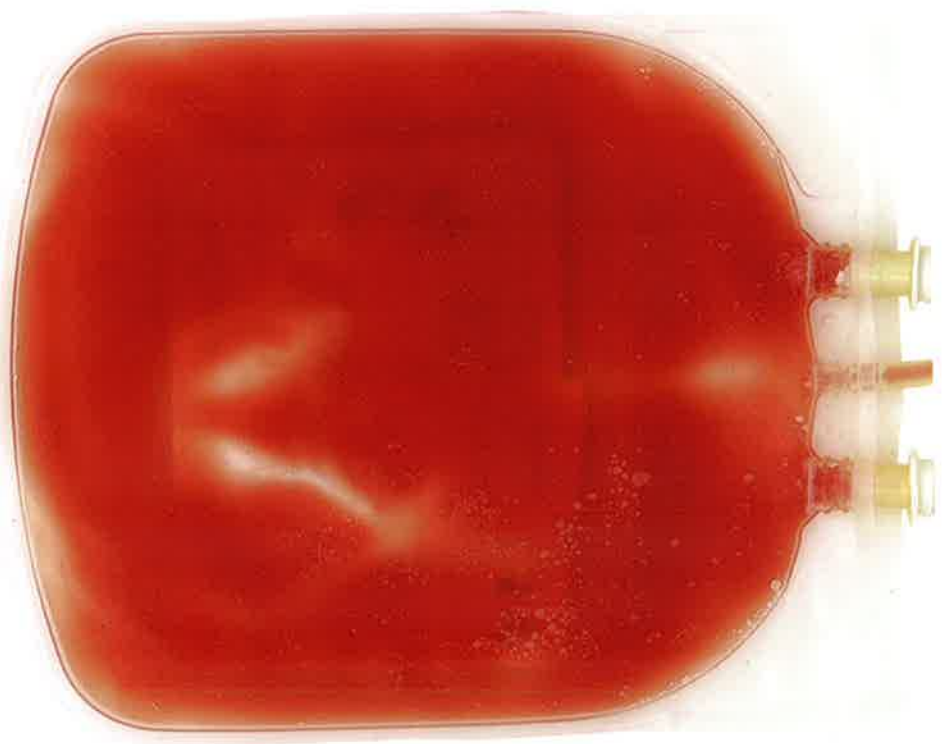
Platelets No Swirl

Blood Component Visual Inspection Guide

Platelets



Platelets – 0.1 mL RBCs



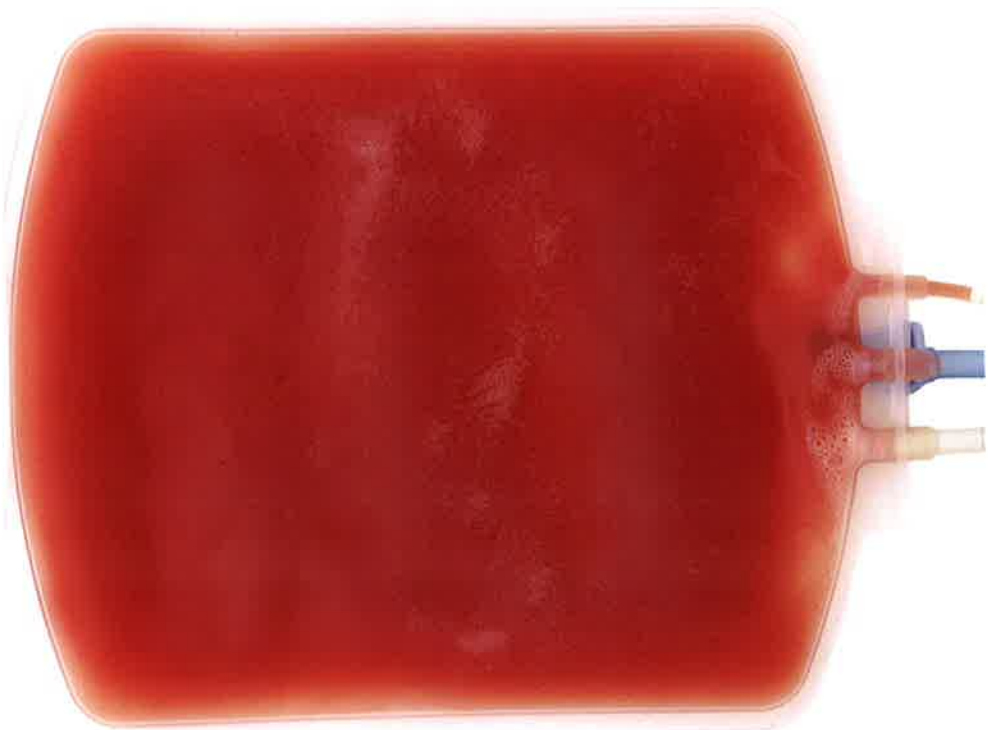
Platelets – 0.5 mL RBCs

Blood Component Visual Inspection Guide

Platelets



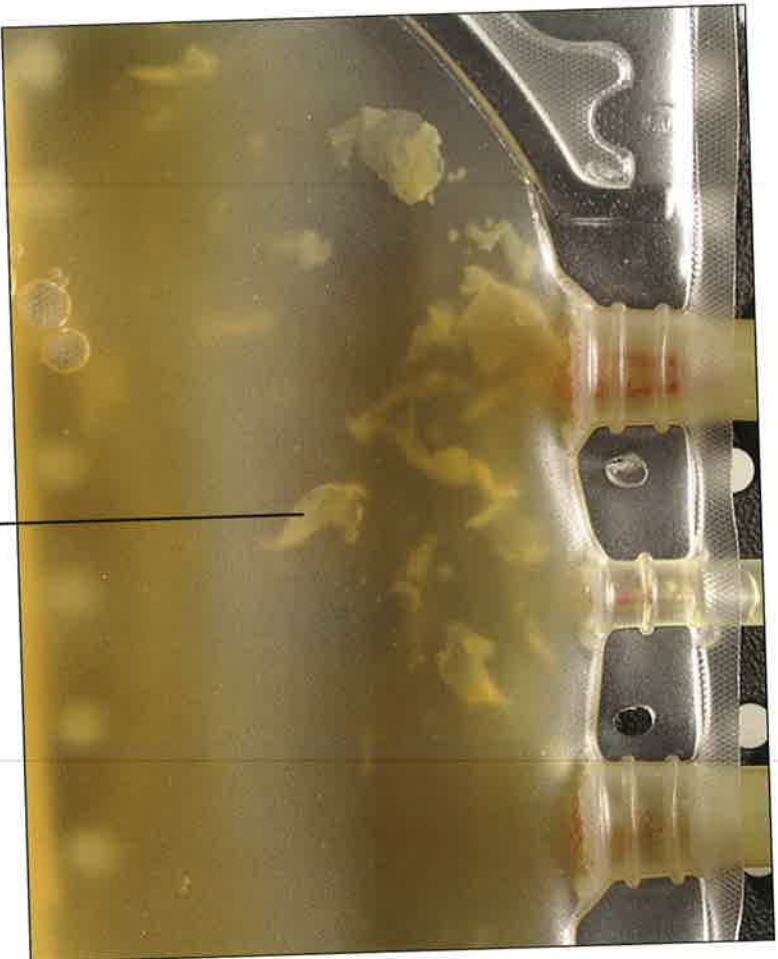
**1.0 mL RBC in Apheresis
Platelet Product**



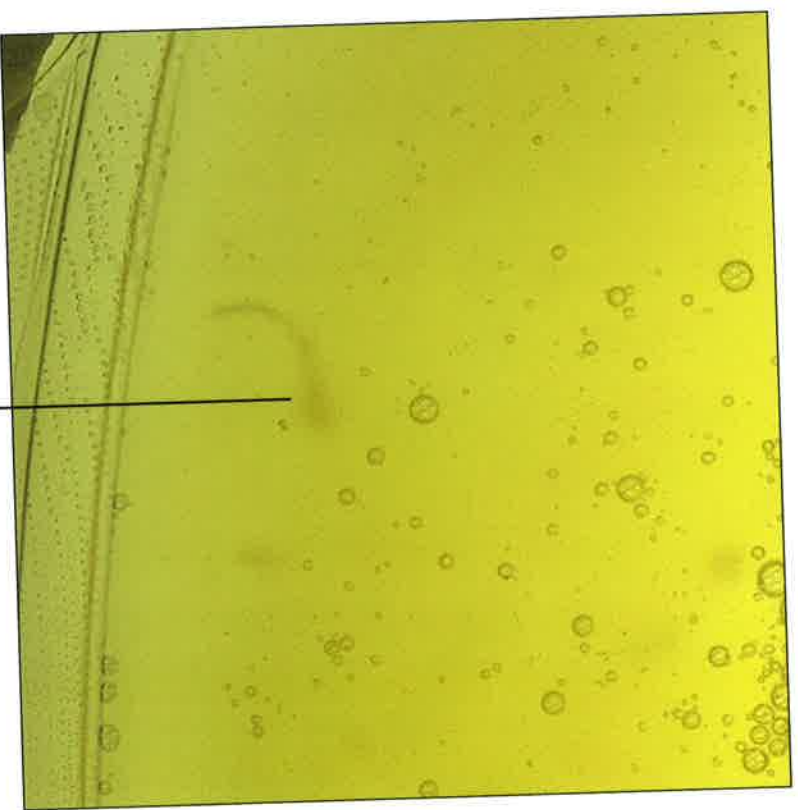
**2.0 mL RBC in Apheresis
Platelet Product**

Blood Component Visual Inspection Guide

Platelets



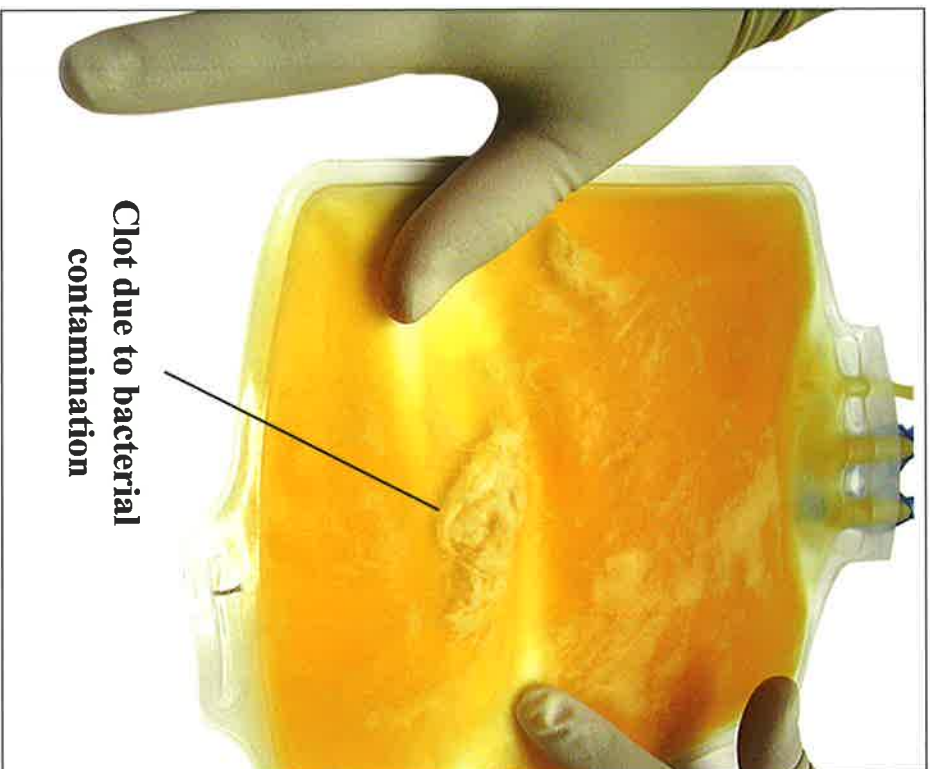
**Particulate Matter (clots) – Platelets
Not Acceptable for Transfusion**



Particulate Matter – Platelets

Blood Component Visual Inspection Guide

Platelets



This photo is a bacterially contaminated apheresis platelet unit which was discovered at a blood center before product release. The product was subsequently found to be contaminated with *E. coli*.

The donor had no signs of infection at the time of donation and met all eligibility criteria. On follow-up questioning, the donor indicated that she was treated several weeks prior to donation for a urinary tract infection. She did not have a post treatment culture to verify that the infection was successfully cleared with antibiotics. She was tested subsequent to follow-up and did have a positive culture result.

Visual Inspection Reference Guide

Cryoprecipitate



Normal Cryoprecipitate

Blood Component Visual Inspection Guide

Quick Reference Tables

Hemolysis	
Component	Appearance
WB/RBC	<ul style="list-style-type: none"> • Dark purple – black • Less opaque • Sheen
Plasma	<ul style="list-style-type: none"> • Pink to red in color • Liquid state – translucent • Frozen state - opaque
Platelets	<ul style="list-style-type: none"> • Pink to red in color • Translucent
Lipemia	
Component	Appearance
WB/RBC	<ul style="list-style-type: none"> • A grossly lipemic WB/RBC will appear similar to a strawberry milkshake
Plasma	<ul style="list-style-type: none"> • Opaque (milky) appearance
Platelets	<ul style="list-style-type: none"> • Opaque (milky) appearance
Icterus	
Component	Appearance
WB/RBC (difficult to see except in separated plasma or segment)	<ul style="list-style-type: none"> • Bright neon yellow to brown
Plasma	<ul style="list-style-type: none"> • Bright neon yellow to brown
Platelets	<ul style="list-style-type: none"> • Bright neon yellow to brown

Clots	
Component	Appearance
WB/RBC (difficult to see except in separated plasma or segment)	<ul style="list-style-type: none"> • Dark purple to very dark burgundy masses that do not disperse easily by gently manipulation
WB/RBC segments	<ul style="list-style-type: none"> • Red to black stringy mass that does not disperse easily by gentle manipulation or change in temperature
Plasma (liquid state) Thawed Cryoprecipitate AHF	<ul style="list-style-type: none"> • A thick, whitish, opaque mass that does not disperse easily by gentle manipulation or change in temperature
Platelets	<ul style="list-style-type: none"> • A thick, whitish, opaque mass that does not disperse easily by gentle manipulation or change in temperature
Fibrin Strands	
Component	Appearance
Any component including segments	<ul style="list-style-type: none"> • Thin, whitish, thread-like strands that do not disperse easily by gentle manipulation or change in temperature
Aggregates	
Component	Appearance
RBC	<ul style="list-style-type: none"> • See white particulate matter
Platelets	<ul style="list-style-type: none"> • Visible, small, whitish masses, some of which may appear waxy and plaque-like

Blood Component Visual Inspection Guide

Quick Reference Tables

White Particulate Matter	
Component	Appearance
WB/RBC or segments and Platelets	<p>Generally described as one of the following:</p> <ul style="list-style-type: none"> • Crystalline material • Fatty material • Tissue • Waxy appearing globs • White specks
Flocculent Matter	
Component	Appearance
Plasma (liquid plasma)	<ul style="list-style-type: none"> • A “cloudy,” “fuzzy,” or “fluffy” white precipitate that may have a tissue paper-like appearance. This material disperses easily by gentle manipulation or increase in temperature.

Discoloration	
Appearance	Possible Cause
Pale green	<ul style="list-style-type: none"> • Oral contraceptives
Dark greenish brown	<ul style="list-style-type: none"> • Icterus
Bright or fluorescent green	<ul style="list-style-type: none"> • Drug therapy or possible bacterial contamination
Bright yellow to orange	<ul style="list-style-type: none"> • Vitamins
Reddish	<ul style="list-style-type: none"> • The presence of red blood cells or hemoglobin

Bacterial Contamination	
Component	Appearance
WB/RBC (difficult to see except in separated plasma or segments)	<ul style="list-style-type: none"> • Product appears darker than the segments • Unusual color; for example purplish in color • Unusual gas bubbles • A zone of hemolysis above the red cell mass • Plasma or supernatant is murky, purple, brown or red • Clots • Fibrin strands
Plasma	<ul style="list-style-type: none"> • Clots • Fibrin strands • Murky
Platelets	<ul style="list-style-type: none"> • Clots • Fibrin strands • Unusual color

