Page D. Inspection of Dry Products—Spray Process. (Form DA - 151 - 4)

Processing and Condensing

Item D1—Room Construction (58.126).

See the guidelines for Item A1—Room Construction.

Evaporator condensers which are equipped with full barometric legs often terminate in a tail-pipe pit located within the plant, particularly where climatic conditions would present freezing problems for an outside pit location. During evaporator operation, the tail-pipe pit receives the mixture of condenser water and condensed vapors removed from the milk. Usually the pits are covered with iron grilles or loose fitting iron plates. This is satisfactory. Sealed covers for such pits are not required as for sanitary sewer system drain pits or sumps. During regular evaporator operation, the pit is continually flushed with large quantities of tail pipe water. While it is true that this water contains some milk entrainment, the evaporator shut down and cleaning procedures generally flush the pit so that odor problems are seldom encountered during shutdown periods. If they do occur, the pit should be cleaned.

Item D2—Lighting & Ventilation (58.126d, e).

See the guidelines for Item A2—Lighting & Ventilation.

Item D3—Pumps, Pipelines, & Valves (58.128, 58.146a).

See the guidelines for Item A3—Pumps, Pipelines, & Valves.

Inspect a sufficient number of pumps, pipelines, valves, and fittings to evaluate condition and cleanliness of this equipment. Also check for dead end piping under the evaporator, especially in the pump-out piping used at the end of the run. Dead ends may also be found in the piping of old style level control devices for some evaporators. Recommend replacement of such level indicating or controlling devices which require the product to reside for long periods in the control piping.

Item D4—Separator (58.128a, e).

See the guidelines for Item B4—Separator.

Item D5—HTST Sealed _____ at _____ sec. _____° F (58.128, 58.236, 58.809).

See the guidelines for Item B5—HTST Sealed _____ at _____ sec. _____° F.

Fill in the required information about sealing date, forward flow hold time, and "cut-out" divert temperature.

It has been long standing Dairy Division policy that milk and milk products be pasteurized prior to condensing in an evaporator. §58.236a and §58.809a of the *General Specifications* outline these requirements, which are based on public health considerations. Without pasteurization to destroy staphylococcus aureus bacteria prior to condensing, the possibility exists that staphylococcal enterotoxin, which is heat stable, may be produced within the evaporator.

Evaporative condensing is used to produce condensed milk and milk products which then may be used in a variety of end products. These end products include not only condensed and dry milk and milk products, but also condensed milk which is used to standardize the solids content of milk for cheese making. Regardless of the end use, milk or milk products shall be pasteurized prior to condensing.

If during plant surveys you encounter situations where pasteurization prior to condensing is not being accomplished, using legally sealed pasteurization equipment, the INELIGIBLE status shall apply for all products produced from the condensed milk or milk product.

Summary of pasteurization requirements for various dry products.

A. Dry Whole Milk, Nonfat Dry Milk (58.236a).

Milk or skim milk used in the manufacture of these products shall be pasteurized prior to the evaporator at a minimum temperature of 161° F for at least 15 seconds or its equivalent.

Note:

> Pasteurization of whole milk prior to the separator as practiced at a few NDM plants will satisfy this requirement.

Condensed milk products made from pasteurized milk may be transported to a drying plant, provided that it shall be effectively repasteurized at the drying plant, prior to drying, at a minimum temperature of 166° F for at least 15 seconds or its equivalent.

B. Dry Buttermilk (58.236a).

All buttermilk shall be pasteurized prior to condensing at a minimum temperature of 161° F for at least 15 seconds or its equivalent. When condensed buttermilk is transported to a drying plant, it shall be repasteurized at the drying plant prior to drying at a minimum temperature of 166° F for at least 15 seconds or its equivalent, except that acidified buttermilk containing 40% or more solids may be transported to another plant for drying without repasteurization.

C. Condensed Milk for Cheese Making (58.236a, 58.438).

Pasteurization at a minimum temperature of 161° F for at least 15 seconds or its equivalent is required prior to condensing. This pasteurization step is required even if the cheese is labeled as made from raw milk.

D. Dry Sweet Whey, Dry Acid Whey, Dry Whey Products, & Lactose (58.809).

> " *(a)* All fluid whey used in the manufacture of dry whey, dry whey products, and lactose shall be pasteurized prior to condensing. When the condensing and drying operations for the production of dry whey products by blending, and modified whey products by fractionation are located at the same plant, the pasteurization may be located at a different point in the operation provided it will protect the quality of the finished product and not adversely affect the processing procedure."

Wording shown above is a correction of the §58.809a version printed in the Federal Register of 10/10/75 and is shown here to make the intent of the second sentence clear.

The pasteurization point for the production of condensed whey for shipment from the plant, for dry whey, or for lactose made by conventional crystallization and separation procedures shall be prior to condensing the whey. There are no provisions for exceptions in the location of this pasteurization point in the manufacture of these products.

The second sentence of §58.809a permits a different pasteurization point in the process for certain products under certain conditions. This pasteurization point exception can apply to dry whey products made by wet blending and to modified whey products made by fractionation processes, (for example ultra-filtration, ion exchange, gel fractionation, electrodialysis, etc.) when, 1) the condensing and drying operations are located in the same plant, 2) the new pasteurization point will protect the quality of the finished product and 3) the new pasteurization point would not adversely affect the processing procedure.

Alternate pasteurization points meeting these criteria may be approved. If the alternate location involves pasteurization of condensed product, contact the National Field Director for guidance about required time and temperature for pasteurization of the product. Supply details about ingredients and total solids content of the product at the desired point of pasteurization.

When lactose is made by conventional condensing, crystallization, and separation procedures, pasteurization is required prior to condensing. When made in connection with other whey

fractionation techniques (usually membrane processing), pasteurization may be at some other satisfactory point in the manufacturing process.

Condensed whey received from other sources shall be repasteurized at the drying plant at a minimum temperature of 166° F for at least 15 seconds or its equivalent, unless total solids content is 40% or higher.

E. Blended Products.

Blends (such as nondairy creamer), are usually various combinations of skim milk, NDM, buttermilk, caseinates, whey, soya flour, vegetable fats, etc. When these products are manufactured by mixing of all ingredients in a fluid state, followed by pasteurizing and drying, or by pasteurizing, condensing, and drying, and when all the dairy ingredients are made by USDA approved plants, the finished dry product may be characterized by an “S” code in the *Approved Plant Book*; when not, the “P” codes are assigned. However, both “S” and “P” code blended products shall be pasteurized in the fluid state after all ingredients are added during some appropriate stage of the manufacturing process.

When the HTST method is used, the required minimum temperature and hold time will depend upon the kind of ingredients and the total solids content of the mixture. Fluid products having dairy ingredients with a fat content of 10% or more, or which contain added sweeteners require pasteurization at a minimum temperature of 166° F for at least 15 seconds. The equivalent vat pasteurization treatment is 150° F for 30 minutes. Consult the National Field Director when questions arise about the appropriate pasteurization treatment.

These same dry blended products may be made by thoroughly mixing all of the ingredients in their dry form. For surveying such operations, use survey Page G—Dry Products Blending and Packaging.

Item D6—HTST or Vat Pasteurizer (58.128).

See the guidelines for Item B6—HTST or Vat Pasteurizer.

The forward flow of product after the flow diversion valve may go directly to a hot well; however, many installations provide for direct piping to the first effect inlet of the evaporator. In such case, a vacuum breaker and check valve or automatic shutoff valve downstream from the vacuum breaker, shall be provided in the line between the flow diversion valve and the inlet to the evaporator. This is required to prevent suction on the forward flow port of the flow diversion valve during diverted flow.

When the flow diversion valve is the double-valve type, such as the Crepaco, G&H, or Tri—Clover, the vacuum breaker is not required if the leak detector port is open to atmosphere. However, when this port is piped back to the constant level tank, the separate vacuum breaker is required between the flow diversion valve and the automatic shutoff valve (most installations have the leak detector port piped back to the tank to avoid losing product to the floor during start-up).

A process cheese cooker is an acceptable pasteurizer for a cheese slurry (see the guidelines for Item K31—Cheese Cooker).

Item D7—Hotwell (58.216).

Many plants have hot wells for product preheating treatment or holding ahead of the evaporator. Use of a conventional "in-out" hot well shall not be considered a satisfactory alternative to HTST pasteurization equipment. Hot wells shall be enclosed or covered. To minimize foaming, the product inlet should be below the milk level or should be provided with a "down pipe." Check the hot well for sanitation, with particular attention to the dome, level control if any, and milk inlet and outlet areas.

If direct steam injection heating is used, the steam pipes and injection system in the hotwell shall comply with the *3-A Sanitary Standards for Steam Injection Heaters for Milk and Milk Products, Number 61-* and culinary steam shall be used (see the guidelines for Item A36—Culinary Steam).

Review plant safeguards to prevent mixing of milk product and cleaning solutions. As a general rule, cross connection piping between product and cleaning solution shall be criticized. There shall be a full break between the two systems until all the milk is removed and actual cleaning operations are started on the milk handling system. Be particularly alert for cross-connection piping in this area because the hot well is often used to make up cleaning solutions for the evaporator (see the guidelines for Item A3—Pumps, Pipelines, & Valves for information on block and bleed piping).

Pipelines located inside the hot well which are cleaned-in-place shall have welded joints or specially designed loose fitting joints which permit effective CIP cleaning of exterior as well as interior surfaces. Hex nut or conventional CIP fittings are not satisfactory for this purpose. If noted, recommend replacement with welded or special joints. Daily removal of the pipelines for hand brushing of the fittings, although a satisfactory alternative, is not a practical solution.

Hot wells are often equipped with exhaust ducts to remove excess vapor. Such vent pipes should be made of stainless steel and be constructed so that condensate from inner or outer surfaces cannot reenter the hot well.

In the manufacture of dry whey, a light colored product may be desired. To accomplish this, the fluid whey may be bleached with a hydrogen peroxide or benzoyl peroxide solution, usually in connection with hot whey storage or "hot well" operations prior to the evaporator. Bleaching with hydrogen peroxide or benzoyl peroxide in this manner is a satisfactory practice (see the guidelines for Item W31—Utilization of Whey).

Item D8—Evaporator(s) (58.217).

New or replacement evaporators shall comply with *3-A Sanitary Standards for Milk and Milk Products Evaporators and Vacuum Pans, Number 16-* . If you encounter a newly installed

evaporator or vacuum pan, which does not bear the 3-A symbol handle in the same manner as outlined in Item A3—Pumps, Pipelines, & Valves.

A Product Preheaters (58.215).

Many evaporator systems employ a number of vapor preheaters for the milk prior to the final heater (which is usually heated with steam). It is not necessary to check all interstage heaters at each survey when previous inspections showed satisfactory cleaning.

On tubular type preheaters, an adequate check on tubes can be made by opening two or three header plates or ells and checking these tubes. If these are not clean, open the heater completely for inspection. Also, check the condition of the gaskets.

If the heater is a plate type, it should be completely dismantled for inspection of each plate during each survey (see the guidelines for Item A27—Product Cooler).

Some evaporators have spiral type tubular preheaters which are fully enclosed inside the tube chests or inside milk vapor areas. This is permitted by the 3-A Sanitary Standards when the heat exchange surface is one continuous tube and the heater is designed to be mechanically (CIP) cleaned. Inspection of such heaters, other than the inlet and outlet, is impossible. Also, check on the company control of the cleaning regimen. If the other exposed parts of the evaporator are clean, such as the heating surfaces in each effect, there is reasonable assurance that the same cleaning regimen was also effective in cleaning the spiral tubes.

Except for the enclosed spiral type, check that preheaters are accessible for inspection. Where necessary, recommend means of safe access, such as ladders, decks, etc.

B. Tube Chests (Calandria).

Because of operation at low temperatures, especially in the last effect, it is especially important that evaporating equipment be clean and free of open seams or cracks. Inspect this equipment carefully, with special attention to condition and sanitation of the following areas:

1. Tube chests, or heating plates if evaporator is plate type.

2. Passages connecting tube chests and evaporating chambers.

3. Underside of distributing plates, baffles, and vapor separator devices, if used.

4. Vapor ells. These curved sections should be cleaned all the way around to the point where they slope down and away from the product zone in the evaporator. Because of location and construction, they are usually cleaned with properly located spray cleaning devices. However, on some units, cleaning is achieved by “boil-over” of cleaning solutions induced by manipulation of the amount of vacuum.

5. Control valves for regulating product inlet and transfer to subsequent effects.

6. Optional steam injection piping used during the cleaning cycle for solution heating and turbulence (usually installed in the milk chamber at bottom of each effect tube chest on rising film evaporators). Such piping should be disconnected during processing or be of stainless steel construction through the shutoff point and be free of "dead-end" conditions.

7. Air release valves, manhole gaskets, sight glass gaskets.

8. Cleanup and construction of continuous Baume testing equipment. The condensed product should not be exposed to the atmosphere at the point where tested. The open type Baume pot can be covered with a transparent dome which can be purchased from plastic manufacturers or the concentration of the product can be monitored with an in-line device, such as a refractometer.

Item D9—Evaporator Vapor Condenser (58.127, 58.217).

Evaporators with open type condensers (which utilize direct intermingling of product vapors and condensing water) shall be equipped with an automatic level control, barometric leg, or be so constructed as to prevent water entering the product. Condenser surfaces which contact milk vapors and condenser water are not sanitary or inspectable. Condenser water from these surfaces must not be allowed to enter the evaporator in case of malfunction whether or not the water was initially potable. Acceptable safeguards to prevent this include one of the following:

1. A full barometric leg extending at least 35 feet vertically from the maximum safe water level in the condenser system to the free water level at which the leg discharges, less one foot vertical height for each 1200 feet of elevation above sea level.

2. A safety shutoff valve, located in the water feed line to the condenser, automatically actuated by a control which will shut off the in-flowing water when the water level rises above a predetermined point in the condenser. This valve may be actuated by water, air or electricity, and shall be so designed that failure of the primary motivating power will automatically stop the flow of water (the above wording is from the *3-A Sanitary Standards for Milk and Milk Products Evaporators and Vacuum Pans, Number 16-05)*.

Closed type condensers by their construction (usually shell and tube type) provide for physical separation of condensing water from the vapors and condensate and therefore may use either safe or nonpotable water without further controls.

Closed condensers, or open condensers equipped with the safeguards stated above, may therefore use nonpotable water. Such water might be recirculated on cooling towers or spray ponds or be of otherwise nonpotable origin from nearby ponds or rivers. It shall be handled in separate water lines with no cross connections to potable water lines (review §58.127).

Make recommendations as applicable. Do not recommend a type of condenser. The open type condenser with proper safeguards should be considered as equivalent to a closed condenser with respect to protection from condenser water (also see Item D1—Room Construction).

Item D10—Cooler for Condensed Product (58.128a, 58.238).

See the guidelines for Item A27—Product Cooler.

Do not report product temperature unless it is unsatisfactory (should be 50° F or lower except that higher temperatures may be utilized for condensed whey during the crystallization process, or to make special blend products).

Item D11—Crystallizer Vats or Tanks (58.128, 58.809c).

Proper lactose crystal development usually involves slow cooling and controlled agitation for a period of time. Seeding with finely ground lactose is sometimes practiced. Do not criticize the slow cooling. It is necessary and is provided for by §58.809c.

Most equipment for crystallizing condensed whey and sweetened condensed milk is of the following types:

A. Vertical crystallizer tanks.

These vertical tanks usually have heavy duty, top-mounted agitators and cone shaped bottom construction. The tanks may have cooling jackets or simply have cold water spray rings on the exterior. Inspect the interior of the tank, the inlet and outlet valves, agitator shaft, sling, and all other appurtenances for condition and sanitation.

B. Coil type crystallizer vats.

These are usually horizontal type vats, very similar to coil pasteurizer vats for cream. Inspect them in the same manner, as outlined in guidelines for Item B6—HTST or Vat Pasteurizer, except that a recording thermometer is not required.

Item D12—Storage Tanks (58.128d, 58.237, 58.238, 58.810).

See the guidelines for Items A28—Storage Tanks - Silo & A29—Storage Tanks - Horizontal.

Condensed product tanks may or may not be present in a spray drying operation. In some installations there is direct piping of the warm condensed product to the dryer. However if there is excess production over that which the dryer will take, it shall be cooled to at least 50° F and held at this temperature until used (also see Item D10—Cooler for Condensed Product).

When tanks are used for storage of sweet whey for more than two hours prior to processing, product shall be held at 45° F or lower or above 145° F. Check that a recording thermometer

is provided to verify proper storage of whey as outlined in the guidelines for Item W9—Whey Heating or Cooling.

Item D13—Housekeeping (58.126e, 58.127f, 58.146d).

See the guidelines for Item A7—Housekeeping.

Drying

Item D15—Room Construction (58.126).

See the guidelines for Item A1—Room Construction.

The location of doors or adjacent operations should not cause excess or unnecessary personnel traffic through the drying area.

Check particularly for deficiencies in floor drains and traps that are located in the vicinity of air intakes for processing air.

Give special attention to ceiling, walls, and floors regarding insect control, following the guidelines of Item A37—Pest Control (if insect evidence is noted, report it under Item D56—Pest Control).

Item D16—Lighting & Ventilation (58.126d, e).

See the guidelines for Item A2—Lighting & Ventilation.

Ventilation of some dryer rooms is accomplished by air movement induced by the dryer air intake systems. Most Coulter dryer installations, for instance, have main air intakes and filters mounted high inside the building. Outside air is often introduced at a lower level, then is drawn across the room and upward to ventilate the room and also be warmed by the exposed hot surfaces of the dryer.

Even with dryer installations that draw air directly from the outdoors, ventilation is usually not a problem because of air movement in the room to supplementary air intakes.

Ventilation may be a serious problem, however, when drying systems are run only intermittently, or are shut down for considerable periods of time. In such instances, check more carefully for condensation, mold, etc.

Item D17—Pumps, Pipelines, & Valves (58.128, 58.146a).

See the guidelines for Item A3—Pumps, Pipelines, & Valves.

Use this item to cover pumps, pipelines, valves, and fittings for product at the preheater area prior to the high pressure pump.

Item D18—Product Preheaters (58.128j, k, 58.236a).

See the guidelines for Item A27—Product Cooler (condensed product preheaters are usually of the tubular type).

Some drying systems do not employ a preheater for the product prior to drying. In such instances, show NA in the satisfactory column.

If the plant receives condensed milk or whey from another plant, it must be repasteurized at the drying plant. See the guidelines for Item D5—HTST Sealed_____ at _____ sec. _____° F (the high pressure pump at the dryer is sometimes used as the timing pump).

Item D19—High Pressure Pump (58.218, 58.219).

New and replacement high pressure pumps shall comply with the *3-A Sanitary Standard for Homogenizers and Pumps of the Plunger Type, Number 04-* . When inspection reveals poor condition parts, recommend repair or replacement with a pump meeting these 3-A requirements.

With good process planning, use of surge tanks can often be avoided. For instance, there should be no need for a surge tank at the pump-heater-high pressure pump complex just ahead of the dryer. The extra product flow from the heater generated by the heater recirculating pump may be bypassed back to the inlet piping of the recirculating pump.

When a surge tank is necessary for some special process reason, there is danger of bacterial growth (especially in the foam) if the product is held at critical temperatures for long periods of time. When applicable, make a recommendation for raising the product temperature to 150° F, or lowering it to 50° F, or using two surge tanks alternately every 4 hours with washing of tanks after each use. Covers, easily removable for cleaning, shall be provided and used at all times.

The high pressure pump is also used to circulate cleaning solution through the subsequent high pressure lines to the dryer. This recirculation may clean much of the interior of the pumps; however, it does not assure proper cleaning of the pistons, piston seal assemblies, some pressure gauge fittings, or low velocity areas in the intake manifold. Have the machine dismantled for inspection and check these parts carefully. Also check any fine mesh strainers and valves used in the condensed product line or at the pump. When pump cleaning deficiencies are found, recommend daily dismantling for hand cleaning.

Inspect the removable short high pressure line sections just prior to the spray device. These too, should be cleaned by solution circulation along with the main nonremovable (welded) sections of the high pressure line. Use this item to report any condition or sanitation deficiencies of the high pressure lines as well as the high pressure pump.

Note:

> The high pressure product lines are exempt from the design and construction requirements of the 3-A Sanitary Standards. Therefore, threaded fittings are acceptable. However, the lines and fittings shall be stainless steel.

For safety reasons threaded stainless steel pipe is usually used. Threaded fittings shall not be used on the inlet side of the high pressure pump. Also, ball valves used in the high pressure lines are not required to meet the 3-A Sanitary Standards for Ball Valves, but the product contact surfaces shall be stainless steel or acceptable plastic and they shall be cleanable. These valves shall be dismantled and hand washed each time the lines are washed.

Check the high pressure lines for dead ends that may be formed by improper placement of valves. Especially check valve location for bypass piping to the floor at the high pressure pump or where water may be introduced during loss of product flow. Proper location of valves at the dryer front is also important if some of the spray nozzles are not used during operation. Also, criticize brass or black iron check valves.

Item D20—Dryer Air Supply (58.220a).

A. Air Supply and Air Intake Location.

The source of air supply for drying, conveying or cooling powder shall be relatively free from objectionable odors, smoke, dust, or dirt. Unsatisfactory environmental conditions near the plant should be reported (poultry or livestock buildings or pens, etc.) Check the immediate vicinity of the air intake to the dryer for unsatisfactory conditions that may cause contamination; for example, an exhaust stack from a dryer or boiler near the main dryer air intake, main air intake drawing in air over a roof that contains excess powder, etc.

B. Air Intake Hood, Screen, etc.

The air intake openings shall be screened (maximum screen openings ¾ inch diameter). New dryer installations shall have louvers that can be closed when the dryer is shut down and a hood to minimize the intake of rain, snow, dust, etc. unless the nature and location of the openings accomplishes these purposes. Lack of such louvers and hoods on older dryers should not be criticized.

C. Air Inlet Plenums.

Construction requirements of the air ducts and plenums differ depending on the temperature of the air. The two types of air defined by 3-A are “air to be heated” (air over 240° F) and “air not to be heated” (air under 240° F).

On dryers installed after November 1998, plenums and ducts for air to be heated shall be constructed of stainless steel. Welds shall be continuous, whether or not they are ground and polished. All air contact surfaces shall be accessible and cleanable.

Dryers constructed before November 1998 that have been under virtually continuous USDA inspection may have air plenums and ducts for air to be heated constructed of galvanized sheet metal using conventional fabrication techniques (iron or Coreten are not satisfactory construction material for filtered air plenums or ducts). When rusty conditions are noted inside galvanized ducts or plenums that are downstream from the filters, recommend regalvanizing or replacement (removal of rust and recoating with cold galvanizing compound may be satisfactory if the rust damage is not serious). Painting of such inside surfaces is not a satisfactory practice. Recommend immediate removal of the paint if this is noted.

Ducts and plenums for air not to be heated shall meet product contact surface requirements (stainless steel, number 4 finish, proper radius, etc.)

D. Filtering of Process Air.

The air supply system and ducts shall be such that all of the air passes through properly installed air filters before coming in contact with product or product contact surfaces of the drying system. This 3-A requirement that dryers “be so constructed as to prevent the entrance of unfiltered air” should be met even on “pre-3-A” dryers, so if such deficiency is noted, recommend correction.

Drying systems commonly employ process air from two or more separate intakes, each of which may be fitted with a separate filtering system. Examples of such intakes are:

1. Main air intake, usually located ahead of an inlet fan and steam radiators or gas burners. This main process air supply is usually heated to over 240° F.

2. When the dryer is gas-fired, supplementary air to the burners is usually supplied by a separate small fan and air intake. Sometimes filtered air is conveyed by ducts from the main air intake (on most newer dryers, the gas burners are of a different type and do not require mixing of air with the gas prior to entering the burners for combustion).

3. Air inlets to the redryers.

4. Air inlets for conveying and cooling the powder after it leaves the dryer (use Item D27—Powder Cooling System or Item D24—Product Removal & Conveying Equip. to show any needed recommendations regarding these filtering systems).

Check that each of the air sources is properly filtered. Also, check for unfiltered air leakage into the drying system. For instance, check for leakage at openings for spray nozzle insertion. When unfiltered air enters the dryer at the spray nozzle pipes, recommend correction of the condition according to the recommendations of the dryer manufacturer. Do not attempt to advise management how to accomplish this. In actual practice, correction will simply consist of blocking the opening, or providing for filtration of air that enters at this point. However, this may be done in many different ways, some of which may affect proper operation of the dryer system. The methods of correction, therefore, should be the prerogative of management and the dryer manufacturer.

Examples:

D20. — Arrange with the dryer manufacturer to prevent entrance of unfiltered air around the spray nozzles (C).

— Prevent the entrance of unfiltered air through the unused spray nozzle openings (A).

Also check for gasketing of the filter frames, poor fitting doors or parts, spray nozzle pipe openings, poor fitting joints on powder conveying pipes, broken flexible sleeves, etc.

E. Filters—Construction and Filtering Efficiency.

The *3-A Accepted Practices for Milk and Milk Products Spray Drying Systems, Number 607*- outlines requirements for filter materials and for filter efficiency. Inspectors should be familiar with the applicable sections of this 3-A document. Notice particularly that different filter efficiency requirements and tests apply for air to be heated (over 240° F) and for air not to be heated (under 240° F).

It is a USDA requirement that filters meeting these 3-A requirements be used on all spray drying systems, including those installed prior to development of the 3-A criteria. When noncomplying filters are noted, recommend replacement with filter systems that meet 3-A requirements.

Any filter that meets the 3-A materials and efficiency requirements is satisfactory. Where there is doubt about compliance, recommend that management obtain certification from the filter manufacturer.

F. “Absolute” Filters—General Information.

The term “absolute” is used informally to denote a class of very high efficiency filters guaranteed to remove 99.97 percent of airborne particulates of .3 micron size. Their efficiency far exceeds the 3-A cold air requirement and is such that even bacteria are removed from the filtered air.

As a general rule, when absolute filters are used, they should be located downstream of fans, radiators, etc., so that unfiltered air or other contaminants do not have a chance to enter the filtered air from leaks in the system. With the fan located upstream of the filter, any leaks in the system will permit escape of some filtered air, but the positive pressure will not allow entrance of unfiltered air. For installations which handle humid air, special frames are available (usually made of exterior grade plywood) to withstand 100 percent relative humidity conditions.

Absolute filters far exceed the minimum requirements and you should neither recommend nor discourage their use. This should be an option of management, based primarily on their evaluation of environmental conditions and history of salmonella control in the finished product. Under some conditions, use of absolute filters may be indicated.

Item D21—Dryer Air Heating System (58.220a).

When the *3-A Accepted Practices for Milk and Milk Products Spray Drying Systems, Number 607-4* took effect in November 1998, it changed the material requirements for air contact surfaces. The main change was to require stainless steel for all air contact surfaces, except for: flexible connectors in air to be heated and exhaust air contact surfaces; burners; steam and other heat transfer coils; exhaust fans; and dampers in exhaust air contact surfaces. Therefore, all fans between the main air intake and the dryer chamber shall be stainless steel. In an additional change, motors, belt drives, and bearings are not permitted in the air stream after the filters. Dryers constructed before November 1998 that meet the 3-A Accepted Practices then in effect are grandfathered.

Heating of process air for drying purposes is usually accomplished by one or more of the following methods:

A. Direct Gas Firing.

In direct gas fired dryers, precautions should be taken to assure complete combustion of the fuel (usually natural gas or propane). This is achieved by 1) maintaining proper gas pressure, 2) proper mixture with air if a premix is burned, 3) keeping all equipment components in good repair, and 4) careful adjustment of the burner. Proper combustion is indicated by flame color and tests of the combustion residue. Incomplete combustion can cause flavor and quality problems with the dried product.

B. Finned Radiators, Steam Heated.

Sometimes “waste” steam or hot water is used in these radiators to partially heat the air prior to a gas burner. Some dryers use steam to accomplish all the heating. However, the air temperature achievable by steam radiator heating is limited and this in turn affects dryer capacity and cost of operation.

C. Finned Radiators—Liquid Heating.

Since the air heating is an indirect procedure, the recirculated hot liquid may be heated by a direct fuel oil burner, there is no sanitary objection to this.

In the event of a radiator leak, there could be danger of product contamination under certain conditions. However, this can be minimized by provision of a downstream sump and alarm system or other mechanism to detect fluid leakage.

D. Direct Oil Firing.

Although utilized on dryers for many food products, direct oil firing is not considered suitable for drying dairy products, because of their delicate flavor and tendency to absorb foreign odors.

E. Indirect Heating-any Fuel.

This procedure involves the use of a heat exchanger, so that the kind of fuel has no sanitary concern. However, construction and maintenance of the heat exchanger have many sanitary aspects. The *3-A Accepted Practices for Milk and Milk Products Spray Drying Systems, Number 607-* does not have any guidance in this regard—because such heat exchangers are now rarely used. If it becomes necessary to use them because of natural gas shortage, it is likely that 3-A guidance will be developed.

F. Regeneration (Air-to-Air or Air-Liquid-Air).

Exhaust air from the dryer may be used to partially heat incoming process air by means of a heat exchanger. This heat exchanger can be air-air or air-liquid-air. If the two streams of air are separated by the heat exchanger there is no direct sanitary concern. However, the system and surrounding areas should be relatively free of fines or caked powder.

On dryers built after November 1998, the heat exchanger shall be designed so that it can be cleaned, either by recirculation or by hand cleaning. In addition, if the heat exchanger is located after the final filters, processing air contact surface requirements apply for materials and fabrication (stainless steel construction with continuous welds and accessible for cleaning).

If the two air streams are not completely separated, assign the INELIGIBLE status (category A deficiency) and notify the National Field Office.

Item D22—Drying Chamber (58.220a, 58.242, 58.246).

Show the make of the dryer on the report.

New or replacement drying systems or portions of systems replaced shall comply with *3-A Accepted Practices for Milk and Milk Products Spray Drying Systems, Number 607-* . Inspect new or remodeled spray drying equipment accordingly.

Note:

> Do not expect to find a 3-A symbol on a spray dryer. The applicable 3-A document is an “Accepted Practice” for a spray drying system; it is not a “Sanitary Standard.” The 3-A Symbol Council makes symbol authorization only when there is a 3-A equipment standard.

Special covers for footgear and clean clothing shall be worn when entering the dryer (see the guidelines for Item D29—Dryer Dry Cleaning Methods).

Periodically, arrangements shall be made to inspect the interior of all dryers for unsatisfactory conditions regarding sanitation, construction and repair.

If due to production schedules a dryer is not available for inspection during the survey, document the facts on the report. If it is not available the next survey, the highest status for the affected codes shall be APPROVED 3- MONTHS. Show the reason for the status assignment and the date of the survey the dryer was last inspected on the report. If the dryer cannot be looked at for three consecutive surveys, assign the INELIGIBLE status. We will attempt to cause as little imposition to the plants as possible by allowing the PROBATIONARY 10-DAYS status to be assigned in lieu of the INELIGIBLE status, provided they can make the equipment available within that period.

With respect to dryer sanitation, various procedures for cleaning are acceptable, depending upon the construction differences of equipment. Many drying chambers are the cone type and they are cleanable by wet methods only. For box dryers designed mainly for dry cleaning, the frequency of wet cleaning should be determined by the condition of the dryer chamber. Under normal operating conditions, dry cleaning procedures may be used satisfactorily over an extended period of time. However, when there is improper spray operation or other dryer malfunction, wet cleaning is necessary. When wet cleaning is performed, it shall be done thoroughly. Make careful inspection for caked powder due to inadequate wet cleaning.

Although main drying chambers of some dryers are routinely wet cleaned, subsequent collectors, cooling and conveying systems are often not designed to allow routine wet cleaning. It is, therefore, important to prevent splashing or movement of wet vapors into these “dry” areas during wet cleaning of the main chamber. This can be achieved with valves, shutoff plates on ducts, making a complete disconnect, by using a polyethylene liner over openings, etc.

Where a plant is drying buttermilk or whey using the same dryer and equipment as for NDM, such drying should be done following the day's production of NDM. Before returning to drying NDM, the dryer and equipment shall be thoroughly dry cleaned, including brushing of shaker bag type collectors, if used. Bag collectors using reverse pulse cleaning may require extra, repetitive pulsing to dislodge as much product as possible from the surface of the bags. Adequate measures should be taken to prevent adulteration of one product with another. This usually involves the common practice of drawing off a number of bags of NDM at the start of the run. Wet cleaning shall be done when unsatisfactory conditions (burn-on, excess fat or powder on walls, etc.) do not result in adequate dry cleaning. This procedure shall also be followed when alternating between approved products and unapproved dairy products.

If the plant is drying unapproved nondairy products, contact the National Field Office.

Special Considerations for Lactose Equipment.

1. Product contact surfaces upstream from the point where the dairy fats and solids are removed from the mother liquor shall meet the requirements for sanitary design, materials, and fabrication of dairy processing equipment as outlined in this guideline. For example, the point of dairy fat and solids separation in a lactose centrifuge occurs as the mother liquor passes through the basket screen.

2. Product contact surfaces from which liquids may drip, drain or be drawn into contact with the separated dairy fat and solids shall also meet the requirements for sanitary design and construction of dairy processing equipment as stated in item one above. This may include some surfaces downstream from the point where the dairy fats and solids are removed from the mother liquor.

3. Surfaces in contact with lactose crystals **and** from which liquids will **not** drip, drain or be drawn into the dairy by-products may be constructed using the following criteria:

   a. Equipment shall be constructed of nontoxic material meeting applicable FDA regulations. The materials shall be resistant to corrosion, pitting and flaking. The use of stainless steel is recommended but optional.

   b. A 2B mill surface finish is accepted on lactose contact surfaces made of stainless steel. Surface finishes equivalent to a number 4 finish are not required.

   c. All welds should be continuous, relatively smooth, and free of pits, folds and snags. Where necessary for functional reasons, skip welds can be used. Grinding and polishing of welds is not required.

   d. Minimum radii of internal angles of less than 135 degrees are not required. However, it is recommended that sharp corners be avoided.

   e. Bolted construction and exposed threads are acceptable on dry lactose applications.

Item D23—Second Stage Drying Equipment (58.220c).

Dryers for nonhygroscopic whey usually reduce the moisture to approximately 12% in the first stage spray drying. Then the moist powder is conveyed to a second stage drum-type dryer. The conveyor is usually belt-type and moves slowly to permit more lactose crystallization and conversion to the nonhygroscopic alpha-lactose hydrate form (by taking up one molecule of water of hydration). Use this item to cover inspection of such drying equipment. Use Item D24—Product Removal & Conveying Equip. to cover the conveyor (show NA if not present).

A. Fluid Bed.

Some redryers are the fluid bed type, whereby the partially dried product moves over a perforated plate or “bed” while hot air comes through the perforations from below. Powder movement on the bed is induced by reciprocal mechanical motion, vibration, or by air flow from angled perforations. These units are often equipped for mechanical cleaning. Inspect for sanitary construction and cleanliness, particularly of the bed plate, inspection doors, any gasketed joints, and appurtenances (any deficiencies regarding the fluid bed air supply or filters should be covered under Item D20—Dryer Air Supply).

B. Rotary Drum Dryers.

These systems shall be made of stainless steel or equally corrosion-resistant metal and constructed following the applicable principles of the *3-A Accepted Practices for Milk and Milk Products Spray Drying System, Number 607-* . Check particularly for method of attaching vanes inside the revolving drum.

The drum dryer will have a separate air filter and heating system plus equipment for removing, conveying and collecting the product. In checking these systems, follow the applicable guidelines that apply to spray drying systems and list the recommendations under the corresponding item number.

Note:

> On dryers used exclusively for lactose see "Special Considerations for Lactose Equipment" under Item D22—Drying Chamber.

Item D24—Product Removal & Conveying Equip. (58.220a, 58 221, 58.239).

Each dryer should be operated to produce the highest quality dry product consistent with the most efficient operation. The dry products shall be removed from the drying chamber continuously during the drying process.

Use this item for equipment for conveying the powder from the dryer by air, vacuum, augers, or mechanical type pusher devices. Product contact surfaces for such equipment shall be made of stainless steel, aluminum, or equally corrosion resistant material. Iron or galvanized iron product contact components shall not be used. If noted, recommend replacement. Pay particular attention for black iron ducts with stainless steel cladding on the exterior.

Small diameter pipeline fittings shall comply with the requirements of the applicable *3-A Sanitary Standards*. If the fittings are larger than 6-inches in diameter, they shall meet the general criteria of, and be accepted by, the Dairy Grading Branch. These large diameter ducts shall be made of stainless steel and have sanitary construction. Flanged joints shall form tight, pinch seals with the gaskets. Criticize crevices on the product contact surfaces created by rounded flange components. The ducts shall have sufficient joints to permit adequate cleaning and inspection of the product contact surfaces.

Inspect all ducts for cleanliness. A light, dusty condition is acceptable. If caked or wet product is observed, recommend that the entire system be wet cleaned. Ducts may be designed to be frequently cleaned with spray devices. Spray devices that are permanently installed in the ducts shall be of sanitary design. Ducts utilizing mechanical cleaning are to be properly pitched to assure complete drainage of cleaning solutions.

Point out badly dented conditions on the conveying equipment that may cause difficulty in cleaning. Recommend correction. The use of tape to seal cracks, and improperly gasketed or

misaligned joints in product or air ducts is unacceptable. When these conditions are observed, recommend repair or replacement of the pipeline junctures.

Flexible connectors shall be the smooth-sided type and shall be in good condition, clean, and free of cracks or tears. Flexible connectors that are used in the vertical position may have corrugations that have a radius of not less than ½ inch and are no deeper than their width. If cracks, tears, or holes are noted, recommend replacement. If caked or encrusted product is observed, recommend that the connectors be removed and thoroughly cleaned.

When the powder removal system utilizes cables, the pulley and cable portions that are on the dryer exterior shall be suitably enclosed. This may be accomplished with stainless steel construction, with or without detachable covers. The entire enclosure should be easily removable or should have covers or doors to allow easy access for periodic cleaning. When such protection is not provided make an appropriate recommendation.

A. Pneumatic Conveying Systems.

Pneumatic conveying systems shall comply with the *3-A Sanitary Standards for Pneumatic Conveyors for Dry Milk and Dry Milk Products, Number 39-* . Check the system air supply. The plant must be able to present letters of certification that the filters being used meet the requirements of the standards. Disassemble the rotary valve and sections of the conveying line to evaluate fabrication and sanitation. Check the system for defective gaskets and leaks where unfiltered air may be drawn into the system or where the product may be expelled into the plant environment.

Rotary fluidizing valves (star valves) used with pneumatic conveying systems shall be reviewed and accepted for use by the Dairy Grading Branch. Iron or galvanized iron product contact surfaces shall not be used. The rotary valves that have been reviewed and accepted for dry applications have been designed so that the rear, drive end plate does not have to be removed when the valve is disassembled for wet cleaning. The design may include a gasket at the juncture of the rear end plate and the valve body, or a fully welded and machined body. Therefore, for plants using the USDA accepted rotary valves it is not appropriate to recommend removal of the rear end plate for manual wet cleaning on the plant survey report.

Fans that are located within the product contact surfaces shall be made of stainless steel and have sanitary construction. Refer to *3-A Accepted Practices for Milk and Milk Products Spray Drying Systems, Number 607-* or *3-A Accepted Practices for Instantizing Systems for Dry Milk and Dry Milk Products, Number 608-* . Iron, galvanized iron, or painted iron fans are unacceptable. Recommend replacement when fans made of material other than stainless steel are used to convey human food products or fines recovered for human food. The fans shall be of a construction that will not draw unfiltered air into the product stream. Check the annular shaft openings for proper sealing.

B. Mechanical Conveyors.

When the plant survey coincides with wet washing of the dryer system which uses auger conveyors, arrange with management for dismantling of the augers to determine if the hollow interior is properly blocked off at the point where drive connections or couplings are made. When applicable, recommend proper plugging of the hollow interior. Such remodeling work should be done according to the dryer manufacturers recommendations (usually accomplished by driving in a close fitting stainless steel plug and flooding the outside surface with solder).

Mechanical conveyors shall comply with the *3-A Sanitary Standards for Mechanical Conveyors for Dry Milk and Dry Milk Products, Number 41-* check the following items:

1. Belts shall be endless (no mechanical splices) and product contact surfaces shall be made of food grade rubber or plastic materials that meet the applicable 3-A Sanitary Standard.

2. The conveyor shall be fully enclosed, including covers over the loaded portion and also around the empty return portion. Cover sections shall have hinges of sanitary construction (no piano type hinges) or be of such size that they can be easily handled.

3. Product contact surfaces except the belt shall be stainless steel or equally corrosion resistant metal under conditions of use, including pulleys, idlers, slide pans, and covers. Nonproduct contact surfaces of the frame need not be stainless, but if made of coated or painted iron, check that they are clean and free of rust or peeling paint.

4. Lubricated bearings shall be located outboard. Protection shall be provided for frame slots needed for adjustment of belt tightness. The annular space around the shaft shall also be protected to prevent the entrance of contaminants.

5. Check for sanitary construction of inlet and discharge assemblies.

6. Open cell foam rubber is not suitable for gasket material because of its sponge-like character. Gaskets shall be solid and shall meet either the *3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Number 18-* , or the *3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces in Dairy Equipment, Number 20-* .

7. Means of safe access are required to any portion of the conveyor that is not easily accessible from the floor level (adjacent catwalk and railing, movable stairway and platform, etc.).

8. If air purge seals are used, the air supply shall comply with the requirements in the *3-A Accepted Practice for Supplying Air Under Pressure in Contact with Milk, Milk Products and Product Contact Surfaces, Number 604-* except that the sanitary check valve is not required and plastic air hoses may be used instead of stainless steel.

C. Vacuum Conveyors.

Occasionally vacuum conveyors may be used to draw and send products from bulk containers to blending or packaging equipment. Check that the equipment used for this method is of sanitary design. If conveying is done by means of an unloading lance or probe that allows entrance of unfiltered air recommend the INELIGIBLE status (category A deficiency). Check that the unloading lances and probes are properly cleaned and stored in a suitable sanitary cabinet or container when not in use.

Item D25—Dryer Collectors (58.221).

Primary or main collectors for drying systems are basically of two general types: bag filters or various modifications of the centrifugal cyclone principle.

A. Cyclone Collectors.

Inspection ports or doors on cyclone type collectors should be opened for inspection of interior surfaces and any off conditions should be noted on the report. Some cyclone type collectors are set up for spray ball cleaning with solution recirculation. In such case also be sure to check for proper cleaning of the interior surfaces of the circular extension into the cyclone which takes exhaust air from the center of the cyclone.

Cyclone collectors require air lock devices to continuously remove the collected powder without loss of the vacuum inside the collector. The most common type of air locks are rotary star valves (see the guidelines for Item D24—Product Removal & Conveying Equip., paragraph A) or double acting flapper valves. When inspection is made after a wet cleanup of the equipment, be sure to inspect these units for condition and sanitation.

B. Bag Houses.

Bag houses, whether separate or integral to the dryer shall meet the *3-A Sanitary Standards for Bag Collectors for Dry milk and Dry Milk Products, Number 40- .*

Use a large floodlight for inspecting interior surfaces of the bag house. Be sure to check for cracks, especially in the vicinity of any vibrating devices. When cracks are noted, recommend welding and smooth finishing of the repaired areas. Many welds might indicate metal fatigue that would make successful repair difficult. In such instance, recommend the entire stainless steel section be replaced.

Some bag houses clean the bags by air reversal during operation from a timed sequence programmer. There shall be access to allow inspection of the interior of the air manifold. All welds shall be continuous but do not need to be polished and a filter shall be provided as close as practical to the manifold. Also, open the inspection port or doorway and check the condition of bags from the outside. It is not necessary to have bags removed for additional inspection.

The interior of the bags, such as used on Rogers or Walker dryers should be inspected periodically with a flashlight to determine if the bags are being brush cleaned properly and if bags are in good condition.

C. Wet Collectors.

Any new or replacement wet collectors that save the fines for use as human food shall meet the *3-A Sanitary Standards for Wet Collectors for Dry Milk and Dry Milk Products, Number 43- .*

Some wet collectors are used to remove fines from dryer exhaust air for recovery as human food. These wet collectors spray recirculated fluid product through the escaping exhaust air. To control bacteria, the fluid product is kept hot by recirculation through a heater. Nevertheless, bacterial development can be a serious problem in the foam, or in the fluid if thermophilic bacteria are established during long runs, or if sanitation is poor. Inspect such units carefully for condition and sanitation, including the collector and sump surfaces, the level control, spray pipes, heater, recirculating pump, and related pipes and valves. Also check that the exhaust stack is covered during shutdown periods. This is usually performed manually (stairway access to the rooftop is usually provided from the top of the drying cone or the wet collector).

Other collectors also use fluid product to collect the fines by mixing a liquid spray with the exhaust air in a specially constructed duct just ahead of the collector, by wetting all interior surfaces of the collector, and by a final spray through the air being exhausted from the stack. The liquid is usually at about 110° F, but is not recirculated; after a single pass, it is piped to the pasteurizer preheater prior to the evaporator. The exhaust stack is equipped with a sanitary cover that closes automatically when the unit is shut down. Cleaning of the collector is accomplished through the special sprays and jets which wet the interior surfaces during regular operation. Inspect all product contact surfaces carefully for condition and sanitation, including the stainless steel fan located ahead of the venturi section.

During recent years, some additional wet type collectors have been developed and are installed in dairy operations. Manufacturers of this equipment have consulted with USDA about materials and fabrication for the initial installations. Further review during actual operations is necessary to determine cleaning and operating performance. Contact the National Field Director for guidance when you encounter wet collectors that are being operated for the human food recovery of product fines.

Collectors for human food, regardless of type, shall be located in a suitable room or area within the plant. See Item D43—Waste Products Handling for inspection guidance for collectors that recover product for animal feed or other than human consumption.

Item D26—Dryer Exhaust System (58.220a).

The *3-A Accepted Practices for Milk and Milk Products Spray Drying Systems, Number 607-* requires a self-closing head to be installed at the terminal end of all exhaust-to-atmosphere ducts or stacks for process air. Some dryers have two or more exhaust stacks. This self-

closing cover requirement also applies to such separate exhaust ducts from collectors, including either cyclone or bag type.

Means of access should be provided to the self-closing covers to permit the periodic cleaning and maintenance needed for their proper operation. The roof area around the exhaust stack(s) should also be inspected and any unsatisfactory conditions noted on the report. Roof areas near the exhaust stack should be self-draining. Sloped cleanable roofs should be recommended for new construction and when there is excessive pooling of water coupled with dirty conditions from stack loss at existing dryer installations.

To meet pollution control requirements, management may install devices in the plant or on the roof top to reduce noise or product loss in the exhaust air. If such devices are causing sanitation, bad odor, insect, or dust control problems with the drying operation, report the conditions fully for follow-up by the National Field Director.

Note:

> Open roof top location is not satisfactory for collection systems that recover the product for human consumption.

If the dryer exhaust system has an animal feed collector, either the wet or dry type, see Item D43—Waste Products Handling.

Item D27—Powder Cooling System (58.220a, 58.222).

Cooling of dry finished products in most systems is accomplished by metering the hot product into a stream of moving cold air. The mixture is then separated in a cyclone separator and powder is discharged through an air lock device. Exhaust air from the cyclone may contain some fines and is often returned to the drying chamber or primary collector. Air movement through the cooling system on modern units is induced by a sanitary stainless steel fan located separately from the cyclone that delivers the exhaust air back to the drying system. Many older cooling systems, however, have fans mounted vertically as an integral part of the cyclone collector. Because of their weight and location, such fans are extremely difficult to dismantle for cleaning. When drying systems are replaced or when major remodeling takes place, encourage provision of a separate sanitary stainless steel fan.

Since the cooling system handles only dry product, the related piping, cyclone, and fan usually do not require frequent cleaning. When the rest of the dryer system is wet washed, there should be segregation of the cooling components to protect them from water splashing and humid air. This can be accomplished by making a physical break at the point where powder is picked up and where exhaust air and fines are returned to the system. Another alternative is to cover the open ends of such pipes with polyethylene or to have them suitably plugged by other means. Except for checking that these precautions are followed, there should be no need for checking interior surfaces of the powder cooling system (more detailed inspection of powder cooling systems may be indicated on plant survey follow-ups made in connection with salmonella problems).

To improve efficiency of a powder cooling system, sometimes provision is made for cooling the air by water or mechanical refrigeration before the powder pickup point. Most of these air cooling units have coil and fin type construction and may be very difficult to clean. Remove the inlet air filter and check the exposed surfaces of the fins and if possible also check the downstream side of the fins. If not clean, try to determine why (an inefficient air filter, filter not properly gasketed, unfiltered air leaks into the system, powder conveyed backwards by air currents during shutdowns, etc.). Recommend corrections as may be applicable.

If there are deficiencies with the air inlet filter, recommend changes to comply with the requirements of 3-A Accepted Practice.

As an alternative to mechanical refrigeration of the air, some new dryer systems employ two-stage cyclone cooling using unrefrigerated room air or air directly from the outdoors. These two-stage systems will reduce the product temperature much closer to the ambient temperature so that satisfactory powder cooling performance below 110° F may often be achieved without refrigeration (depends greatly on the climate in the area).

Some special dry products are cooled with jacketed equipment. This is satisfactory when it is properly constructed and when operated to prevent moisture condensation on product contact surfaces. If air is <u>not</u> used for cooling the product, describe the cooling system and, if necessary, call the National Field Director for inspection guidance.

Item D28—Storage Bins & Conveyors (58.226, 58.246).

Storage bins shall be constructed with welded seams from stainless steel, aluminum or other equally corrosion resistant material. The interior surface shall be relatively smooth and easily cleanable. Unpolished 2B mill finish that is free of defects is satisfactory. Seam welds shall be polished to be at least a number 4 finish. Although frequent cleaning is usually not necessary if the storage bin is kept closed and dry, all product contact surfaces shall be easily accessible for cleaning, or there shall be satisfactory provisions for mechanical cleaning.

A storage bin is usually equipped with a top vent to allow air to escape and enter during the filling and emptying operations. Such vent openings shall be equipped with a suitable filter. The filter has a dual purpose, to prevent escape of product dust, and to filter air entering the bin. Usually, these functions are best handled by filter sock or special filter cartridge units. Filter media that meets the materials and efficiency criteria of the 3-A Accepted Practices for Spray Drying System may be encouraged, but failure to provide complying filters should not be considered a deficiency (the scope of 3-A Accepted Practice for Spray Drying Systems terminates at the point the final product enters either the packaging systems or storage for further processing).

Use this Item for any conveyors for transporting product out of the bin to the packaging equipment. See the guidelines for Item D24—Product Removal & Conveying Equip

Item D29—Dryer Dry Cleaning Methods (58.225, 58.246).

If possible during the survey, check personnel practices and procedures for dry cleaning the dryer. Areas to observe include the following:

1. Proper footgear and clothing shall be used in the dryer.

2. Personnel shall not walk on floor surfaces outside the dryer with this special footwear.

3. Proper tools and brushes shall be used and they shall be properly stored when not in use.

4. Check the effectiveness of the dry cleaning.

5. If the product collected by dry brushing is off-quality, it should not be mixed with the regular production, but should be packaged separately for appropriate disposition.

In applicable box type dryers, special boots or shoe covers shall be used for entering the drying chamber. The plant should provide sufficient number of rubber or plastic boots, or disposable shoe covers so that clean, sanitized footwear will always be available when entering the dryer chamber is necessary. The clean boots shall only be used for this purpose and shall be stored in a special cabinet. Recommend that boots be of a distinctive color (preferably yellow or white) so that use of the boots can be easily monitored by plant supervisors. Using cloth shoe covers is also satisfactory if they are cleaned and sanitized after each use and the plant maintains clean cloth boots available at all times. When these are found not clean make appropriate recommendations.

Special clean clothing shall be provided when the dryer is entered for dry cleaning. Miscellaneous equipment (brushes, brooms, etc.) shall be maintained in a clean and sanitary condition and, when not in use, shall be stored in a suitable metal cabinet, preferably constructed of stainless steel. The inside of the cabinet should provide a place to hang brushes, scrapers, and vacuuming tools. In addition, shelves are necessary for storing special footgear. A sanitary step should also be provided for changing into clean footgear before entering the dryer. Brushes used in the dryer should have stainless steel or plastic handles and bristles should be encased in rubber or plastic heads. Hand tools, such as scrapers, brushes, squeegees, shovels, etc., should also be of sanitary construction. The use of this clothing, footgear and equipment shall be restricted to interior dryer work.

Item D30—Vacuum Cleaner (58.230).

Each dry milk plant shall have a heavy duty industrial vacuum cleaner. The vacuum cleaner can be either the portable or stationary central type. The material removed from the collectors of the vacuum system shall be properly disposed of to destroy any insects or salmonella organisms that might be present (use of tied plastic bags or other tight containers to handle such waste is satisfactory). Emptying and cleaning of portable type vacuum cleaners shall not be done in the dryer or packaging rooms.

A central vacuum system, properly engineered and installed, has some advantages over the individual portable vacuum cleaner. Vacuum plug-in stations may be placed at various convenient locations to allow improved housekeeping and easy cleaning of hard-to-reach areas. When a central vacuum system is used, the exhaust air for the vacuum pump shall be directed outside the plant and not near any air intake to the plant. Check this air exhaust area, and when found unsatisfactory, make appropriate recommendations. The central type system should preferably be located in a separate room with a separate entrance from the outdoors to keep personnel traffic to a minimum. Material collected should be considered as “Salmonella suspect” and be handled accordingly. Personnel traffic into the room should be restricted. The room should also have a separate exhaust fan to prevent dust spreading from the room during emptying of the collector units.

Item D31—Housekeeping (58.126e, 58.127f, 58.146d).

See the guidelines for Item A7—Housekeeping.

Proper housekeeping and dermestid insect control is enhanced with frequent use of the heavy duty vacuum cleaner. Special attention should be given to ducts, switch boxes, conduit boxes, motors, conveyors, cabinets, pipes, lights and tops of beams and supports.

Packaging

Item D34—Room Construction (58.126, 58.211).

See the guidelines for Item A1—Room Construction.

A separate room or area shall be provided for filling containers and construction shall be in accordance with §58.126 (i.e., a processing room or equivalent). Generally a separate room is required. A separate area may suffice for low volume drying operations or for dry products which are not very dusty. However, if packaging in an unenclosed area is causing dust drift and housekeeping problems in other parts of the plant, recommend provision of an enclosed packaging room.

The number of electrical switch boxes in this area should be kept to a minimum. Control panels shall be 1) mounted a sufficient distance from the walls to facilitate cleaning, 2) satisfactorily sealed to the wall, or 3) mounted in the wall and provided with tight fitting removable or hinged covers to facilitate cleaning.

Only packaging materials that can be used within a day's operations should be kept in the packaging area. These materials shall be kept on tables or metal racks at least six inches off the floor. Unnecessary fixtures, equipment, or false areas which may collect dust and harbor insects, should not be allowed in the packaging room.

Properly trapped floor drains shall be provided and the floors shall be pitched to the drain points. While the dry products packaging areas may not require regular or frequent wet cleaning, floor drains are required for times when wet cleaning will be necessary. Because of their infrequent use, floor drains should be equipped with a removable cap or a seal. Alternately, the trap can be filled with a nonevaporating liquid. Open drains shall not be located in the vicinity of air intakes for processing or conveying air.

Item D35—Lighting & Ventilation (58.126d, e, 58.211).

See the guidelines for Item A2—Lighting & Ventilation.

Item D36—Dust Control (58.211, 58.230).

An adequate exhaust system shall be provided to minimize the accumulation of product dust within the packaging room, and where needed, a dust collector shall be provided and properly maintained to keep roofs and outside areas free of dry product. This can usually be best accomplished with an exhaust system which maintains negative pressure in the packaging room. This will prevent dust from drifting into processing room or warehouse, thereby minimizing housekeeping, insect and bacterial problems. Vertical duct work in exhaust systems is desirable to allow cleaning and inspection. Rectangular or square shaped ducts which are mounted horizontally should either be sealed on both surfaces against the ceiling or wall, whichever is applicable, or be mounted to allow access for periodic cleaning of the ledge on top.

The room exhaust system may optionally be provided with a filter or dust collector to minimize product loss at the exhaust outlet. There are some drawbacks to filtration of the room exhaust air. The amount of dust may plug up conventional filters. More elaborate dust collection systems may require considerable maintenance, cleaning, and surveillance for dermestid insect control.

A few companies hold the view that the food packaging room should be pressurized with fresh filtered air. Occasionally therefore, you may find a packaging room with static air flow condition or a very slight positive pressure. This is satisfactory provided there is no evidence of dust drifting from the packaging room into processing areas or warehouse. When dust drift is found, recommend that the plant make corrections or provide negative pressure conditions in the packaging room.

Item D37—Sifter (58.224, 58.246).

When new sifters are installed, they shall meet requirements of the *3-A Standards for Sifters for Dry Milk and Dry Milk Products, Number 26-* . In the production of nonfat dry milk and dry whole milk, it is customary industry practice, and a USDA requirement, that the product be sifted at some suitable point between the dryer and the final package.

Recommendations for screen mesh size to be used for various dairy products are outlined in Appendix H of the 3-A Sanitary Standard. Although stainless steel woven mesh is most commonly used, the 3-A Sanitary Standards also provide for optional use of cotton, linen, silk or synthetic fibers for screening surfaces.

Routine cleaning of the sifter by dry brushing or vacuuming is a satisfactory practice. When inspecting the sifter, also check for proper gasketing, screen breaks, condition of balls and ball trays, etc. Wet cleaning should be performed when needed. Frequency will depend somewhat on product sifted, humidity conditions in the room, etc. After thorough washing, all parts should be rinsed with hot water and allowed to air dry before reassembly.

In most cases oversize “screenings” or “tailings” shall be promptly and continuously discharged from the sifter. If such removal is prevented or impeded by restricting baffles, vibratory action, or other design considerations, make recommendation for correction. The tailings material is usually collected into a container below the oversize spout of the sifter. It is important that there is a tight connection between the spout and the container receiving such material to prevent any possibility of a back-draft drawing unfiltered air or foreign particles into the sifter (such back-draft may be induced by air leakage through the airlock device under a cyclonic collector which feeds the sifter). The container shall be emptied daily and maintained in a sanitary condition. A separate clean washable container would be satisfactory, or a bag (or poly liner) may be clamped or tied to the sifter oversize spout. The bag would be discharged along with the tailings material and be replaced with a clean bag. Floor sweepings from powder spillage or cleanup should not be placed into this container. The tailings container for dry milk or NDM operations should be marked “Not for use as human food” or otherwise clearly marked to distinguish it from human food containers (see the guidelines for Item D43—Waste Products Handling).

As a general rule, sifter “screenings” or “tailings” are considered as waste powder and should not be used for human food. There are exceptions to this practice, depending on the equipment or the manufacture of certain products. For instance, particle sizing operations in manufacture of instant NDM, dry whey manufacture by spray process, etc., whereby sifter oversize material is routed to sizing rolls, hammer mill, reprocessing, etc., for eventual human food use. In the case of filtermat dryers, the oversize material may be returned to the main drying chamber, provided unfiltered air is not admitted, and the process is handled in a sanitary manor.

There is no objection to such human food use, provided that the oversize food particles are not excessively scorched, “off grade,” unwholesome, or mixed with other extraneous material obtained from the screening process. In case of doubt about proper disposition of screenings from special food products, examine the process, the intent of the screening procedure, the condition and appearance of the screenings, and also review the company surveillance and testing of the screenings. When necessary, call the National Field Director for guidance.

In the production of dry whey, it is usual practice to install a hammer mill prior to the sifter. When the hammer mill is equipped with a fine screen (actually a perforated plate), all the resulting whey particles will pass through a subsequent sifter screen with no “overs.” Under these circumstances, a sifter would serve no useful purpose and may be omitted.

Accordingly, if a dry whey hammer mill has a screen or perforated plate with holes equivalent to 20 mesh (.033 inch diameter holes), provision of a downstream sifter should be considered as an option to be decided by management.

Hammer mill screens are usually stamped with hole diameter or “mesh size.” The Fitzpatrick mill screens for instance, are stamped at one end with eight digits. The first four concern the model number and may be disregarded. The last four digits denote mesh size as follows:

0016 indicates 16 mesh
0020 indicates 20 mesh
0024 indicates 24 mesh

As with sifters, proper performance of hammer mills requires good condition screens which are properly seated so there can be no passage of oversize product. These points should be checked during surveys when practical.

This same principle of using a hammer mill in lieu of a sifter is applicable to all roller dried products. It may also be applicable for certain other spray dried products. In such instances where the manager wishes to operate without a sifter, gather all relevant information and telephone the National Field Director for guidance.

Item D38—Bag Filler & Scale (58.128m, 58.229).

Check that filling equipment is of sanitary construction with all parts accessible for cleaning. New or replacement equipment shall comply with *3-A Sanitary Standards for Equipment for Packaging Dry Milk and Dry Milk Products, Number 27- .*

The design of many filling systems includes a pressure relief air displacement pipeline from the filler head of the packaging unit. This pipeline is sometimes connected back to a section of the drying system which is under negative pressure (such as a cyclonic collector, or pneumatic powder conveying line). Under these conditions, unfiltered air from the packaging room may be drawn into the drying system whenever containers are being changed at the filler heads. Such admittance of unfiltered air into the drying system is unsatisfactory. Recommend correction. Following are some alternatives for correcting the problem which may be suggested to management:

1. Valves and mechanical actuating linkage can be provided to automatically shut off flow in the vent line from an individual filler head during periods when a container is <u>not</u> clamped in place.

2. For <u>small</u> capacity dryers, it may be possible to simply remove the pipeline and to install a filter or small cloth sock on the vent at the filler head for air displacement as the container is being filled.

3. The vent pipeline may be connected to the suction side of the dryer fan which exhausts directly to atmosphere. A throttle valve may be necessary in the pipeline to regulate the vacuum and prevent excess powder from being drawn out. When this method is used, the pipeline should be in sections with removable fittings to allow dismantling for periodic cleaning.

4. The vent pipeline may be connected to a central vacuum system (dust collector) or to a small portable vacuum unit that exhausts outdoors (product so recovered is not suitable for human food).

Sintered material, used as deaerating probes, can be either plastic or stainless steel (with stainless steel the most common). This material is formed under high temperatures and pressures. This process produces a porous material that is used to draw the excess air out of the powdered milk bag after filling. Because of the nature of this material, these probes cannot be adequately cleaned. Therefore, it is a USDA and a 3-A requirement that the probes be kept dry and that they are discarded after they become plugged. This does not preclude the practice of removing the probes temporarily and then reinstalling them into the packaging machine (for example, the plant may have a separate set of probes for each product). If you find a situation where a plant is attempting to wash and then reuse the probes, assign the deficiency to category B.

If the plant has more than one set of probes, or, if the probes are reinstalled after wet washing the packaging machine, check that the extra set(s) are handled and stored as outlined in Appendix I in the *3-A Sanitary Standards for Equipment for Packaging Dry Milk and Dry Milk Products, Number 27-*.

Appendix I recommends that prior to handling the probes, hands should be washed, sanitized, and dried. In addition, clean, disposable, sanitary gloves should be worn. The probes should be stored inside a gasketed, stainless steel cabinet that has a rack or shelves. Alternately, the

probes can be stored inside a cleanable or single use container (see Appendix I for more information). This guidance is provided because the probes will be reinstalled throughout their service life without being washed or sanitized. Therefore, it is imperative that they are protected from contamination while removed from the machine.

During the survey, check that the storage cabinet or container is sealed and located in the packaging room or other processing area. Acceptability of the storage conditions will depend on whether the probes are protected from contamination. If conditions exist where the probes can become contaminated (but contamination has not been observed), assign the deficiency to category C. For example, the probes can be stored on a rack or shelf, in the packaging room, sealed inside a plastic bag. However, if the plastic is torn there is a chance the probes will become contaminated, therefore, assign this deficiency to category C. If the probes have become contaminated recommend that the probes be properly disposed of and assign the deficiency to category B. Category A is appropriate only if contaminated probes are put back into use. Assigning deficiencies to category D is appropriate only for very minor items, such as storing gaskets or other parts in a cabinet where probes are also stored (if the probes were sealed inside another container, such as a plastic bag, no comment would be required as this is an acceptable alternative).

Also check the cleanliness and condition of the weighing equipment.

Item D39—Portable Bin Filling Equipment (58.229).

Equipment for filling portable bins may vary considerably, from simple Y-type chutes to large screw conveyor arrangements for filling three to ten bins. Use this item to cover inspection of this equipment, flexible connectors, and filling attachments. If screw type conveyors are used, follow the applicable guidelines of Item D24—Product Removal & Conveying Equip.

Filling equipment for woven fabric sacks (e.g., super saks) shall meet the requirements the *USDA Equipment Guidelines* (see the guidelines for Item A3—Pumps, Pipelines, & Valves).

Item D40—Portable Bulk Bins (58.226).

When portable bulk bins are used for handling finished product, use this item to report on their condition and sanitation. For the item heading, insert the commonly used trade name (for instance, Tote, Delcon, Invert-A-Bins, etc.).

Portable bulk bins shall conform to the *3-A Sanitary Standards for Portable Bins for Dry Milk and Milk Products, Number 34-* . The standards provide for the use of either stainless steel or aluminum for product contact surfaces (it is common industry practice to utilize the aluminum option). An amendment to this standard allows unpolished welds in aluminum product contact surfaces, therefore <u>do not</u> criticize unpolished interior product contact surface welds of aluminum bulk bins unless the welds exhibit cracks, pits or voids.

Inspect a sufficient number of empty bins to make an evaluation of those in use at the plant. This random inspection normally may be limited to bins which are easily available during the

survey. Those examined will be considered representative of bins in service. Check for cleanliness on both inside and outside surfaces. A thin film of dry dust film on interior surfaces should not be criticized. However, caked or encrusted dry product should be criticized. Inspect ports, doors, latches, and gaskets for condition and product leaks. Show the number of bins inspected on the report together with the number found unsatisfactory and a brief description of unsatisfactory conditions. Make a recommendation for correction when applicable.

Also, observe the exterior condition of filled bins for cleanliness and freedom from leaks. Use of tape, towels, rags, etc. to prevent product leaks is a serious deficiency because it is not a sanitary practice and because such material might get into the product during subsequent dumping of the container. Recommend that such faulty bins be removed from service immediately for necessary repairs. (Tote Systems Inc. has developed a “blade seal door” to provide improved sealing against leaks, this door is now standard on new totes and is also offered in a special kit for field installation on older totes). If the inspection of portable bulk bins reveals routine use of tape, paper towels, rags, etc., to prevent product leakage from faulty doors or gaskets, assign this deficiency to category C.

Note:

> Do not criticize the use of shrink wrap if it is used to protect the door and gasket and if it is replaced each time the tote is filled.

Successful use of portable bulk bins for dry products requires a regular well-organized program of inspection, cleaning, gasket replacement, and maintenance. This in turn requires establishment by management of definite policies about cleaning and inspection frequency, assignment of responsibilities for the work, provision of adequate cleaning and maintenance facilities, setting up a record or tag system, etc. Recommend that such programs be set up when the condition or sanitation of bins is substandard.

Collapsible type bins are not covered by the 3-A Sanitary Standards, instead they shall comply with the *USDA Equipment Guidelines*. If super saks or reusable cardboard bulk containers are used, observe how the empty containers and liners are handled and stored. The empty containers and liners shall be handled in a sanitary manner.

Item D41—Product Packaging Temp. _____ ° F (58.240).

If the dryer(s) is operating during the survey, check the temperature of the finished product in a newly filled container (except lactose, which has no temperature requirements). Show the temperature in the space provided.

If the dryer is not operating during the survey, show a dash for this item to indicate “Not checked.” However, if the previous report showed unsatisfactory product packaging temperature and no equipment correction was made, repeat the recommendation on the current report, with a notation that it is based on cooling performance observed at the previous survey.

When powder is temporarily stored in nonportable storage bins prior to packaging in bags, drums, totes, etc. it is not necessary to check the temperature of product in the bin. Heat loss from such stationary bulk bins is quite slow. If powder was too hot upon entering the bin, it will likely still be too hot at the time of final packaging. Check product temperature in the final container just after packaging from the bin and follow the same guidelines outlined for portable-type bins.

A. Packaging into 25 kg, 50 lb. or 100 lb. Bags, 240 lb. Fibre Drums, etc.

In all instances where the packaging temperature exceeds 110° F, powder cooling performance is unsatisfactory, improved cooling shall be recommended, and the deficiency discussed with management.

Product temperature in the range 111—125° F shall be considered a category C deficiency.

Product temperatures in the range 126—140° F shall be considered a category B deficiency. The plant manager shall be advised that better cooling performance will be necessary for continuation of plant approval. If the next quarterly survey again reveals packaging temperature in the 126—140° F range, and no changes are underway or ordered for upgrading the powder cooling system, the INELIGIBLE status shall be assigned (category A deficiency).

Product temperatures over 140° F shall be considered a category A deficiency and the basis for the immediate assignment of the INELIGIBLE status.

B. Product Storage in Totes, Super Sacks, and Other Bulk Bins.

When product is packaged into portable bulk bins or is temporarily stored in stationary bulk bins (more than overnight), cooling of product to approximately 90° F is encouraged because of the much slower rate of heat dissipation from such containers. §58.240 requires that "if the product is to be held in a bulk bin, the temperature should be reduced to approximately 90° F, but shall be not more than 110° F."

Cooling to 95° F or below will be considered satisfactory conformance with the "approximately 90° F" recommended nonmandatory provision of §58.240. However, in all instances where the packaging temperature exceeds 95° F, the cooling performance shall be checked unsatisfactory and a recommendation shown on the survey report.

Product temperatures in the 95—110° F range shall be considered a category D deficiency.

Product temperatures in the 111—120° F range shall be considered a category C deficiency.

Product temperatures in the range 121—130° F shall be considered a category B deficiency and the inspector should stress the importance of proper powder cooling to reduce the likelihood of heat caking (lumping) and adverse effect on product flavor and storability. The manager shall be advised that better cooling performance will be necessary for continuation of plant approval. If the next survey again reveals packaging temperatures in the 121—130° F

range, and no changes are underway or ordered for upgrading the powder cooling system, this shall be considered a category A deficiency and the INELIGIBLE status shall be assigned.

Packaging temperatures more than 130° F shall be considered a category A deficiency and the basis for immediate assignment of the INELIGIBLE status.

C. Factors Affecting Powder Cooling.

When cooling is unsatisfactory, make recommendation for improvement and also discuss with management the possible alternatives for achieving better cooling. The following factors are important in systems which cool product by air:

1. Air lock to meter the hot product into the stream of cooling air (the air lock device prevents admittance of hot air from the dryer into the cooling system).

2. Good condition air lock under cooling cyclones (a leaky air lock will reduce the volume of cooling air drawn through the system).

3. Sufficient air inlet filters (kept clean) to avoid undue air resistance.

4. Enough air moved through the unit to cool the powder at the rate produced. This is a basic engineering consideration. Sometimes a booster fan for cold air will dramatically improve cooling performance.

5. Temperature of air used for cooling (if management proposes to cool the air prior to introduction of the hot powder, point out the access and cleaning problems with conventional fin-type heat exchangers, these matters should be considered in the development of such equipment).

6. A two-stage cyclonic cooling system using air at ambient temperature is an alternative to providing refrigerated air for a one-stage cooling system which does not cool the product sufficiently.

Discuss these points with management but do not include them in the recommendation for improved product cooling. Keep it simple, for instance: “Reduce NDM packaging temperature to 110° F or below, currently 115° F (C).”

Item D42—Packaging Workmanship (58.241a, b).

In checking packaging technique, observations should be made during actual packing operations. If not operating during the survey, arrange for opening a few bags of packaged powder for checking (when the survey includes sampling for Salmonella tests under Instruction DA 918—I, check packaging details on containers selected for sampling). Points to check include neatness of markings, powder on outside of bags and between liners, powder spilled on scale, protection of empty containers, tying of polyliners, sewing and sealing of bags, and handling of filled bags in the packaging room.

If container net weight is adjusted by supplementary hand filling, check to see that the “makeup” powder is stored in a clean covered container. A clean metal or acceptable plastic scoop should be used for this hand filling. Sewing machines should not be located directly over open containers of product.

When packaging is into portable bulk bins (tote bins, etc.) check that any spilled powder on top of the bin is satisfactorily removed by brushing or vacuuming after the top cover is applied. Vacuuming is the preferred way to clean exterior surfaces of such bins.

Item D43—Waste Products Handling (58.127f).

All waste powder (first product through a system, sifter tailings, dust collector bag bushings, etc.) shall be adequately packaged, clearly identified as animal feed or waste, and stored separately in the warehouse. Waste powder collection containers should also be clearly identified as animal feed or waste prior to filling.

A. Animal Feed (dry products).

When the dryer has an animal feed collector that does not meet the usual criteria for sanitary construction, sanitation, or location, check for the following points (see paragraph B for guidance where a plant has an ongoing animal feed or pet food production operation within the same plant as the human food operation):

1. Whether located within the plant or outdoors, the methods for collecting and handling the animal feed shall not constitute an insect, odor, or sanitation problem that would be inconsistent with the human food operation.

2. The animal feed shall be packaged with separate equipment into properly identified containers and be stored separate from human food. Storage in a separate area of the same warehouse may be considered satisfactory. If a plant is using the same equipment for human food quality and animal feed quality products recommend the INELIGIBLE status (category A deficiency).

B. Animal Feed (fluid products).

If the animal feed collector device uses water to “scrub” the air and collect the fines, means shall be provided for preventing back-flow of air through the device to the human food part of the dryer system during shutdown periods. Such back-flow prevention will also protect the dry parts of the dryer system from splashing or wet vapors when the animal feed wet collector is cleaned. Such segregation of the collector may be accomplished by disconnecting the duct during shutdown or by providing a suitable valve or shutoff device for the duct (the valve or shutoff device would not have to be sanitary type if suitably located downstream from the final human food collector in the drying system).

The storage area for fluid products, whether outside or inside, shall be maintained in a satisfactory condition. When the storage area is located outside a concrete slab, drain, and a

water hose shall be provided to allow for cleaning and rinsing of the area. The storage tank(s) need not be sanitary, but leaky conditions noted in the tank, valve or load-out hose should be criticized. Necessary precautions shall be taken to minimize flies, insects, and development of objectionable odors. Inspect the exterior of the tank(s) and entire load-out area and, when applicable, make appropriate recommendations for correction.

C. Pet Food.

Use this item when a plant has an ongoing operation that uses human quality food that is disposed of as animal feed or pet food. All animal feed or pet food products shall be clearly labeled and stored separate from human food products. Storage in a separate area of the same warehouse may be considered acceptable, provided that satisfactory handling practices, housekeeping and inventory control procedures are demonstrated.

There is no objection to labeling and selling products for animal feed if it is of human food quality provided that all facilities, equipment, and processing procedures meet human food standards and requirements. This is a fairly common industry practice when there is little price spread for these utilizations.

On the other hand, it is not satisfactory for animal feed quality fluid products to be processed with human food equipment. Nor is it satisfactory to make animal feed employing substandard sanitation practices on human food equipment. Either of these conditions would be incompatible with USDA approval of a human food operation using the same equipment. If either condition is noted, the INELIGIBLE plant status shall apply (category A deficiency).

Item D44—Housekeeping (58.126e, 58.127f, 58.146d, 58.211).

See the guidelines for Item A7—Housekeeping.

Encourage the practice of storing only a day's supply of packaging supplies in the room on tables or metal racks at least six inches off the floor. Also check that the room is free of unnecessary fixtures, equipment, or false areas which may collect dust and harbor insects.

Item D45—Tote to Bag Packaging (58.241c).

When applicable, use this item and heading to cover bulk dumping equipment used to repackaging product from portable bulk bins into bags.

Check for compliance with requirements of §58.241c. Also check that repackaging is done in a suitable room or separate area to protect the product and to prevent spread of powder dust around the plant. Recommend relocation or enclosure of the operation when applicable.

As with other NDM packaging equipment, routine dry brushing or vacuuming is a satisfactory practice.

When portable bulk bins are used, check that they are cleaned before they are attached to the dump mechanism. In addition, the exterior surfaces of the unloading door shall be vacuum-brushed. A portable vacuum cleaner system can be used to do this or, preferably, a stationary industrial type vacuum cleaner with dedicated piping and hoses. The connections between the tote and the dump hopper shall be dust tight, sanitary, and shall protect the product from any dirt or foreign material that may fall from the exterior of the bin during the unloading process.

The bulk container unloading hopper shall be covered or sealed when not in use. Covers shall be of sanitary design and shall be properly stored when not in use. Inspect gaskets, level controls, and other parts for design and condition.

Super saks shall meet the above requirements and, in addition shall have a plastic liner. Debris from the exterior of the super sak shall be excluded at all times from the dump hopper. This can be accomplished by using a tight connection between the interior of the neck of the liner and the exterior of the dump hopper feed tube. Also, observe how the empty containers and liners are handled and stored before they are returned to the originating plant or disposed of. The empty containers shall be handled in a sanitary manner. They are to be neatly stacked, be clean and relatively dust free. They shall not contribute to poor housekeeping, poor dust control, or be a potential area for rodent or insect pest harborage. If the plant is dumping super saks that do not utilize a liner, assign the deficiency to category D. If the dumping is not done in a sanitary manner, assign the deficiency to category B. If contamination of the product is observed, assign the deficiency to category A.

Product Storage

Item D46—Room Construction - Warehouse (58.126, 58.153, 58.210, 58.241d).

See the guidelines for Item B53—Room Construction - Warehouse.

When the warehouse area is adjacent to or directly connected to the drying or packaging rooms, check for excessive powder drift. If the area is dusty, make an appropriate recommendation to correct the condition and to prevent further drift (also see Item D36—Dust Control).

Item D47—Lighting & Ventilation (58.126d, e).

See the guidelines for Item B54—Lighting & Ventilation.

Lighting shall be at least 5 F/C. If official sampling is performed in the warehouse, the sampling area shall have a minimum of 50 F/C.

Item D48—Housekeeping (58.126e, 58.127f, 58.146d, 58.241d).

Product in bags shall be placed on pallets or on racks elevated approximately 4 inches from the floor. It shall be stored in aisles, rows, or sections, approximately 18 inches from any wall, and in such manner as to allow easy access for inspection, cleaning, and spraying of the room perimeter.

Care should be taken in the storing of any other product foreign to dairy products, to prevent any damage to the dairy product from mold, absorbed odors, or insect infestation. Animal feed products shall be stored in an area apart from human food products to prevent contamination, insect infestation or mistaken use.

Check that packaging supplies, such as empty bags, are stored on pallets or racks up off the floor in an orderly manner for accessibility and cleaning of the room. It is preferable that the supplies be stored in an area separate from dry products. Check that packaging supplies are kept enclosed in their original wrappers or boxes until used. After removal of supplies from original containers, they shall be kept in an enclosed metal cabinet, bins, or on shelving and if not enclosed, shall be protected from powder and dust or other contamination.

General Items

See the guidelines for Page A — General Items

Page D. Inspection of Dry Products—Roller Process. (Form DA - 151 - 4)

Processing & Condensing

Items D1 to D13.

Follow the same guidelines as outlined for spray process drying operations.

Although the product is heated extensively in the roller drying process, this cannot serve as pasteurization. For USDA plant approval, the dairy product must be pasteurized with approved and sealed “3-A” HTST equipment or by the vat method.

When the product is condensed prior to roller drying, follow the spray process guidelines for these items. If there is no precondensing, show NA for these items.

Cooling and crystallization of condensed products is seldom employed prior to roller drying: show NA for these items.

Drying

Show the word “Roller” on the report page just above the “Drying” subheading.

Items D15 to D31.

The source of the air supply used in the dryer room shall be free from objectionable odors, smoke, dust, or dirt and shall be filtered before coming into contact with product. Because of the nature of the drying process, all of the powder is exposed to the room air, therefore, all air entering this room shall be filtered. A minimum filter efficiency has not been established, therefore, when air is not filtered recommend that adequate filters be provided to supply clean air. Because a separate dryer air filter is not required mark Item D20—Dryer Air Supply NA.

Distribution of product between the rolls may be accomplished with an oscillating down-pipe or with a long pipe with holes in the bottom. Be sure to check such pipes for condition and sanitation.

Delete the heading for Item D22—Drying Chamber, instead use the term Dryer or Dryers. Show on the report the number and make of roller dryers. Most common makes are double-roll American, Blaw-Knox (Buflovak), and Overton machines. The drums (rolls) shall be smooth, readily cleanable, and free of pits (iron construction is unsatisfactory). The knives shall be maintained in such condition as not to cause scoring of the rolls.

Roll end dams shall be provided with a means of adjustment to prevent leakage and accumulation of milk solids. Wooden end dams are unsatisfactory. When noted, recommend replacement with sanitary impervious material such as phenolic resin, Micarta, etc. These plastic wear surface materials are usually about ¾-inch thick and, although quite rigid, they cannot withstand the pressures required to prevent product leakage at the interface with the revolving rolls. Metal backup plates are required to provide the necessary stiffness. The backing material should also be made of sanitary material, such as stainless steel or aluminum. The plastic wear surface material should be easily removable from the backing for cleaning of the interface. This can be accomplished by short positioning studs on the backing plate which protrude into partial holes in the back of the plastic material, plus a few conventional countersunk screw-bolts made of stainless steel. Check that the end dams are removed from the dryer after each run and are taken apart for thorough cleaning.

The vapor stack, hood, the drip pan inside of the hood, and related shields shall be constructed of stainless steel and be readily cleanable. Fabrication of the stack, hood, and drip tray shall be according to dairy construction procedures with all joints welded and smoothly finished. However, smoothly finished soldered joints, free of cracks, are acceptable. Open seams or other hard-to-clean construction features such as the use of rivets, crimped seams, overlapped “stovepipe” joints, rough or cracked solder joints, etc. are unacceptable.

The lower edge of the hood shall be constructed such as to prevent condensate from entering the product zone. Also, a removable stainless steel tray shall be located directly below the stack to prevent condensate or other particles from dropping from the stack into the product.

Condensate from the hood trough and drip tray should be conducted to the floor by means of either piping or flexible hose. The condensate drain line, whether it is a pipe or a hose, should be easily removable for cleaning (be alert for leaks in the troughs and tray).

The hood shall be properly located and the stack shall be of adequate capacity to remove the vapors. Inspect the vapor hood, tray, stack, etc. for sanitation and show recommendations for any deficiencies. Stacks are very hard to clean manually because of their height and difficult access. Nevertheless, they should be cleaned as necessary. Encourage recirculation type cleaning using a spray ring or spray ball together with permanent piping, pump, and means of recovering the solution at the bottom of the stack.

Most exhaust stacks are equipped with a condensate ring to catch any liquid which runs down the inside. The condensate is piped to the hood trough or directly to the floor. Check the ring and pipe for leaks, cleanliness, etc.

The dryer stack shall be protected from birds and the elements during shutdown time. This may be accomplished with a stainless steel, aluminum, or equivalent metal cover (painting the cover is not satisfactory as loose paint could fall into the product). Since the exhaust vapors are not forced, as is the case with a spray dryer, a self-closing cover would not automatically open when the dryer is started. Since most stacks are quite tall, mechanical or manual means can be devised for operating the cover using cables, pulleys, chains, counter weights, etc.

Conveyor troughs, augers, and aprons used as product removal and conveying equipment shall be made of stainless steel or other metal with engineering plating such a chromium or nickel. Cadmium plating or galvanizing are not acceptable protective coatings for product contact surfaces. When the equipment is not plated with acceptable materials or when there is evidence of iron exposure or rusting, show as unsatisfactory and recommend replacement with stainless steel.

Note:

> Cadmium is a very toxic “heavy metal.” Dryers which have such coatings on product contact surfaces shall be assigned INELIGIBLE status.

Also show as unsatisfactory when auger type conveyors have flush type, greased end bearings or have center-located greased bearings in the product zone (use of so-called “edible grease” does not justify such construction). Recommend replacement with sanitary outboard type bearings when repair or replacement is needed. These outboard bearings shall be located at least one inch from the product zone at the shaft opening. When necessary, the shaft annular space shall be protected with a sanitary seal or by other means to prevent entrance of contaminants or escape of product (shaft hole protection may be unnecessary for side conveyors, but would be needed for auger type elevators to prevent powder leakage).

Bucket type conveyors may be used to convey product to the flaker or hammer mill, show on report whether it is belt or chain type. Also check the *Accepted Equipment List*. Follow the guidelines for Item A3—Pumps, Pipelines, & Valves if the conveyor is not listed. In addition,

remove access doors and inspect the unit carefully for construction, condition, and sanitation. Check the elevator housing for cracks, hard-to-clean areas, flush type bearings, access doors, gaskets, etc. If a belt type conveyor is used, check for riveted-on buckets, iron pulleys and shafts, etc. For chain driven units, inspect for deficiencies such as poor condition belt, mechanical splices on belt, bolted-on buckets, hard-to-clean chain links, iron sprockets and shafts, etc. Recommend replacement of conventional bucket type elevators which exhibit the aforementioned deficiencies.

Conveying may be accomplished with enclosed auger, filtered air, or with any other satisfactory sanitary equipment. If the elevating or conveying equipment is portable, wet cleaning after each dryer run is not necessary if inlet and outlets are protected and the unit is moved to a dry area while the roller dryer is wet cleaned.

If no cooling is used, show NA for Item D27—Powder Cooling System. When cooling equipment is used, inspect and report according to Spray Process Drying Operations

Most roller dryer systems do not require product cooling systems as there is usually sufficient heat loss through the conveying, elevating, flaking, pulverizing, and filling operations to result in packaging temperature under 110° F. However, during hot weather, or when production from more than one dryer is combined, higher temperature may be encountered. Cooling with air, as routinely employed for spray powder, is probably the most practical solution.

Packaging

Item D34 to D44.

Packaging of roller powder may be conducted in the drying room if satisfactory dust control is maintained. During wet cleaning operations in the area, the packaging equipment should also be wet washed or should be kept dry by moving it out of the room or by covering it carefully with plastic. However, if inspection reveals inadequate dust control or unsatisfactory care of packaging equipment, recommend that a separate packaging room be provided.

When packaging is performed in the dryer room, air movement to the exhaust stack normally prevents dust drift into the warehouse or adjacent processing rooms. However, if dust drift out of the room is noted, recommend correction by improved ventilation or provision of a separate packaging room. When a separate packaging room is used, follow the guidelines for Item D34—Room Construction.

Delete the word “Sifter” from Item D37—Sifter and show “Flaker and Mill.”

A. Flaker.

The shell, shaft, arms, flaker bars, screen frame, screen, and any other product contact surfaces shall be made of stainless steel or equally corrosion-resistant metal. Show as unsatisfactory if shaft bearings are flush mounted. Recommend conversion to sanitary outboard type bearing construction when replacement or major remodeling is done.

The shaft, arms, and flaker bars need not be easily removable, provided that means of easy access are provided for cleaning. The screen should be easily removable for cleaning and should be fastened to its frame in a sanitary manner with no bolts, cracks, or crevices. Describe briefly any deficiencies with construction materials, sanitary fabrication, or cleanliness.

Show on report if no flaker is used. For instance, Overton Machine Company makes screw type elevators which deliver crushed flakes from the side conveyors directly to the mill. Crushing is accomplished with a spring-loaded device which subjects the flakes to pressure and abrasion from the side conveyor auger before the powder enters the screw type elevator. Inspect such devices, if used, and report any deficiencies with condition or sanitation.

B. Mill or Pulveriser.

Grinding of roller powder is usually accomplished with a small hammer mill, which in turn usually feeds direct into a bagging device (sifting of the product after the mill is not a requirement for USDA approval). The mill may be portable, in which case it is customary to disconnect the unit after the day's operation, and move it to a dry location during the wet cleanup of the dryer. This is a satisfactory practice provided the inlet and outlet openings are protected and that exterior surfaces are cleaned, preferably by vacuum brushing.

The mill housing and all internal product contact surfaces shall be constructed of stainless steel or equally corrosion-resistant metal (aluminum construction, in good condition, should not be criticized). Show as unsatisfactory if shaft bearings are flush mounted. Recommend conversion to sanitary outboard type bearing construction when replacement or major equipment remodeling is done.

If the dryer(s) is operating during the course of the survey, determine temperature of the finished product in a newly filled bag and show the thermometer reading on the report. The requirements are the same as spray dried products.

Product Storage

Items D46 to D48.

See the guidelines for these items under Spray Process Drying Operations.

General Items

See the guidelines for Page A — General Items