THE DAIRY PRACTICES COUNCIL®

GUIDELINE FOR LAYOUT OF DAIRY MILKROOMS FOR SMALL RUMINANT OPERATIONS

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EXCEPTIONS FOR INDIVIDUAL STATES NOTED IN TEXT OR FOOTNOTES
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Guideline Preparation and Review Process

Guideline development within Dairy Practices Council (DPC) is unique and requires several levels of peer review. The first step in the process of guideline development starts with a Task Force subcommittee comprised of individuals from industry, regulatory and education interested in and knowledgeable about the subject to be addressed. Drafts, referred to as 'white copies,' are circulated until all members are satisfied with the text. The final white copy may then be distributed to the entire Task Force, DPC Executive Vice President and whoever the Task Force Director feels would add to the strength of the review. Following final white copy review and correction, the next step in the process requires a yellow cover draft that is circulated to the member Regulatory Agency representatives that are referred to as "Key Sanitarians." The Key Sanitarians may suggest changes and insert footnotes if their state standards and regulations differ from the text. After final review and editing the guideline is distributed in the distinctive DPC green cover to people worldwide. These guidelines represent the state of the knowledge at the time they are written.

Disclaimer

The DPC is not responsible for the use or application of the information provided in this Guideline. It is the responsibility of the user to ensure that the information addresses their needs and that any action taken complies with appropriate regulations and standards.

TABLE OF CONTENTS

INTRODUCTION

This guideline addresses the basic design of milkrooms, bulk tank installations, can coolers and freezers on the dairy farm. The milkroom, sometimes called the tank room or milkhouse, is the room, or rooms, that house the milk cooler, bulk tank or the portion of the tank with the filling and emptying ports. The wash vats, drying racks, and related equipment are also in this room(s).

The guideline provides layout information. As you begin the design process, contact your local regulatory agency for specific information and assistance in obtaining approval for the installation. For more detailed information on milkroom design and construction detail see DPC041, Milkrooms and Bulk Tank Installations.

The layout and size of the milkroom is based on the amount and type of equipment installed in the room and the clearances required around the equipment. On farms with a cylindrical bulk tank that have all of the openings at one end, or with some commercial freezer units, bulk heading into the milkroom will substantially reduce the size of the finished area. The size of the milkroom is not dependent on the size of the herd or flock. Often a smaller operation with the manual washing of bucket milkers and milk cans for storage will need a larger milkroom than a farm with a pipeline system with CIP and a bulk headed tank.

The plans included in this guideline have not been checked for compliance with the Americans with Disabilities Act (ADA.) Check with local regulators to see if ADA applies to your farm and then adjust the plans accordingly.

DEFINITIONS

None

GUIDELINE CONTENT

Functional Planning

Plot Diagram

Draw scale diagrams of present and future buildings to ensure that you will be able to change the operation as the business changes. Avoid building in a manner that will not allow for the future expansion of the facility.

Processing Areas

This is not a guideline to design cheese rooms or other milk processing areas. Processing areas should not be immediately adjacent to animal areas and are best if located in a completely separate building, considering topography, prevailing wind, type of processing, milk movement and other considerations. If a processing area is to be in the same building as the

stable area, be sure people and supplies can get to the raw milk production areas (milk house, parlor, etc.) without going through the processing area.
Likewise, there needs to be access to the processing area without going through the milkroom or animal areas. For example, do not put the processing area between the milking parlor and the milkroom.

Usage and Accessibility

Milkrooms should be dedicated to their specific purpose: i.e., the room housing the milk storage and milking equipment cleaning facilities should be used only for the cooling and storing of milk, and for the cleaning and storing of milking utensils. All other activities associated with the milking operation should be in another room(s). Other activities include storage of cleaning supplies, inflations, repair parts, and equipment supplies; utility services; refrigeration equipment; vacuum pump(s); water heater; etc. The use of separate room(s) for storage and support equipment will reduce the size of the milkroom and make it easier to clean the milkroom.

The milkroom must be located for easy access to the milking operations and for easy access by the trucks picking up the milk and the delivery of supplies. Even if you are starting as a producer-processor you should make allowances in your plans for pick up by a bulk milk tank truck in case of surpluses or changes in operations. A location providing a road for drive through without backing is desired. The hauler/sampler should be able to enter the milkroom without going through animal areas to minimize the chance of disease transmission.

Dry Milkroom[1]

In some sheep milk operations, milk is frozen for storage before delivery to the processing facility. If the freezer used is not rated for a damp location, a room separate from the washing area will need to be provided. The wall construction (finish) and cleanability requirements must meet the PMO and therefore will be the same as a normal milkroom; however, if the freezer is less than 3 feet wide, and is easily moveable, the clearances behind and beside the freezer are less. Most freezers are designed to be only a few inches from the wall and the electric cords supplying them power are designed accordingly.

In a dry room the risk for safety and loss of product from the unit being 2 feet away from the wall, where it was not designed to be, outweigh the chance of significant soil building up around the unit. Household duty freezers are not constructed to be anchored down and are easily moveable for cleaning at intervals as needed for the conditions. By having a dry room there is less chance of mildew or mold forming and with a sealed frozen container of milk inside of a sealed freezer cabinet you have greater protection from contamination than a bulk tank.

This room should not be used for the storage of anything not related to milking as the rules for milkrooms still apply. Do not store drugs in the freezer or an attached refrigerator unit as the risk for cross contamination is too great. The freezer should have a dedicated outlet to minimize the chance of another piece of equipment tripping the breaker. A temperature alarm on the freezer and an outlet retainer clip on the electric plug would be wise investments.

[1] Maryland does not allow the freezing of milk so all references to freezing in this guideline are not applicable in Maryland.

Fresh milk should always be placed low in the freezer and moved up after freezing. This minimizes the chance of milk leaking from the container and spilling over already frozen containers.
At seasonal operations where the freezer will not be used for prolonged periods, provisions should be made for allowing air to circulate in the de-energized freezer and still provide for child safety by preventing the possibility of a child entering the freezer and then closing the door. Always wash and sanitize the inside of the unit before starting another milking season.

Operations that milk continuously need to have provisions to shut down the freezer periodically and, wash and sanitize the unit in case of milk spillage.

Driveways

The driveway must provide easy access for the milk tank truck. The driveway width, turn radius and construction may have to accommodate large trucks. Considerations for a good driveway include the following:

1. Curves and turn-around: Construct these areas large enough for a semi-trailer to maneuver, with approximately 50-foot radii. Where possible, provide a loop drive to avoid any backing up. Where backing up is required, avoid obstacles that impair vision. **Do not build a driveway such that the milk tank truck must back in from the road.**
2. Grade: Provide the most level grade possible for the milk tank truck to park while loading.
3. Length: Specific length is not too important. Consider the ability for maintenance and snow removal. Make long drives wide enough for vehicles to pass.
4. Be sure the milk tank truck has adequate visibility when leaving the driveway to view potential traffic on the road.

Elevations

Entrance to the milkroom at grade level provides for easy access and lower maintenance. The milk tank truck pump is capable of lifting milk 6 to 10 feet so a driveway may be higher than the milkroom floor. However, this results in one to two gallons of milk in the hose that cannot be drained to the pump. In can operations a loading dock needs to be provided so you may want the milkroom to be higher than the driveway surface. Two heights of dock are preferable to accommodate a variety of trucks or trailers used for picking up milk or delivering supplies.

The milkroom floor should be close to the floor level of the barn or parlor to facilitate moving milking equipment and utensils. Curbs at doorways help control floor wash water; however, if cans are used their movement needs to be considered to avoid lifting full cans more than necessary.

Miscellaneous Considerations

Consider the ease of installing the milking equipment, relationship of other rooms and the ability to keep the milkroom clean. A separate equipment room for the vacuum pumps and refrigeration equipment keeps the dirt and heat away from other items.
A separate storage area keeps supplies clean and away from the dirt and heat. A restroom and office or break area can help with employee morale and comfort and may be required in many jurisdictions.

Since the milkroom location can affect the total farmstead layout, plan for future expansion before starting initial construction. Herd expansion may require an additional or larger bulk tank and related equipment. Also, the space required for additional animals, feed storage and handling, and manure storage and handling should be considered.

Size and Location

Milkhouses need to be large enough to provide adequate space to meet present needs and should take into account the prospect of future expansion.

Cooler Installation

Install stationary bulk tanks rigidly, without the use of removable blocks or shims under the legs (except for metal plates required by some states for load distribution on the floor). If a bulk tank is not permanently mounted, the correct position needs to be clearly and permanently marked.

Clearances for Coolers (Bulk Tank, Can Cooler or Freezer, except in Dry Milkroom Area)

Space around a bulk milk tank is needed for calibration, measuring and removing milk, cleaning, maintenance and inspection. Minimum clearances around a cooler are provided in Table 1. Measure clearances from a permanently attached platform, or an accessory fitting that extends the entire width or length of the cooler, or from the body of the cooler without platforms or accessory fittings to the wall ceiling, floor or any fixed equipment. A single manhole cylindrical tank or can cooler with no serviceable parts on the back, could be installed against the wall with the back end sealed with a watertight joint. Prior to the installation, obtain approval from the Regulatory Agency. A minimum of 32 inches of ceiling clearance on bulk milk tanks is recommended, but more space may be necessary with large tanks.

The National Bureau of Standards, Handbook 44, requires sufficient clearance over the measuring rod to completely remove and reinsert the rod in a vertical position without the rod touching any part of the building or structure. A recessed area above the measuring port can be constructed instead of raising the entire ceiling height.

Cylindrical tanks or commercial freezer cabinets designed for surface mounting can be bulk headed into another room or the outdoors. This approach keeps the milkroom small, allows easier cleaning, and removes the temptation to store items in the milkroom. A design that minimizes traffic through the milkroom will also aid in keeping the milkroom clean.

Freezers that are not designed to be water resistant should be located in a “dry” location that meets the sanitary regulations of the milkroom. This may necessitate a separate room for the freezer unit. If the freezer is less than three feet wide it may be located 6 inches away from the back wall, provided the unit can be easily moved for cleaning. The bottom must be; sealed down if a flat bottom, on legs, or easily moveable for cleaning under the unit.

Table 1. Minimum Cooler Clearances

Clearance around Bulk Tanks and Can Coolers	Distance and Direction
On Wash Vat Side	3 Feet Horizontally
On Cleaning Side	3 Feet Horizontally
On Other Side(s)	2 Feet Horizontally
To Vertical Wall in 2-level Milkroom	9 Inches Horizontally
To Floor Drain (Not Under Cooler)	18 Inches Horizontally from Tank Drain
To Ceiling	32 Inches Vertically
To Floor	
Beneath Rounded Tanks >72 in.Diam.	8 Inches Vertically
Beneath Flat Bottom Coolers	6 Inches Vertically or Tank Mounted and Sealed on a Slab*
Beneath Other Rounded Tanks	4 Inches Vertically

* If a flat bottom tank is mounted on a slab or island, the base of the tank shall be sealed to the mounting surface. This does not include freezers if easily movable for cleaning or located in a "dry" milkroom.

Bulk Heading

1. The manhole (tank access point) and vent must be located inside the milkroom. CAUTION: Entering a bulk tank can be dangerous. Use caution to be sure there is no build-up of gases. Do not enter a bulk milk tank without someone else there to assist you if needed. In some states a harness or other safety equipment may be required and is always a good idea in case the assistant needs to help you exit the tank. Commercial freezer cabinets must have the opening to the frozen product storage area located in the milkroom or dry milkroom.

2. Motors and agitator shafts must be properly protected when mounted outside the milkroom. Note: Some agitators when installed outside need a different lubricant.

3. The portion of the tank or cabinet located outside of the milkroom should be in a clean area not accessible to livestock and may be outdoors. Freezer cabinets bulk headed to the outdoors must be constructed and rated for the location.

4. Provide adequate leg support below the frost line.

5. Provide a lintel over the tank or cabinet when it passes through a load-bearing wall. The tank or cabinets should not be used for support.

6. The tank should not rest upon the wall through which it passes. For proper calibration, full support of a bulk milk tank should be distributed to its legs.

7. The walls should be tightly sealed around the bulk milk tank or cabinet.

8. Single manhole bulk milk tank installations generally require a permanently installed light that is not located directly over the manhole opening. In many states it can be a

permanently located portable light, i.e., rechargeable flashlight dedicated to use with the tank, which can be extended through the manhole to illuminate the interior of the tank for inspection, cleaning and special maintenance. This light shall be of a waterproof and shatterproof type and be rated as suitable for use under damp conditions.

9. Protective posts or other barriers are recommended around the exterior portion of a bulk headed bulk milk tank or cabinet if vehicle or other equipment traffic will be near it.

10. All bulk milk tanks manufactured after January 1, 2000, must have a recording thermometer. All tanks should be equipped with an appropriate receptacle to accommodate the temperature-sensing element of an approved thermometer. The receptacle shall be so located that the bulb of the temperature-sensing element permits registration of the product temperature when the tank contains no more product than 10% of its capacity and shall be located so that the sensing element is not influenced by the cooling medium.

11. Where necessary, bulk headed tanks or cabinets should be protected from milkhouse roof run off.

12. A protective roof over the tank should be considered.

Platforms and Ladders

Platforms and ladders should be of hot dipped galvanized metal or other non-corrodible material. All single manhole tanks over 65 inches high, as measured from the floor to the top of the manhole flange, must have a platform at the manhole end of the tank. Platforms shall be a minimum of 12 inches wide. There shall be at least two feet of clearance around the outlet valve.

Ladders with flat steps, OSHA approved, permanently and securely attached to the outside of the tank or floor, in the final installation, will be acceptable instead of platforms.

A convenient means for access to the bulk milk tank's interior shall be provided. Bulk milk tanks exceeding 48 inches in interior depth shall be provided with a ladder of non-corrodible material that can be inserted into the tank to facilitate access for inspection, cleaning and special maintenance. Such ladders should be provided with appropriate protection to prevent damage to the surfaces of the bulk milk tank. These ladders should be stored in the milkroom off of the floor.

Can Coolers[2]

Can coolers may be used provided the cooling requirements are met. To ensure optimal quality Dairy Practices Council recommends that milk be cooled to below 40°F (4.5°C) within one hour of the completion of the first milking (30 minutes is achievable, and a good goal). Many states require milk be stored at below 40°F (4.5°C). Check with your

[2] Maryland does not allow the use of cans and requires all milk to be handled in bulk, so all references to can operations in this guideline are not applicable in Maryland.

local Regulatory Agency. Blend temperatures on subsequent milkings should not exceed 45°F (7°C). The PMO requires: "Raw milk for pasteurization shall be cooled to 10°C (50°F) or less within 4 hours or less of the commencement of the first milking and to 7°C (45°F) or less within 2 hours after the completion of milking. Provided, that the blend temperature after the first milking and subsequent milkings does not exceed 10°C (50°F)."

Can Cooler Design

There are two basic can cooler designs:

1. **Water bath** - A tank filled with water that is cooled by an ice bank within the tank or a direct expansion heat exchanger adjacent to the tank. The water level must be equal to, or greater than, the level of the milk in the cans to effectively cool the milk. Water levels with the cooler full of cans should not exceed the height of the neck of the can to minimize the risk of cooling water entering the can. Many also employ a circulator pump to keep the water moving around the cans.

2. **Spray styles** - A cabinet designed to accommodate milk cans, in which chilled water is sprayed over the can. The spray needs to be directed to start above the level of milk in the can. As with the tank style coolers the water is chilled by an ice bank or by use of a direct expansion heat exchanger. One of the big advantages of this style is that the can does not have to be lifted over the side and lowered into the water. Most spray style coolers have the cans slide in from the front.

Most existing can coolers are designed to use 40-quart cans but can be modified to use other sizes. When selecting can size, remember that a 40-quart can of milk, including the can, weighs over 90 pounds and will need to be lifted into the cooler. To adjust a tank-type can cooler for a smaller can, racks can be placed in the bottom of the cooler so that the milk level in the cans corresponds to the proper height in the water bath. In some coolers the water level can be lowered, but if you lower the water be sure you do not have the water level too low for the cooling coils to operate effectively.

Milk in cans should be delivered to the processing plant every 48 hours or less. Cans should be transported in an insulated truck or container. Care needs to be taken to ensure that the milk does not warm above acceptable levels (generally 40° or 45°F). Check with the local Regulatory Agency for acceptable means of transport.

Other Equipment and Arrangement

Ceiling height should allow the raising of any covers to a normal open position and the convenient inspection and cleaning of the interior of the cooler. Whenever the ceiling height does not permit the removal of the measuring stick, an enclosed aperture at least 16 inches in diameter or width should be provided in the ceiling to allow for the complete removal of the measuring stick. Some states require tanks with a capacity greater than 2,000 gallons must be equipped with an external gauge to measure the milk. Refer to NIST Handbook 44, Specifications, Tolerances and Other Technical Requirements for Weighing and Measuring Devices, current edition.

The washing, storage and auxiliary equipment located within a milkroom includes a wash vat or vats, a hand sink, and milking equipment and utensils storage racks or cabinets. The

milk receiver, milk pump and in-line plate cooler are also normally in a milkroom. The water heater, compressor, water pump, and water softener should be located in a utility room.

To meet National Electric Code requirements all electrical fixtures in the milkroom should be moisture and corrosion resistant. The main entrance panel should not be located in the milkroom, parlor or stable areas. Avoid pipe, electrical or other lines over the bulk tank, especially directly over any bulk milk tank manhole or opening. A milkroom may be arranged with washing and storage along the wall parallel to the bulk tank. This equipment and storage usually requires a space 2 feet wide plus the width of the equipment going the length of the cooler. If the washing and storage area is at the end of the milkroom, a longer and narrower milkroom may be used.

Auxiliary Equipment and Utility Room

Additional rooms for equipment and storage are strongly recommended. The vacuum pump(s), refrigeration equipment, water heater and similar equipment should be in a dry location. This will reduce the cost of the equipment and wiring, as it would not have to be moisture resistant. If cleaners are stored in this room it may still need to be corrosion resistant. This room requires good ventilation to reduce heat buildup from the equipment. Storing supplies, inflations and repair parts should be kept in a separate room. This keeps them from being exposed to high temperatures. A refrigerator for the storage of medicines and other items that require cool storage should be included. A direct entrance from the outside that is oversized to allow for the removal of the largest equipment in the room is desirable and makes servicing of the equipment more convenient.

A toilet, hand sink and shower might be located nearby to minimize plumbing. If not included now, plan the facilities for future expansion to provide these spaces. A toilet will need a state approved septic system. Check with the Regulatory Agency to see if they are required.

Submit these plans along with the application for a bulk tank or milking system to the local Regulatory Agency before any construction is started.

Floors and Drains

Floor Construction

To be clean and cleanable, construct floors of concrete or equally impervious material, provide slope to drain(s), and maintain the floor in good repair.

Slight dips that hold or pool water should be eliminated. Provide a uniform 2% floor slope (1/4-inch rise for every foot of run) to the drains. Use an isolation strip, topped with moisture resistant curing silicone- rubber mastic, tolerant to temperature changes to seal the joint at the junction of the floor and wall. (For more detail see DPC041, Milk Rooms and Bulk Tank Installations.)

The discharge of wash and rinse water is hard on concrete floors. Plumbing wash vats directly into the waste piping system will eliminate this source of floor deterioration.

Floor Drains

The proper selection and location of floor drains improve drainage and minimize cleaning and maintenance problems. (See DPC015, Milking Center Wastewater for more detailed information.) When possible, plumb sinks through a trap and directly into the sewer line. Place the drain for the bulk tank no closer than 18 inches to the tank outlet, but not under the tank. Provide a 2% floor slope to drain(s). Trap all drains to prevent entry of odors, insects or rodents. To improve wastewater drainage, recess floor drains 1/2 inch below the top of the floor. Gutter style drains are easier to wash and maintain than a tradition single point drain.

If there is a milking parlor pit that is lower than the milkroom floor, consider plumbing the trapped milkroom drain to the parlor pit area so that the operators can notice unusual milkroom activity (i.e., forgetting to close the tank valve before starting to milk).

The proper disposal of the wastewater is essential. (See DPC015, Milking Center Wastewater and Local Water Quality Specialists and State Regulatory Officials for specific requirements.)

Walls and Ceilings

The walls and ceilings shall be constructed of smooth impervious material, be easily cleanable, kept in good repair, well painted, or finished in an equally suitable manner. For details on wall construction see DPC041, Milkrooms and Bulk Tank Installations.

Doors, Windows and Hose Ports

Doors

Direct openings between a milkroom and stable, milking barn or parlor are permissible only where tight- fitting self-closing doors are provided and where ventilation moves air from the milkroom to the stable. Where direct openings are not permitted, an open passageway or "breezeway" between the milkroom and stable is preferred to a vestibule.

All outer doors shall be self-closing doors which helps to keep small animals, insects, dust and odors out of the milkroom, and outward opening doors help to keep flies and other insects from entering the milkroom.

Hose Ports

Milk is transferred from a bulk-holding/cooling tank to a milk tank truck through a hose port in the milkroom wall. The hose port shall have a tight door, kept in good repair and be closed when not in use. A hose port convenient to the tank outlet should be at least 6 inches above the outside grade and inside floor. A more convenient height for the hose port is one foot above the ground. This height keeps the hose off the ground and prevents kinking of the milk hose.

Commercial prefabricated hose ports with self-closing doors are readily available and easy to install. Construct an easily cleanable surface under the hose port, adjacent to the outside

wall, sufficiently large to keep the milk hose on the pad to protect the hose from contamination. The pad may be an extension of the entrance step or a paved area about 4 feet by 4 feet square. Consider extending the pad to the working area of the milk tank truck. The pad must be constructed of an impervious and reasonably smooth material. Materials such as concrete or natural stone slabs with slight irregularities would be considered reasonably smooth for this purpose. The pad must be free of large cracks or other damage. The pad may be constructed in sections and small cracks between sections would not be considered as a construction violation. If the milk tank truck or other vehicles will drive over the pad, heavy-duty construction may be necessary.

Lighting and Electrical Service

Milk Tank Truck Outlet

Locate a 240 volt grounded, waterproof electrical outlet for the milk pump of the milk tank truck if bulk milk is being considered. The outlet should be located outside of the milkroom near the hose port, but high enough to be out of the reach of small children. The controlling switch should be located inside the milkroom near the tank outlet. Check with your milk hauler for the specific style receptacle needed and other needs the hauler may have.

Lighting

Good lighting is necessary to adequately see to wash equipment and utensils, and to accurately read the bulk milk tank measuring device. A light fixture should be located over the wash vats. When located directly over the wash vats, lights should be properly protected with shields to assure against glass entering the milk supply through the wash system. Do not locate lights directly over the opening into a bulk tank because milk could be contaminated due to bulb breakage and insects, which are attracted to the light. Angled spotlights shining into and flooding the interior of the tank permits the better inspection of the tank's interior.

Single manhole tank installations may require a light that can be extended through the manhole to illuminate the interior of the tank for inspection and special maintenance. This light shall be of a waterproof and shatterproof type with a ground fault interruption device, and preferably have a retractable cord. The light should be installed close to but not directly above the opening(s). A cord reel or other suitable device provides for convenient storage of excess cord. Some states allow for a portable light, such as a rechargeable flashlight dedicated for the purpose. Check with the local Regulatory Agency.

Electric Service

Safety is the most important criterion of an electrical system. The milkroom is generally a wet and corrosive environment. Have a qualified electrician design the electrical system for your entire farmstead including the milkroom. The electrical service entrance needs to be located in a dry area close to, but not in, the milkroom. Check with your power supplier before adding significant load to make sure the line service equipment can handle the load. Ground Fault Circuit Interrupter's (GFCI) should be used on all outlets within 6 feet of any sink. Be sure to follow the National Electric Code and all applicable local codes.

Cleaning and Storage Facilities

Washing Equipment

A two compartment wash vat is required to conveniently wash and rinse milking utensils and equipment. Each compartment should be large enough for each portable utensil or container. If racks for in-place- cleaning of a pipeline milking system are permanently installed in, or on, a wash vat, then a third compartment is needed. Check the physical size of all components that will be washed manually before purchasing wash vats. Drop pipes to bulk milk tanks require brush washing.

A swing-type mixing faucet is practical and desirable to fill the two compartment wash vat. If a hose and shut off is connected to a mixing faucet, put in check valves to prevent mixing of hot and cold water in the lines or tanks. Anti-siphon protection is also needed when a hose is attached.

Storage

A storage space is needed for spare parts, detergents, sanitizers, strainer pads or socks, etc. Except for small operations, the storage should be in a separate room(s) from the milkroom. If stored in the milkroom, use a wall mounted cabinet(s) large enough to store the items. Strainer pads or socks and other items that come in contact with the milk must be protected from contamination. They can be stored in a special dispenser designed to completely protect them or in their original container on the top shelf of a cabinet.

Metal racks at least 20 inches above the floor should be used to drain and store any milk containers, pails, cans or utensils.

A wall mounted, glass faced, bulletin board is recommended and keeps all documents on display dry and easily readable. Provide a bulletin board large enough to display state registration, water and milk quality counts, T.B. inspection reports and any other material as required by the Regulatory Agency. The display should be easily accessible so the material can be kept current.

Hand Wash Facilities

A permanently fixed hand sink with hot and cold or warm running water, soap and paper towels should be located in the milkroom and convenient to the milking parlor or barn. This may be adjacent to the wash vats and above a hose station to simplify plumbing. All handlers of milking equipment and utensils, and the milk hauler must use these hand washing facilities.

Toilets and Wastewater Disposal

Toilets

The toilet should be convenient for workers on the dairy farm. A flush toilet with a separate disposal system and in a separate room away from the milkroom is recommended. However, a flush toilet that has a self-closing door will not be considered a violation of the PMO (Pasteurized Milk Ordinance). A toilet in a private home, convenient to the dairy

barn, and accessible for workers may be used. A chemical toilet or pit privy may be used but neither can open directly into the milkroom. All outer openings in toilets or privies must be screened or protected from the entrance of flies or other insects.

Toilet waste must go to an approved septic system. Local plumbing and health regulations must be followed.

Milkroom Wastewater

Disposal of milkroom wastewater in a sanitary manner usually means no surface discharge that creates pools that generate odors, insect breeding or other nuisances. Milking center waste must not discharge to any roadside ditches or waterways.

The milkroom waste contains cleaning and sanitizing solutions, some milk and dirt. This waste can be contained in a storage tank and used to clean the interior of the milking parlor. The amount can vary from one to ten gallons per animal per day. The amount will depend on the size of the milking system and bulk tank and the type of washing system.

Subsurface leach fields typically have problems with plugging unless specially designed and maintained. The milk and other solids quickly clog the leach fields. Using settling tanks before the leach field can delay trouble if the tanks are properly designed and maintained. This maintenance should include regular pumping. Tanks can be used for short-term storage and the material pumped onto a sloped grass infiltration area or hauled to the field.

When a liquid manure system is present, the milkroom waste may be added to the system. This can be accomplished by pumping the waste directly to the storage or to a reception pit where manure is scraped. The latter approach can help drier manure flow to the storage. Waste from toilets is not allowed to not go into the animal manure storage.

Proper disposal of the wastewater is essential. (See DPC015, Milking Center Wastewater and your local Water Quality Specialists and State Regulatory Officials for specific requirements.)

Ventilation and Heating

Ventilation

To reduce odors and condensation on floors, walls, ceilings and cleaning equipment and utensils, the milkroom must be adequately ventilated. Changing the air sometimes cools the milkroom so well, that insulation and supplemental heat may also be necessary. Air entering the milkroom must not come from a barn or milking parlor or any smelly, dirty or fly infested location. Either an exhaust fan system pulling air out of a milkroom or a pressure system pushing air into a milkroom can direct the correct airflow. A minimum ventilation rate of 4 air changes per hour is recommended. Fans can be wired to a humidistat to automatically turn on when the moisture reaches a certain level. Positive pressure ventilation systems, with fans forcing the air into the milkroom, have been successful in temperate regions where moisture is less likely to be driven into walls or ceilings.

Heat from Cooling Milk

Waste heat from the milk cooling can be used for warming the milkhouse. Probably the most financially beneficial use of this waste heat is for heating water if production levels are high enough to warrant it. However, many farmers will find that until this equipment is added, considerable value can be obtained by using this waste heat for space heating. Screens and/or louvers are needed on inlets and outlets of a milkhouse; contact the State Regulatory Authority to assure proper placement and use.

To lower the temperature of one pound of milk from 90°F (32.2°C) to 40°F (4.5°C), nearly 50 BTU's must be removed. An additional 25 BTU's of electrical energy, which is converted to heat, is needed to run the refrigeration cycle. The total heat dissipated to the air or water is approximately 75 BTU's for every pound of milk cooled to 40°F (4.5°C). For example, if 100 animals are producing an average of 5 lbs. of milk at each milking, then the heat produced from cooling this milk will be 100 x 5 x 75 = 37,500 BTU's.

A well-insulated milkroom should rarely require more than 15,000 BTU/hr, even in severe conditions. This means that there is enough heat given off by the compressor-condenser unit from cooling 500 pounds of milk to supply the heat loss from a well-insulated milkroom for about 2 to 3 hours or more in severe weather. Direct expansion type bulk tanks generate all the heat within the milking time plus one hour; as a result, the milkroom will over-heat if all this heat is retained. Adequate ventilation will prevent over- heating. An ice-bank type bulk tank or can cooler would dissipate the heat during a 4 to 8-hour period and are less energy efficient, therefore more total heat is produced. Supplemental heat may be necessary between the milk cooling (or ice bank formation) and the next milking. Larger dairies will have proportionately more heat to utilize. With proper planning and construction, part of this heat could also be used to heat the milking parlor during cold weather. During warm weather, this heat should go directly outside so that severe over-heating of the milkroom and the refrigeration system does not occur.

Ideas for Milkhouse Layout

The floor plans that follow are not intended to be blueprints for a milkhouse. They are intended to give the reader ideas on milkhouse design by showing different options and arrangements. Note: They offer an office space, bathroom and separate utility room. They also show a foot wash station near the stable door to provide for convenient washing of footwear by visitors, salespersons and others. Always check with the Regulatory Agency before starting construction to make sure you are in compliance with local regulations. Also note that these plans have not been reviewed for compliance with the Americans with Disabilities Act (ADA). If you fall under the ADA check with local officials for details on compliance.

Page 20 is a SAMPLE Application Form to Install a Refrigerated Bulk Milk Storage Tank. Check with your Regulatory Agency to obtain the form required in your state.

Figure 1. Layout with a Bulk Tank

This is a typical layout for bulk tank installation. Note that the air for the refrigeration unit has ducting to allow for warm air to be added to the milkroom in the winter or ducted to the outside in the summer.

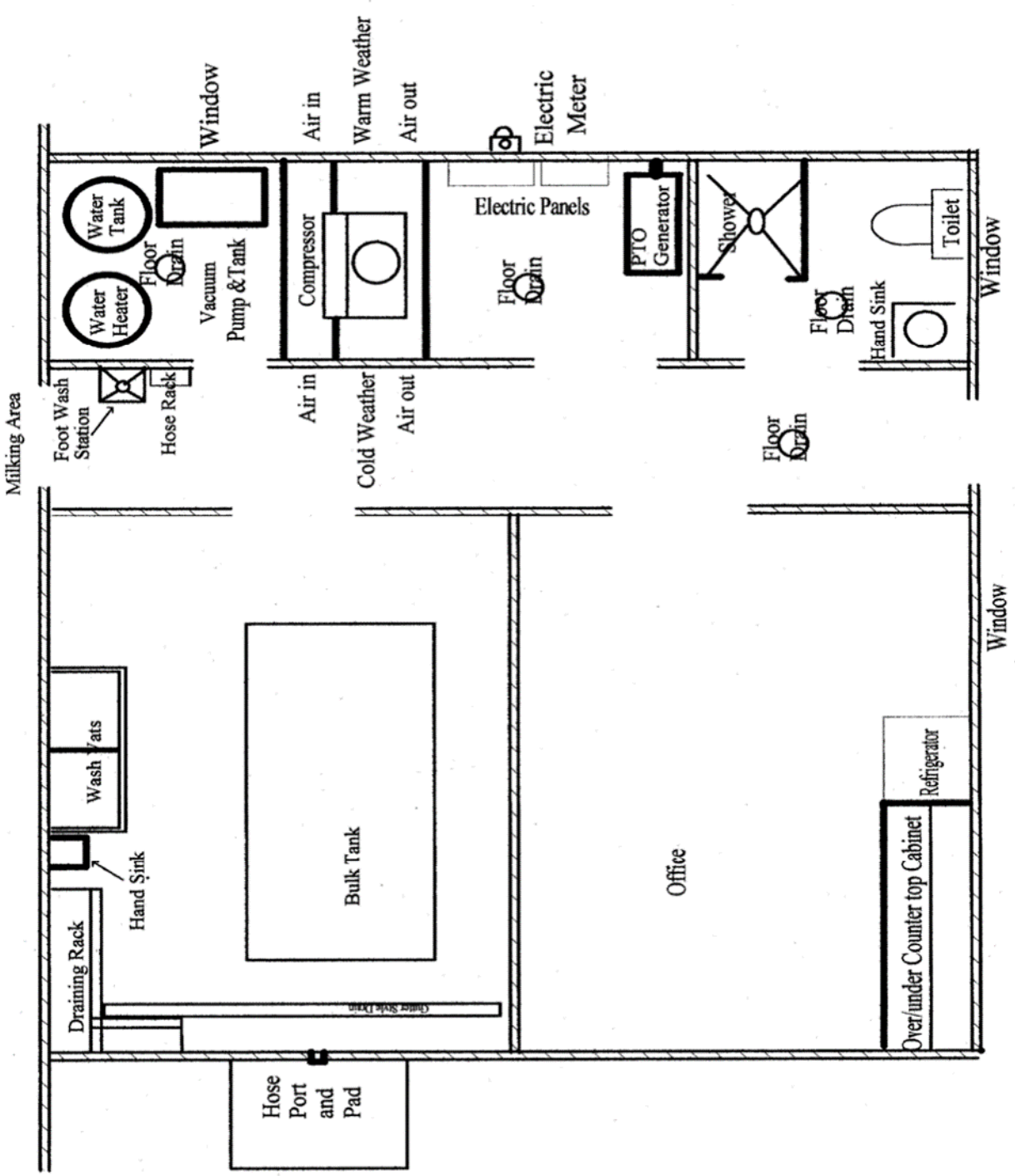


Figure 2. Layout with Can Cooler or Large Freezer

This layout shows a can cooler or chest freezer installation. Remember all units over 3 feet wide or not easily moveable for cleaning need clearance all the way around the unit.

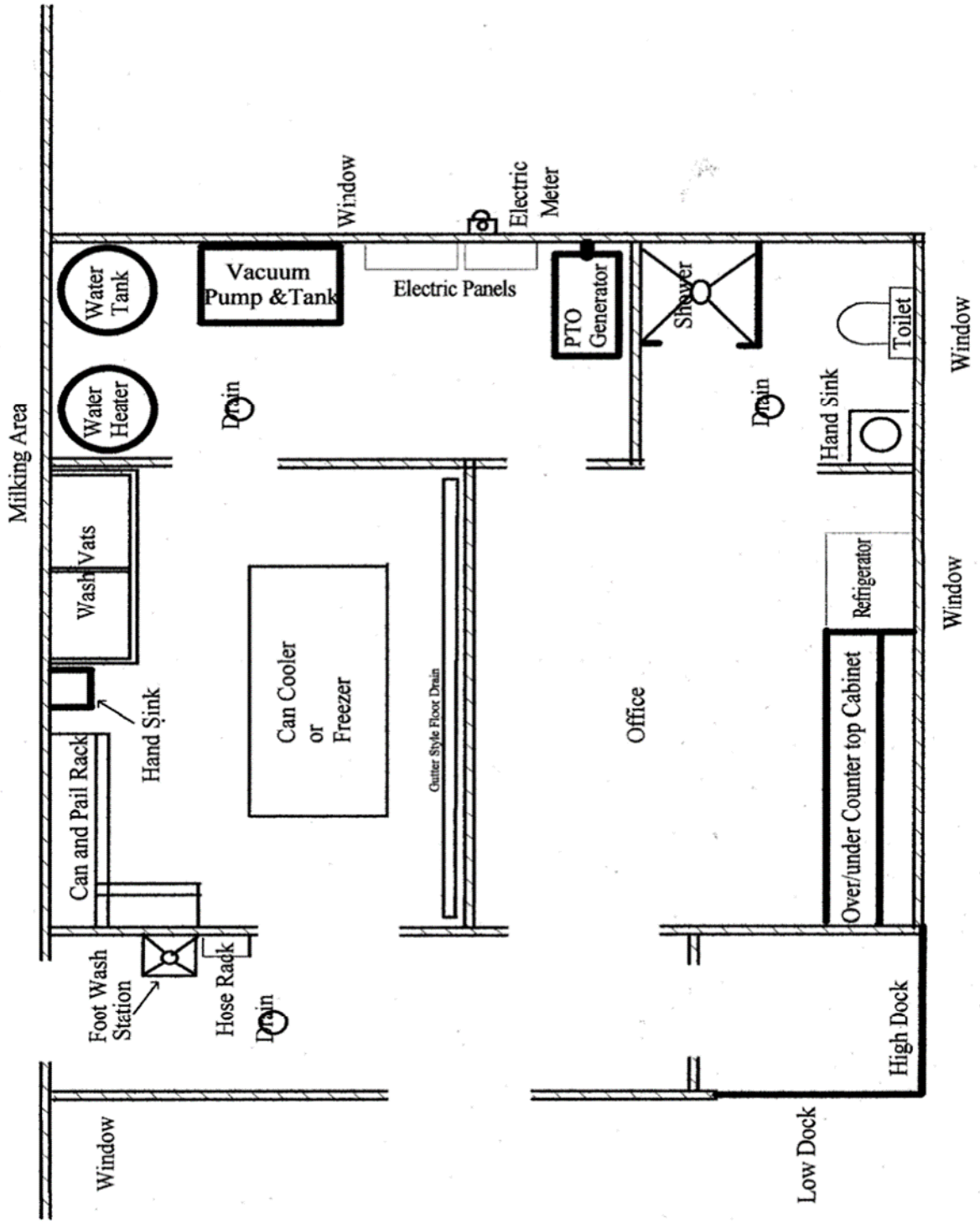


Figure 3. Layout with Dry Milkroom for Upright Freezer

This layout shows an upright freezer unit that is not waterproof and needs to be in a room separate from the area where equipment and utensils are washed. Both rooms need to meet the same construction and cleanliness requirements.

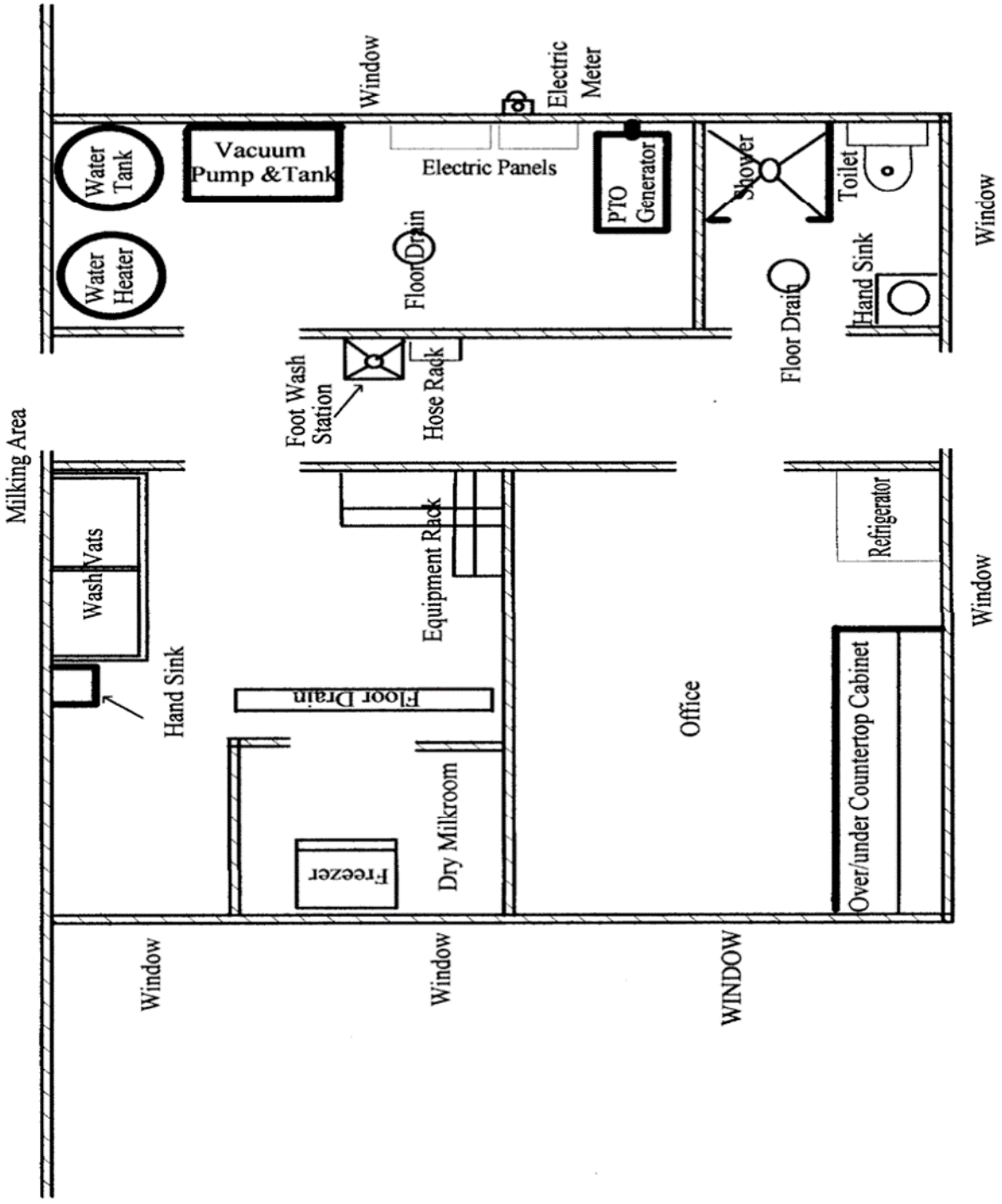
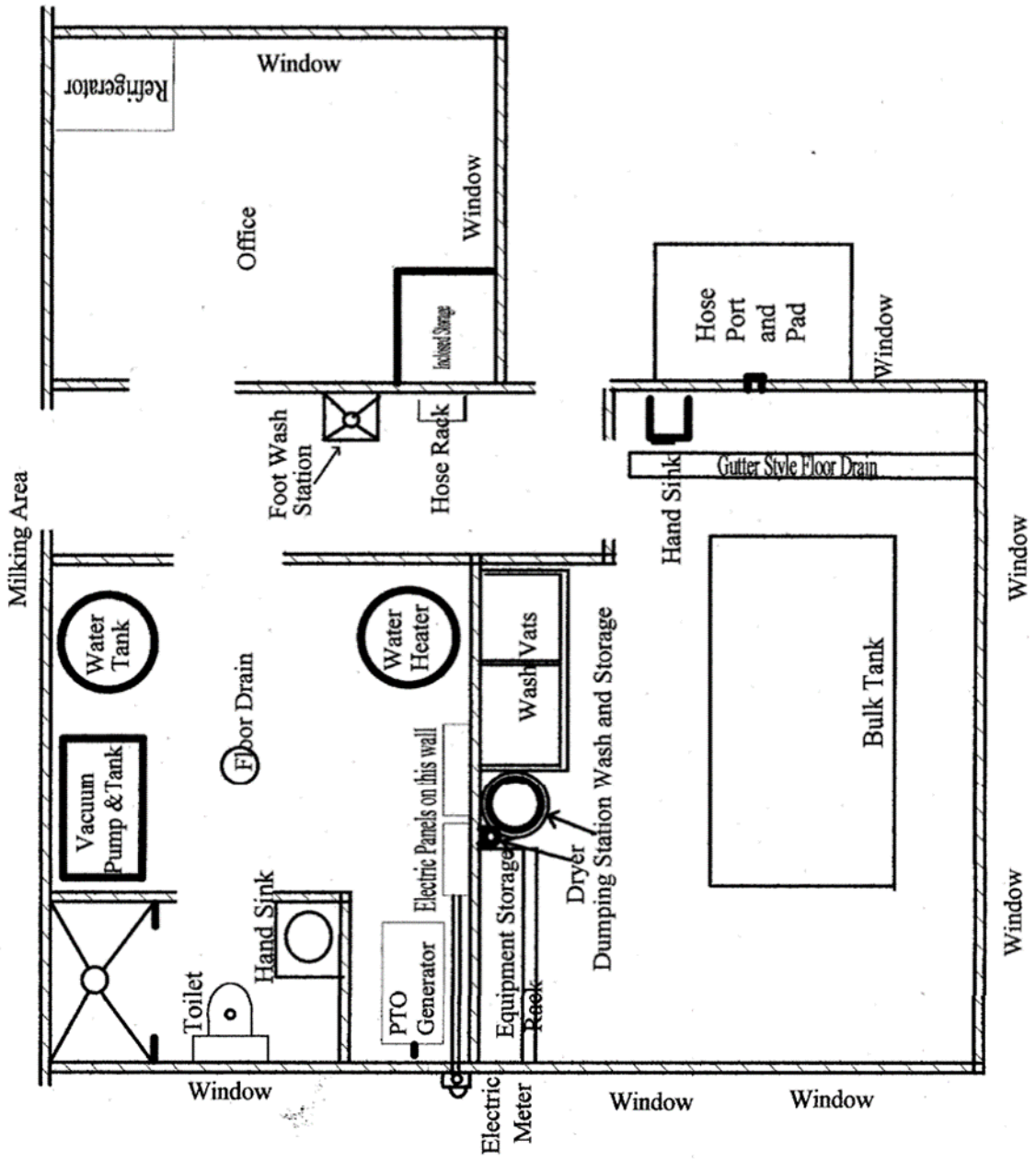


Figure 4. Alternative Layout with Bulk Tank

This view shows a different layout for bulk tank use. Note that the outside door does not require traffic to go through the milkroom to get to the barn.



Sample Application to Install a Bulk Tank

APPLICATION TO INSTALL A REFRIGERATED BULK MILK STORAGE TANK

Name of Producer_____ Date _____ Telephone _____

PO Address_____

Name of Dealer Receiving Milk_____

Address _____

Fieldman or Sanitarian _____

I HEREBY MAKE APPLICATION FOR PERMISSION TO INSTALL A REFRIGERATED BULK MILK STORAGE TANK. THIS EQUIPMENT WILL CONFORM TO OR EXCEED 3-A SANITARY STANDARDS FOR FARM COOLING/STORAGE TANKS.

I. Farm Refrigerated Storage Tank

Make

Model No._____Capacity_____gallons

Tank Bulkheaded Recording Thermometer

Condensing Unit Make_____ BTU per hour_____

Every Day Pickup Every-Other-Day Pickup

No. Milking Units_____; Milking Rate_____lbs/hr.

Bucket Pipeline System Max. Cooler Loading Rrate____lbs/hr.

Pre-cooler Pre-cooling Capacity_____BTU/hr @_____gal/hr.

List Automatic Equipment _____

II. Washing Equipment

Automatic Manual Estimated Hot Water_____gallons each use

Hot water: Type heater_____; Capacity_____gallons

Recovery Rate gal/hr/100° rise_____gallons

III. A cleaning program including water hardness and detergent and sanitizer concentration must be posted in the milkroom. If procedure is changed in any way, a new program must be posted.

IV. A detailed drawing of this installation is required on the reverse side of this application.

V. Any future modifications of this equipment must have prior written approval.

Owner or Authorized Representative_____

Bulk Tank Dealer_____

OFFICIAL ACTION

PLAN APPROVAL

Fieldman-Signature_____Date _____

Regional Sanitarian Signature_____Date _____

INSTALLATION APPROVAL

Regional Sanitarian-Signature_____Date _____

THIS APPLICATION WHEN PROPERLY FILLED OUT AND SIGNED BY THE OFFICIAL REGULATORY AGENCY SERVES AS THE OFFICIAL APPROVAL. IT SHOULD BE POSTED UNDER PLASTIC OR GLASS IN THE MILKROOM.

REFERENCES

- DPC041, Milkrooms and Bulk Tank Installations
- DPC015, Milking Center Wastewater
- NIST Handbook 44, Specifications, Tolerances and Other Technical Requirements for Weighing and Measuring Devices, current edition

APPENDIX

None

CURRENT ACKNOWLEDGEMENTS

**This guideline was developed by contributors who are of experienced individuals in a related field(s). The acknowledged persons are included with their professional affiliations and may be contacted via a DPC Officer(s) and/or Task Force Director(s) for questions or concerns.*

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