

Cleaning guidelines for reducing chlorpropham (CIPC) from potato stores and equipment

Objective: Reduction of CIPC from store fabrics, structures and equipment in order to minimise residues found on future potato crops.

The following steps are advised to reduce traces of chlorpropham (CIPC) in potato stores and to reduce the risk of exceedance of any future tMRL.

1. Key principles

1. **All stores with a history of CIPC use must be cleaned as soon as the 2019 crop has been unloaded** (see section 2).
2. Cleaning activities must integrate safety parameters: always use personal protection equipment (PPE) and pay attention to safety when working at height.
3. Keep written records and pictures of what has been cleaned, how and when. The buyer of the potatoes may request a record of cleaning activities.
4. Preferably use dry cleaning methods and in any case start with them. Only if no suitable dry cleaning method is available, or not sufficient for complete cleaning, should water be used. When using complementary wet cleaning, an acceptable method of collecting water and disposing of it appropriately must be used to avoid dispersing waste water into the environment.
5. Care should be taken to minimise re-distribution of CIPC. Loose materials should be removed promptly, by vacuuming. Sweeping and brushing generate dust, which risks re-distribution.
6. Cleaning must be carried out from top to bottom (i.e. roof to floor).
7. CIPC is only slightly volatile. Volatilisation will contribute to removal of CIPC, but over longer periods of time. When the store is not in use for potato storage, doors and hatches should be left open to allow for continuous refreshment.
 - Underground cleaned ducts should also have a constant movement of air after cleaning, either by running fans or by natural draft. Low airspeed is sufficient.
8. Where possible, first remove loose waste material by dry cleaning and then move store hardware (boxes, above ground ducts, etc.) outside so weather action (sun, rain, wind, temperature) can also contribute to CIPC removal.
9. Cleaning efforts should focus in positions of highest contamination, like plenum and fans (see section 2.1 and 6).

2. **Clean all loose materials by brushing + vacuuming together** (not in sequence, but always combined) from all critical areas in the store. For stubborn deposits, more aggressive methods may be required (wire brush):

1. Removing loose waste material from all critical parts of the store (see section 6 Hotspots).
 - Above and underground ducts require special attention because of soil and CIPC residues. First, remove all soil and then follow up with brush + vacuum cleaner.
 - Above ground metal ducts can receive a special treatment in a re-shaping machine which will remove particles during the re-shaping process or by weathering outside. Metal ducts should be cleaned on both sides with high-pressure water on dedicated area.
 - Where wooden ducts, wooden panels, slats, or duct covers valves are used, these should be ideally be replaced by new ones. Replacement of any wooden parts needs to be done only after thorough cleaning of the store in order to avoid as much as possible contaminating the new wood with CIPC from previously

contaminated material. If replacement is not possible, proceed to intense cleaning, and complete with weathering outside for as long as possible.

- In box and bulk stores, fans (including circulation fans), refrigeration units, and associated air distribution ducts will need particular attention when these have been used to re-circulate CIPC fog.
2. **Sweeping/Brushing**
 - On floors and walls use brushes with hard bristles to scrub, e.g. steel or hard plastic, so it will release particles attached to concrete and other store fabrics.
 - On exposed insulation with a rough surface, often on ceilings, use softer, longer bristles to better remove particulates and not cause damage on foam.
 3. **Vacuuming**
 - Use a vacuum cleaner with a robust dust filter (HEPA, M-filter (99.9%) or carbon filter) so even any very small fine CIPC particles are not released back into the store. Change or clean the filter regularly.
 4. As an exception, all store parts that can be easily cleaned outdoors have to be cleaned outside the store on a specific area where waste water can be easily collected (e.g. sprayer cleaning area). Consider high-pressure water for cleaning.
 - Use appropriate pressure for cleaning and avoid too high pressure resulting in excessive spread of dirty material and aerosols.
 - Take care to collect and dispose of waste water as phytosanitary effluent where this is the case.
 5. In the most contaminated places (plenum, fans, refrigerating units), the use of a high-pressure steam cleaner with integrated suction is recommended to complement dry cleaning.
 6. In case of a store with an earth floor, consider removing 10 cm of soil and replace it by new soil or build a concrete floor if possible.
 7. Dispose of dust and other solid material removed from the store in the same way as soil and potato waste from routine crop cleaning/grading etc.
 8. Clean your cleaning tools (brooms, brushes, etc.) using high-pressure water.
3. **Wooden boxes**
 1. Remove all loose materials by brushing. Consider a subsequent wet cleaning method using a box washer, but take care of water disposal.
 2. Store boxes outdoors for the entire period that the boxes are not in use. Boxes should not be close-stacked. Take care that boxes are stacked safely.
 4. **Farm transport, hoppers, conveyors, store loaders and/or box fillers.**
 1. Outdoor wet cleaning with high-pressure water on a specific area where waste water can be easily collected.
 2. Special attention has to be paid to hoppers and conveyors, which were used for CIPC dust or liquid applications, during store loading operations.
 5. **Lorries (bulk transport or taut liner) used for transportation.**
 1. Brush out before wet cleaning with high-pressure water with appropriate waste water collection and disposal.
 6. **Hotspots**

Hotspots depend on the type and location of CIPC application and on the fog distribution within the store when hot-fogging practices were done. Carefully consider the places where CIPC fog was applied and hotspots where accumulated deposits may be found which were not removed by regular cleaning during the past seasons (floor and wall near fogging port, plenum, fans, refrigeration unit, roof-heater fans, anti-condensation fans etc.).

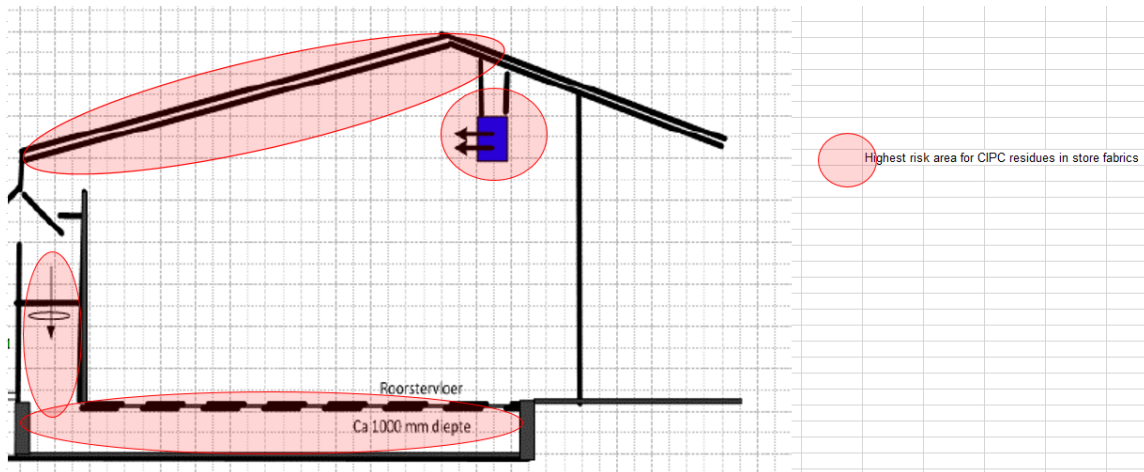


Figure 1 - Schematic diagram of a bulk store showing areas likely to have highest CIPC contamination levels



Figure 2 - Places of the store where CIPC contamination can be easily demonstrated



Figure 3 - Fan and its wooden reverse airflow cover with CIPC deposits



Figure 3 - Underground duct with loose material and CIPC deposits.



Figure 5&6 Air cooling equipment and associated ducts in box stores

Important considerations for potato storage in the upcoming seasons

1. **Make sure you comply with store cleaning. Use the checklist to demonstrate compliance to your customers.**
2. **When doors and hatches have been left open for air circulation, ensure the store remains free of vermin and complies with food safety rules before the new crop is loaded.**
3. **Ensure filling stores at a uniform stack height.**
 - a. It is important that all potatoes of a bulk store receive the same amount of air. Short circuiting of the air through a restricted part of the bulk potatoes might result in accumulation of CIPC residues on those potatoes:
 - Wherever possible, ensure a consistent pile height across the store by using boxes, wooden walls or straw bales at the front of the stack.
 - If this is not possible, restrict or block air flow to the part of the pile which is not at uniform height to prevent [the air] short-circuiting.
 - b. Similar consideration needs to be taken for box stores in order to provide uniform air distribution through all boxes.