United States Department of Agriculture
Agricultural Marketing Service | National Organic Program
Document Cover Sheet
https://www.ams.usda.gov/rules-regulations/organic/national-list/petitioned

Document Type:

☒ **National List Petition or Petition Update**

A petition is a request to amend the USDA National Organic Program's National List of Allowed and Prohibited Substances (National List).

Any person may submit a petition to have a substance evaluated by the National Organic Standards Board (7 CFR 205.607(a)).

Guidelines for submitting a petition are available in the NOP Handbook as NOP 3011, National List Petition Guidelines.

Petitions are posted for the public on the NOP website for Petitioned Substances.

☐ **Technical Report**

A technical report is developed in response to a petition to amend the National List. Reports are also developed to assist in the review of substances that are already on the National List.

Technical reports are completed by third-party contractors and are available to the public on the NOP website for Petitioned Substances.

Contractor names and dates completed are available in the report.

December 4, 2019

National Organic Program
USDA/AMS/NOP, Standards Division
Attention: National List Manager
Room 2642-So., Ag Stop 0268
1400 Independence Ave. SW
Washington, DC 20250-0268

Re: Petition to add Cetylpyridinium Chloride ("CPC") to section 205.605 (b) of the National List

Safe Foods Corporation is enclosing a petition to add CPC as a processing aid for application onto poultry or poultry parts at slaughter or processing plants. The petition follows the format described in the "Guidelines on Procedures for Submitting National List Petitions" (72 Fed Reg 2167; January 18, 2007), as clarified by the proposed "Update of the Petition and Technical Review Process" (August 27, 2013).

Introduction:

CPC is widely distributed over the counter as a component of certain mouthwashes, toothpastes, lozenges, throat sprays, breath sprays, and nasal sprays.

CPC is a generic cationic quaternary ammonium compound found in many types and brands of worldwide, commercially available products such as mouthwash (Crest Pro-Health®, Scope®, Reach ACT®, Cepacol®, Viadent®, Oasis®, Dr. Fresh®, Swish®, BreathRX®, and BetaCell®); toothpaste (Crest Sensitivity® and Crest Plus Scope®); lozenges, throat sprays, and anti-snore throat sprays (Cepacol®, Breathe Right®, Rite Aid, CVS, Walgreens brand, Oasis®, BreathRX®, SinoFresh®, Ayr No-Drip Sinus®, and Septolete Plus); as well as baby teething gels (Anbesol, Calgel, Dentinox, Rinstead, and Woodward's) and baby wipes (Penaten lotion-filled baby wipes).

In addition, CPC is a synthetic antimicrobial agent that has widespread use within the North American poultry processing industry. In poultry processing, the primary purpose of CPC is to reduce, to the maximum extent practicable, foodborne pathogens such as *Salmonella* and *Campylobacter* that may be present on raw poultry. CPC is a safe and efficacious antimicrobial agent that assists poultry processors in meeting pathogen and human illness reduction targets set by the USDA's Food Safety and Inspection Service (FSIS). Adding CPC to the National List would meaningfully supplement, and not merely duplicate, the existing processing aids on the National List that are used for reduction of microbes on raw poultry.

Application of CPC:

At the end of the poultry slaughter process, birds are most commonly cooled in large cold water tanks termed chillers. Alternatively, but less commonly, birds may be air chilled. The internal temperature of birds must promptly reach 40° F or less within specific time frames defined in the USDA regulations at Title 9 CFR 381.66. CPC is currently approved for use at either the pre-chill or post-chill location. These uses of CPC have undergone an extensive safety review by the Food and Drug Administration (FDA), following which the FDA published two separate notice and comment rulemakings[1], and codified CPC use onto raw poultry (21 CFR 173.375). Subsequently, USDA's own public health regulatory agency, FSIS, determined that CPC was safe and suitable for use on raw poultry (FSIS Directive 7120.1).

CPC, the active ingredient in a patented formulation trade named Cecure®, is a food processing aid that is supplied as a 40% concentrate solution of CPC. CPC is diluted to ≤ 1% in potable tap water for use as an antimicrobial treatment for raw poultry carcasses and poultry parts. CPC is specifically approved for this usage in the U.S., by the U.S. Food and Drug Administration and by the U.S. Department of Agriculture, Food Safety and Inspection Service (at a concentration of ≤ 1.0% in an aqueous solution that also contains propylene glycol at a level up to 1.5 times that of the CPC).

As we look toward future expansion of consumer interest in organic poultry products, we have determined that addition of CPC to the National List will provide processors with a safe and efficacious antimicrobial agent that is manufactured, applied, and captured in a manner that is in accord with the underlying principles of the Organic Foods Production Act, the National Organic Standards Board, and the USDA National Organic Program.

The following pages respectfully submit our petition for your careful review and consideration. Should you have any questions or require any additional information, please contact me at the email or phone number below.

Sincerely,

Beatrice Maingi
Senior Manager, Regulatory Affairs & QA/QC Laboratory
Beatrice.Maingi@safefoods.net
501-534-6833

Enclosure

[1] See: April 2, 2004 Federal Register (69 FR 17297), and November 29, 2007 Federal Register (72 FR 67572)

Safe Foods Corporation
Petition to add Cetylpyridinium Chloride (CPC) to the National List

Item A.1:

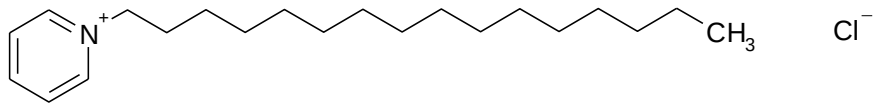
This petition requests that the generic compound Cetylpyridinium chloride (CPC) be added to the National List under 7 CFR 205.605(b) for use on raw poultry carcasses and parts as an antimicrobial processing aid.
7 CFR 205.605(b) lists "Nonagricultural (nonorganic) substances allowed in or on processed products labeled as "organic" or "made with organic (specified ingredients)."

Item B:

Concise and comprehensive information on the substance being petitioned:

1. CPC chemical and/or material common name.

IUPAC name: 1-hexadecyl pyridinium chloride.
Common names: Ceepryn chloride, Cepacol chloride, Cetamium, Dobendan, Pristacin, and Pyrisept.
Synonyms: 1-palmitylpyridinium chloride, C16-alkylpyridinium chloride, Acetoquat CPC, Aktivex, Ammonyx CPC, Cepacol, Ceprim, Cetafilm, Halest, Ipanol, Medilave, Mercocet, Merothol, and Pionin B.
Chemical Abstract Service (CAS) Registry Number: 123-03-5.
REACH Number: None
The structural formula for CPC is depicted below:



The molecular formula of CPC is $C_{21}H_{38}NCl$; the molecular weight is 340 g/mol. CPC is typically present in water in the monohydrate form. The monohydrate has the molecular formula $C_{21}H_{38}NClH_2O$ and has a formula weight of 358 g/mol. The calculated elemental content is C: 70.45%, H: 11.26%, Cl: 9.90%, O: 4.47%, and N: 3.91%.

CPC may be characterized in terms of the following physical properties:

Table 1. Physical Properties of CPC

Appearance/Physical form	**white powder (monohydrate)**
Melting Point	**77°C - 83°C**
pH (1% aqueous solution)	**6.0 - 7.0**
Solubility*	**freely soluble in water, alcohol and chloroform but insoluble in ether**

*CPC does not dissolve in food products including poultry, which is the intended food of contact for this petition.

2. The petitioners name address and telephone number, the manufacturer's or producer's name, address and telephone number (if different) and other contact information of the manufacturer/producer of the substance listed in the petition.

Same as above

3. The intended or current use of the substance such as use as a pesticide, animal feed additive, processing aid, nonagricultural ingredient, sanitizer or disinfectant. If the substance is an agricultural ingredient, the petition must provide a list of the types of product(s) (*e.g.*, cereals, salad dressings) for which the substance will be used and a description of the substance's function in the product(s) (*e.g.*, ingredient, flavoring agent, emulsifier, processing aid).

Cetylpyridinium chloride (CPC) is applied as an antimicrobial agent onto raw poultry carcasses and poultry parts. It does not have a technical effect in finished product and therefore meets the FDA definition of a processing aid (21 CFR 101.100(a)(3)(ii)(c)).

The CPC solution ($\leq 1.0\%$) is used to treat the inner and outer surfaces of raw pre-chill, poultry carcasses after the last inside/outside bird washer (IOBW) at ambient temperature. Optionally, CPC can be applied to post-chill (immersion or air-chilled), whole poultry carcasses or to poultry parts. For post-chill application of whole carcasses or parts, the temperature of the recycled CPC solution will typically be lower than with a pre-chill application due to the colder temperature of the product being treated and the fact that the CPC solution is continually recycled throughout the day as discussed below.

The CPC solution will be applied as a drench or dip to the surfaces of the poultry carcasses or parts. The volume of CPC per carcass will vary, depending on the point of application (pre- or post-chill), size of application nozzles, carcass size, and line speed. Typically, treatment volume

will be in the range, but will not be limited to, approximately 1.0 to 2.0 L per carcass with a pre- or post-chill application. The actual exposure time of the carcass or poultry parts to the CPC treatment solution will be only a few seconds, typically (but not limited to) ≤ 5 seconds for whole carcasses; and, up to (but not limited to) 10 seconds for poultry parts.

The CPC drench application equipment makes use of a cabinet through which the carcasses or parts are conveyed at the plant's normal operating line speed. The cabinet is equipped with spray nozzles and a hertz cycle regulated booster pump to apply the liquid treatment solution at a constant volume in liters per minute ("LPM"). The volume of CPC utilized per carcass can vary somewhat, particularly as the line speed may increase or decrease, given the constant application volume per minute. The CPC dip application equipment consists of a dip tank that is constantly replenished with CPC solution into which poultry parts are immersed as they are conveyed on a conveyer belt. The CPC systems above capture and recycle virtually all solution, so water usage is not significantly affected by treatment volume. Studies have verified that microbial efficacy of the CPC solution is not diminished by recycling.

Following treatment with CPC, the carcasses will continue to move along the line to the next processing stage. Where applicable (in a pre-chill application with air-chilling or in a post-chill application), the application of CPC is followed by a cursory potable water rinse.

4. Intended Activities and Application Rate: A list of the crop, livestock or handling activities for which the substance will be used. If used for crops or livestock, the substance's rate and method of application must be described.

CPC will be applied onto raw poultry carcasses or poultry parts in accordance with the existing FDA approval at 21 CFR 173.375[2]. Please see section 3 above for details on the process application.

21 CFR 173.375 states that CPC may be "applied as a liquid aqueous solution applied to raw poultry carcasses either prior to or after chilling at an amount not to exceed 5 gallons of solution per carcass, provided that the additive is used in systems that recapture at least 99 percent of the solution that is applied to the poultry carcasses. The concentration of cetylpyridinium chloride in the solution applied to the carcasses shall not exceed 0.8 percent by weight. When application of the additive is not followed by immersion in a chiller, the treatment will be followed by a potable water rinse of the carcass."

5. Manufacturing Process - The source of the substance and a detailed description of its manufacturing or processing procedures from the basic component(s) to the final product.

The Petitioner does not manufacture CPC, as it is a readily available item of commerce that may be obtained from a variety of suppliers throughout the world. Our primary supplier deploys an

[2] See: April 2, 2004 Federal Register (69 FR 17297), and November 29, 2007 Federal Register (72 FR 67572)

active corporate sustainability program. For the last six years they have received an A+ finding by the Global Reporting Initiative (GRI) following GRI's review of the supplier's annual Corporate Sustainability Report. As part of their sustainability initiatives, our primary CPC supplier adopts three inter-related activities: (1) Environmental initiatives to include energy and water conservation by use of bio-fuels, (2) Practicing international worker safety standards, and (3) Social responsibility including community empowerment initiatives and partnerships with the World Health Organization, United Nations Development Program, and Non-governmental Organizations.

CPC is prepared by the interaction of cetyl chloride and pyridine under pressure at an elevated temperature. Ethanol (Bio route) is used by our commercial source as the primary feedstock for the manufacture of Pyridine. Although pyridine could be manufactured using a petrochemical source, we do not use this source. Pyridine is synthesized from ethanol derived from glucose fermentation (from sugar cane). The percent of carbon and hydrogen atoms used to make pyridine from this source has been calculated to be 65%. In aqueous solution, CPC is synthesized by alkylation of pyridine with cetyl chloride to yield the monohydrate of the quaternary salt of pyridine and cetyl chloride.

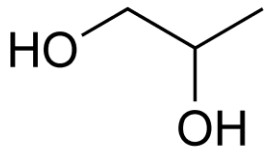
The CPC concentrate solution that is provided to poultry processors is manufactured by mixing the CPC and biodiesel sourced propylene glycol (PG) with water according to Good Manufacturing Practices. As noted below, the PG is an EPA list 4B inert ingredient. The final product is prepared by the Petitioner as a concentrate containing approximately 40% CPC and PG at a concentration of up to 1.5 times that of the CPC, with the balance being water. The concentrated solution is diluted with additional potable water at the point of use to yield the appropriate product application solution ($\leq$ 1.0% CPC).

6. Ancillary Substances - For Handling substances provide information about the ancillary substances (such as, but not limited to, carriers, emulsifiers or stabilizers) that may be included with the petitioned substance, including function, type of substance, and source if known.

CPC is mixed with propylene glycol (PG). The PG to be used under this petition is from a biodiesel renewable resource. The propylene glycol is made from glycerin generated during the manufacture of biodiesel, a diesel-fuel alternative produced from vegetable oil. The PG is included in conformance with the approval from the FDA. PG has been affirmed by FDA as generally recognized as safe (GRAS).[3] The PG molecule is chemically inert and only serves to enhance the stability and solubility of CPC in solution, and to reduce the absorption of CPC on the treated poultry. The PG molecule does not break down on the treated poultry product or in the processing environment. However, when consumed, PG is rapidly metabolized in a manner similar to sugar, where it breaks down into lactic acid, which is excreted from the body in urine.

The IUPAC name for PG is Propane-1,2-diol; the CAS Number is 57-55-6; and, the EC Number is 200-338-0. The structural formula for PG is depicted below:

[3] 21 CFR 184.1666



The molecular formula of PG is $C_3H_8O_2$; the molecular weight is 76.09 g/mol. PG is a colorless, clear, viscous liquid. PG has a melting point of -59°C, a boiling point of 188.2°C, and is freely soluble in water, alcohol, acetone, chloroform and diethyl ether.

Table 2. Physical Properties of PG

Appearance/Physical form	**colorless, clear, viscous liquid with a faintly sweet taste**
Melting Point	**- 59°C**
Boiling Point	**188.2°C**
Solubility	**freely soluble in water, alcohol, acetone, chloroform and diethyl ether**

7. Previous Reviews - A summary of any available previous reviews by State or private certification programs or other organizations of the petitioned substance. If this information is not available, the petitioner should state so in the petition.

No state, private certification programs or other organizations have reviewed CPC. Multiple peer-reviewed studies in the reference section were conducted by state funded university researchers.

CPC is also approved for the petitioned usage for raw poultry, and in some cases for treatment of other foods, in other countries including Argentina, Canada, Colombia, Costa Rica, El Salvador, Guatemala, Israel, Jordan, Mexico, Panama, Peru, Russia, Saudi Arabia, South Africa, U.A.E., and Uruguay. Therefore, potential addition of CPC to the National List would potentially provide for application outside of the U.S.

8. Regulatory authority - Information regarding EPA, FDA, and State regulatory authority registrations, including registration numbers. The information provided must confirm that the intended use of the substance is permitted under EPA or FDA regulations, as applicable. If this information does not exist or is not applicable, the petitioner should state so in the petition.

CPC is approved for the usage described above in the U.S. by the U.S. Food and Drug Administration (FDA) and by the United States Department of Agriculture - Food Safety and

Inspection Service (USDA/ FSIS). The biodiesel sourced propylene glycol non-active ingredient is an EPA List 4B inert ingredient.

9. The Chemical Abstract Service - (CAS) number or other product numbers of the substance and labels of products that contains the petitioned substance. If the substance does not have an assigned product number, the petitioner should state so in the petition.

CPC. The IUPAC name for CPC is 1-hexadecyl pyridinium chloride; the CAS Number is 123-03-5

The product label is provided as **Attachment 1** to this submission. In accordance with the FDA and USDA approvals of CPC as a processing aid, raw poultry does not require labeling following application of CPC under the conditions of use.

10. Physical and Chemical Properties - The substance's physical properties and chemical mode of action

The molecular formula of CPC is $C_{21}H_{38}NCl$; the molecular weight is 340 g/mol. CPC is typically present in the monohydrate form with a molecular formula of $C_{21}H_{38}NCl.H_2O$ and a formula weight of 358 g/mol. The calculated elemental content is C: 70.45%, H: 11.26%, Cl: 9.90%, O: 4.47%, and N: 3.91%. CPC is a white powder, with a melting point of 77°C to 83°C, a pH of 6.0 to 7.0 (1% aqueous solution), and is freely soluble in water, alcohol and chloroform, but is insoluble in ether and does not dissolve in food products. As noted above, CPC is not a chlorine-based compound.

Table 3. Physical Properties of CPC

Appearance/Physical form	**white powder (monohydrate)**
Melting Point	**77°C - 83°C**
pH (1% aqueous solution)	**6.0 - 7.0**
Solubility*	**freely soluble in water, alcohol and chloroform but insoluble in ether**

*CPC does not dissolve in food products, specifically poultry, which is the intended food of contact for this petition.

(a) Chemical interactions with other substances, especially substances used in organic production;

CPC is considered to be a stable compound due to its three carbon-nitrogen bonds. CPC is a quaternary ammonium compound (N atom with 4 attached groups) therefore the nitrogen atom possesses no unpaired electrons leaving no site for N-oxidation, a requirement for reactions with

the nitrogen atom. There are no known impurities, by-products, contaminants or reaction products of concern in concentrated or diluted CPC. CPC is not an oxidant, or acidic in nature and will not alter the structure or function of proteins, lipids, or carbohydrates. In addition, CPC has a neutral pH and will not alter the sensory characteristics of the product being treated.

Based on the above facts concerning the stability of the CPC compound and the multi-year history of safe use in poultry processing plants, we believe that the following situations reflect the use of CPC in a poultry processing facility:

1. CPC solutions will not react with organic acids, sodium hypochlorite, ammonia, or chlorinated water.
2. CPC solutions will not produce odors when used with chlorinated water.
3. CPC solutions will not be affected by a high or low pH.
4. CPC solutions will not produce toxic or hazardous by-products in poultry fat during processing.

(b) toxicity and environmental persistence;

Due to the long history (> 60 years) of safe use of CPC as a disinfectant in mouthwashes, toothpastes, throat sprays, throat lozenges, etc., numerous toxicity studies have been conducted on the compound over the years. Many of these reports have been published in the literature and include studies on acute toxicity, short-term toxicity, sub-chronic toxicity, genotoxicity, carcinogenicity, reproductive development toxicity, and pharmaceutical use. This information is summarized and provided in **Attachment 2**.

Due to its structural nature, there are no degradation or reaction by-products of CPC. The carbon-nitrogen (C-N) bond attaching the aliphatic carbon tail to the pyridine ring of CPC is very strong and would require strong oxidants, well beyond what is used within poultry processing plants, to disrupt the bonds.

Based on the entirety of the genotoxicity testing conducted by Safe Foods Corporation, in addition to the testing in the literature, CPC has no significant potential for genotoxic activity. After reviewing two sub-chronic (90-day) feeding studies in rats and dogs, the FDA concluded that the no-observable effect level (NOEL) for the dog (the more sensitive species of the two) was 8 mg/kg body weight per day. By applying a 1000-fold safety factor to this value, the FDA determined the acceptable daily intake (ADI) for a 60-kg human as 0.48 mg/p/d.

Environment related issues are presented in the next section.

(c) Environmental impacts from its use and/ or manufacture;

The Petitioner does not manufacture CPC, as it is a readily available item of commerce that may be obtained from a variety of suppliers throughout the world. CPC can be prepared by the interaction of cetyl chloride and pyridine under pressure at an elevated temperature. Ethanol (Bio route) is used by our primary commercial source as the primary feedstock for the

manufacture of Pyridine. Although it is available from petrochemical sources, we do not utilize that route. In aqueous solution, CPC is synthesized by alkylation of pyridine with cetyl chloride to yield the monohydrate of the quaternary salt of pyridine and cetyl chloride. [Note – alkyl groups are one of the most common groups that occur in organic molecules]

As part of the FDA's extensive review of the CPC conditions of use in several separate food additive petitions, their Environmental Review Team, Office of Food Additive Safety, Center for Food Safety and Applied Nutrition, "determined that approval of this petition will not significantly affect the quality of the human environment and therefore will not require the preparation of an environmental impact statement." Accordingly, under the Notice and Comment rulemaking for CPC use, the FDA issued a Finding of No Significant Impact (FONSI) for CPC application to raw poultry.

Under FDA's approved condition of use for CPC, at least 99% of the antimicrobial is collected and recycled throughout the poultry processing day. Because the CPC application system captures and recycles virtually all solution, water usage is not significantly affected by treatment volume. It is important to note that this capture of CPC was implemented not over evidence with direct environmental concerns, but rather to "mitigate any possible concerns" with potential recycling into cat food of the "ancillary substance," biodiesel sourced propylene glycol (PG), described in Item 6 above. Although the PG has been affirmed by FDA as generally recognized as safe (GRAS) for humans[4], cats demonstrate a unique, species-specific toxicity to PG[5].

At the end of a processing day, the entire CPC application system is shut down and any solution remaining in the recycle tank is sent to a purge tank. The frequency of this purging varies from one plant to another, although a daily purging is typical. The purged solution is filtered to remove any remaining CPC using disposable carbon filters. The activated carbon treatment provides for complete removal of CPC from the aqueous treatment solution.

The CPC is captured in carbon barrels and disposed of either in approved landfills or by incineration. Disposal of the carbon barrels by either method does not allow for free CPC to enter the environment. Typically, a plant will use and dispose of one carbon filter (55-gallon drum or 209-L drum) every two months. The filtered, CPC-free liquid is then combined with the plant wastewater. In addition, available data for commercial CPC applications indicate that CPC, if present at all in the effluent from wastewater treatment facilities following the capture and recycling processes, will be there in vanishingly low levels and will be of no environmental significance.

Based on the foregoing considerations, the amount of CPC that enters the environment because of its intended use will be extremely low.

[4] 21 CFR 184.1666
[5] See: CPC Final Rule. November 29, 2007 Federal Register (72 FR 67572)

(d) effects on human health;

As noted in section 10.b, CPC has been widely, and safely, used in over the counter medication and hygiene products for decades. Modern poultry husbandry and processing consistently results in products that are safe, wholesome, and nutritious. As a raw product, poultry may be contaminated with *Salmonella* and *Campylobacter*. Poultry establishments in the US must meet *Salmonella* performance level targets that are set by the USDA Food Safety and Inspection Service (FSIS). Recently, FSIS has re-emphasized in its strategic plan its focus on human illness related to *Salmonella* and *Campylobacter*. Modern poultry processing establishments employ a multi-hurdle approach to *Salmonella* and *Campylobacter* control. These hurdles can include counter flow scalders (where birds move into progressively cleaner water) to facilitate feather removal, antimicrobial sprays such as up to 20 - 50 ppm chlorine on equipment, and rapid temperature reduction in immersion or air chillers at the end of a slaughter line.

Establishments also deploy antimicrobial sprays onto equipment and carcasses at multiple locations in the slaughter process. Establishments typically deploy an antimicrobial spray, as a critical control point in a HACCP food safety system, onto birds just prior to the chilling process. Other antimicrobial application points may include after the chilling process to further reduce the levels of *Salmonella* and *Campylobacter* on finished product, or onto parts or belts during the fabrication (cut up) of poultry. Research, and FSIS' experience with regulating HACCP since 1996, point to the reality that there is no "one size fits all" approach to preventing and reducing *Salmonella* and *Campylobacter* levels in poultry processing. Variation in plant facilities, equipment and production processes, along with geographic differences, seasonal effects, and inherent variability in live bird flocks require plants to constantly focus on their food safety preventative practices, to include antimicrobial interventions.

The currently approved antimicrobial agents on the National List, although safe and fully consistent with the National Organic Program, nevertheless limit the options that are available to poultry processors. The addition of CPC to the National List would meaningfully expand the options that are available to poultry processors that produce organic poultry. First, CPC is safe and effective. Second, CPC represents a distinct (non-organic acid) chemical group that is not currently represented on the National List. Accordingly, it would provide an important addition to the available antimicrobial agents that can be applied to organic poultry to reduce *Salmonella* and *Campylobacter* levels. Thirdly, CPC is produced in a manner that is consistent with sustainable practices and then disposed of by capture without general release into the plant effluent or the environment. Without CPC, poultry processors are likely to use sanitizers that are strong oxidizing agents, such as hypochlorite. Hypochlorite can result in the formation of chlorinated amines, a potentially carcinogenic class of compounds (e.g., trihalomethanes) that are a well-known and persistent by-product of water chlorination. CPC can be used as an alternative to hypochlorite to avoid the formation of chlorinated amines.

(e) effects on soil organisms, crops, or livestock.

Not applicable. See section 10.c for the discussion that describes *de minimis* environment impact.

11. Safety information - information about the substance including a Safety Data Sheet (SDS) and a substance report from the National Institute of Environmental Health Studies. If this information does not exist, the petitioner should state so in the petition.

The current Safety Data Sheet (SDS) is provided as **Attachment 3**. We do not have a substance report from the National Institute of Environmental Health Studies. As part of FDA's required activities when it reviewed, and subsequently approved, our secondary direct food additive petitions to use CPC as a processing aid onto raw poultry, the FDA published an environmental finding of no significant environmental impact (FONSI) as described in section 10.c.

12. Research information - information about the substance which includes comprehensive substance research reviews and research bibliographies, including reviews and bibliographies which present contrasting positions to those presented by the petitioner in supporting the substance's inclusion on or removal from the National List. For petitions to include substances onto the National List for organic handling, this information item should include research concerning why the substance should be permitted in the production or handling of an organic product, including the availability of organic alternatives. If research information does not exist for the petitioned substance or for the contrasting position, the petitioner should state so in the petition.

A summary of research is provided in **Attachment 4**.

13. Petition Justification Statement – a statement that provides justification for any of the following actions requested in the petition: *Inclusion of a Synthetic on the National List, § 205.605(b)*

(a) Inclusion of a Synthetic on the National List (7 CFR §§ 205.601, 205.603, 205.605(b))

Recently, USDA's Food Safety and Inspection Service has re-emphasized in its strategic plan its focus on human illness related to *Salmonella* and *Campylobacter*. Modern poultry processing establishments employ a multi-hurdle approach to achieve consistent *Salmonella* and *Campylobacter* control. CPC has been favorably reviewed for safety by the FDA[6] and approved for use in raw poultry as an antimicrobial processing aid. Its conditions of use in poultry processing were subsequently approved by the USDA in FSIS Directive 7120.1, Safe and Suitable Ingredients Used in the Production of Meat, Poultry, and Egg Products (available at fsis.usda.gov).

The currently approved antimicrobial agents on the National List, although safe and fully consistent with the National Organic Program, nevertheless limit the options that are available to poultry processors. The addition of CPC to the National List would meaningfully expand the options that are available to poultry processors that produce organic poultry. First, CPC is safe and effective as demonstrated by its wide over the counter use, regulatory approval by FDA, and

[6] See: April 2, 2004 Federal Register (69 FR 17297), and November 29, 2007 Federal Register (72 FR 67572)

current use by many poultry processors. Second, CPC represents a distinct (non-organic acid) chemical group that is not currently represented on the National List. Accordingly, it would provide an important addition to the available antimicrobial agents that can be applied to organic poultry, using a multi-hurdle approach, to reduce *Salmonella* and *Campylobacter* levels. Thirdly, CPC is produced in a manner that is consistent with sustainable practices and then disposed of by capture without general release into the plant effluent or the environment. Finally, without CPC, poultry processors are likely to use sanitizers that are strong oxidizing agents, such as hypochlorite. Hypochlorite can result in the formation of chlorinated amines (e.g., trihalomethanes), a potentially carcinogenic class of compounds that are a well-known and persistent by-product of water chlorination. CPC can be used as an alternative to hypochlorite to avoid the formation of chlorinated amines.

• Explain why the synthetic substance is necessary for the production or handling of an organic product.

Food safety is an important objective for all poultry processors, as well as the regulatory agencies. To consistently meet the regulatory objectives requiring reductions in foodborne pathogens such as *Salmonella* and *Campylobacter*, poultry processors in both the commercial and organic markets typically seek to use antimicrobial processing aids that have demonstrated safety and efficacy in a particular location in an individual facility. USDA's FSIS recognizes the use of a multiple hurdle approach in poultry processing as the most effective means to control for *Salmonella* and *Campylobacter*. Accordingly, there is no single "best" antimicrobial for all situations. The addition of CPC to the National List would meaningfully supplement the substances on the current National List because it represents a safe, widely used, type of antimicrobial group that is distinct from the chemical groups that are currently on the National List. See section 10.d.

• Describe any non-synthetic substances, synthetic substances on the National List or alternative cultural methods that could be used in place of the petitioned synthetic substance.

Potential alternative substances on the National List include hot water, citric acid, lactic acid, chlorine, peroxyacetic acid, organic ethanol, and chlorine. We briefly discuss these substances currently on the National List below:

Hot Water:

To be consistently effective against common foodborne pathogens, hot water must be applied at a temperature of 165°F onto the carcass surface. Unlike the situation in livestock processing, hot water is not applied onto raw poultry either immediately prior to or after the chiller. Largely, this is because it would negatively impact the ability of an official establishment to meet FSIS' regulatory temperature chilling requirement for poultry at 9 CFR 381.66. Those chilling requirements require poultry processors to reduce product temperature to <40°F within a specified period of time to reduce the opportunity for pathogen growth. The application of hot

water at a location just prior to or after this chilling step would work against these goals. There is no similar temperature chilling requirement for livestock carcasses.

Citric acid:

To our knowledge, citric acid application by itself is not commonly practiced in the poultry industry. Citric acid can be used to lower the pH of water containing sodium hypochlorite (chlorine) in order to maximize the antimicrobial effect of the chlorine. Citric acid alone is not specifically referenced by FSIS as an antimicrobial agent or as a safe and suitable ingredient for use in poultry processing under FSIS Directive 7120.1, Safe and Suitable Ingredients Used in the Production of Meat, Poultry, and Egg Products (available at fsis.usda.gov). This Directive is a widely cited "safe harbor" listing of ingredients, including antimicrobial agents, that describes their approved conditions of use. Therefore, although it is potentially available, citric acid is not commonly accepted or recognized by the USDA public health agency as an efficacious antimicrobial for use is modern poultry production.

Lactic acid:

Lactic acid is widely used in livestock processing as an effective antimicrobial agent. One leading deterrent to the use of lactic acid is the fact that it has a corrosive effect on facilities and equipment. In the poultry industry, lactic acid is not widely used as an antimicrobial agent, in part due to the availability of other antimicrobials, to include CPC.

Peroxyacetic acid (PAA):

PAA is an equilibrium mixture containing peroxyacetic acid, acetic acid, hydrogen peroxide and water. PAA is an efficacious antimicrobial agent that can be applied at multiple process points. However, chemically, PAA contains an organic acid that does not expand the available options for plants that (a) may be facing Salmonella control challenges, or (b) plants that want to focus on prevention and expand their antimicrobial application options beyond the organic acid group. Some processors have noticed a quality aspect to PAA in that PAA may produce a slight grey discoloration in highly vascular areas of a carcass.

Organic ethanol:

Organic ethanol is not specifically referenced by FSIS as an antimicrobial agent or as a safe and suitable ingredient in FSIS Directive 7120.1, Safe and Suitable Ingredient Used in the Production of Meat, Poultry, and Egg Products (available at fsis.usda.gov). This Directive is a widely used "safe harbor" listing of ingredients, including antimicrobial agents, that describes their approved conditions of use. Although organic ethanol could potentially be applied to organic raw poultry, there are insufficient peer reviewed studies to support its use and efficacy in poultry processing.

Chlorine:

Chlorine at up to 50 ppm is commonly used during poultry production to disinfect equipment and for certain applications directly onto product or processing water. To meet FSIS performance standards for *Salmonella* reduction, chlorine alone has not proven sufficiently efficacious. Accordingly, poultry plants deploy additional antimicrobial agents beyond just chlorine. At higher levels of chlorine, some workers experience sensitivity to chlorine off-gassing. When combined with high organic loads from poultry (e.g., fat), as may occur in poultry immersion chillers, chlorine byproducts such as trihalomethanes can form. For these and related reasons, the European Union and certain other countries restrict hyperchlorination of poultry products.

• Describe the beneficial effects to the environment, human health, or farm ecosystem from use of the synthetic substance that support its use instead of the use of a non-synthetic substance or alternative cultural methods.

CPC is a widely used substance in a myriad of over the counter medications with a long history of safety. In section 10.c of this submission, and elsewhere, we described production and disposal provisions associated with CPC. That discussion referenced our sourcing of CPC, and capture of the chemical following its use to provide for separate disposal in an environmentally safe manner. In section 13 we outlined the human health benefits of addition CPC to the National List and described why approval for its use under 7 CFR 205.605(b) would be a meaningful addition to the currently listed synthetic and non-synthetic agents.

As we look at future expansion of consumer interest in organic poultry processing, we have determined that addition of CPC to the National List will provide processors with a safe and efficacious antimicrobial agent that is manufactured, applied, and captured in a manner that is in accord with the underlying principles of the Organic Foods Production Act, the National Organic Standards Board, and the USDA National Organic Program.

Respectfully submitted for your consideration.

##

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Beers, K.W., J. Rheingans, K. Chinault, P. Cook, B. Smith, and A. Waldroup, 2006. Microbial efficacy of commercial application of Cecure® CPC antimicrobial to ingesta-contaminated pre-chill broiler carcasses. Intern. J. Poultry Sci. 5(8):698-703.

Li, Y., M.F. Slavik, J.T. Walker, and H. Xiong, 1997. Pre-chill spray of chicken carcasses to reduce *Salmonella typhimurium*. J. Food Sci. 62:605-607.

Waldroup, A.L., K.L. Beers, P.E. Cook, E.A. Dell, R. Odglen, R.A. Baker, C.W. Coleman, B.A. Smith, and B.W. Maingi, 2010. The effects of cetylpyridinium chloride (Cecure® CPC Antimicrobial) on *Campylobacter* Spp. on raw poultry: A review. Intern. J. Poultry Sci. 9(4):305-308.

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Attachment 1

Cecure® (CPC) Product Label

DO NOT REFRIGERATE

Brand Food Processing Aid
Product of United States of America

SAFE FOODS
KNOWLEDGE | SERVICE | SOLUTIONS
1501 E. 8th Street, NLR, AR 72114 501.758-8500

CETYLPYRIDINIUM CHLORIDE IN PROPYLENE GLYCOL AND WATER
Antimicrobial for direct application to food products

Company Name .....**Safe Foods Corporation**
Address: ....1501 E. 8th Street, North Little Rock, AR 72114

Hazard Statements: Harmful if swallowed. Causes skin irritation. Causes serious eye damage. Very toxic to aquatic life.

Precautionary Statements:
Prevention: Do not breathe dust/fume/gas/mist/vapors/spray. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. Wear protective gloves/clothing/eye/face protection. In case of inadequate ventilation wear respiratory protection. Avoid release to the environment.
Response: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. IF SWALLOWED: rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a POISON CENTER or doctor/physician if you feel unwell. Wash contaminated clothing before reuse. Store in a well-ventilated place. Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations.

FIRST AID
Eye Contact: Immediately flush eyes with water, while lifting the eyelids, for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Seek prompt medical attention if irritation develops or persists.
Skin Contact: Remove contaminated clothing and shoes. Wash off immediately with soap and plenty of water. Seek medical attention if irritation develops or persists. Wash clothing and shoes separately before reuse.
Ingestion: Do not induce vomiting unless instructed by a physician. Give several large glasses of milk, or water if not available. Do not give anything by mouth to an unconscious person. Seek medical attention. Do not leave individual unattended.
Inhalation: Move the exposed person to fresh air at once. If breathing is difficult, properly trained personnel may assist affected person by administering oxygen. If not breathing, properly trained personnel may assist affected person by performing artificial respiration. Seek prompt medical attention.
Note to Physicians: All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred. Treat symptomatically. No specific antidote available.

Before using, read and understand current SDS for this product.

Product Name: Cecure 40% Concentrate
Product Number.....60599A
Cetylpyridinium chloride.....CAS Registry No.6004-24-6
Propylene glycol.....CAS Registry No.57-55-6

DANGER

Directions for Use

Concentrated – Solution (40% CPC) should be diluted at least 40:1 before application. Contents must be at 65◦ F or above before use.
DO NOT REFRIGERATE.

LOT#

Net Weight.....418 lbs. (190 kg)
Net Volume.....50 gals US (189.3 liters)

No warranty express or implied, of merchantability, fitness for a particular purpose or otherwise, is made except that the product conforms to Safe Foods Corporation specifications. Buyer assumes all risk of use, storage and handling. Safe Foods Corporation shall not be liable for any incidental or consequential damages arising directly or indirectly in connection with the purchase, use, storage or handling of the product. To be used only by qualified personnel.

This container may be hazardous when emptied. Since empty container contains product residues (vapor or liquid) all label hazard precautions must be obeyed. Dispose in accordance with Local, State and Federal regulations. Do not reuse empty containers.

24 Hr Emergency Contact CHEMTREC 800-424-9300 ACCT# CCN19424

Licensed under one or more of the following U.S. Patents: 5,366,983; 5,855,940, 6,039,992, 6,742,720, 6,864,269 and additional U.S. and International patents issued and pending.

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Attachment 2

Toxicology Studies Summary

Safe Foods Corporation, 2019

Table I. Toxicology studies on CPC.

Year of Study	Subject of Study	Testing Party or Author of Referenced Citation	Nature of Study	Results of Study (LD_{50} expressed in mg/kg b.w.) (NOEL and NOAEL expressed in mg/kg)
1942	CPC	Warren *et al.*	Acute Toxicity Rabbit	LD_{50} 400
1942	CPC	Warren *et al.*	28-day Oral Administration Study of CPC in Rabbits – (up to 10 to 100 mg/kg b.w.)	No gross pathological changes
1946	CPC	Nelson and Lyster	Acute Toxicity Rat	LD_{50} 200
1965	CPC	Rosen *et al.*	Acute Toxicity Male Rat Female Mouse	LD_{50} 428 LD_{50} 195
1970	CPC in vinyl-Copolymer	Villa *et al.* (cited in BIBRA)	1 Year Feeding Study in Male and Female Rats (up to 35 mg/kg b.w.)	No evidence of carcino-genicity
1970	CPC in vinyl-copolymer	Villa *et al.* (cited in BIBRA)	Feeding Study in Female Rats 3 Months Prior to Mating and Throughout Gestation and Lactation (up to 35 mg/kg b.w.) ; Repeated in 2^{nd} and 3^{rd} Generations	Fertility and incidence of malformations within normal limits in each generation
1970	CPC	Weeks and Rowe (cited in BIBRA)	90-day Toxicity Feeding Study of CPC in Male and Female Rats (up to 1000 mg/kg)	NOEL= 800 (M); 300 (F) NOAEL= 2000 (M and F)
1979	CPC	Gilman and DeSalva	Rat Teratology Study for Days 6 to 15 of Gestation (up to 68 mg/kg b.w.)	27.33 mg/kg b.w. resulted in lower body weight; no skeletal deformity
1979	CPC	Yamaguchi and Yamashita	Ames Test	Not mutagenic to *Salmonella typhimurium*

Year of Study	Subject of Study	Testing Party or Author of Referenced Citation	Nature of Study	Results of Study (LD_{50} expressed in mg/kg b.w.) (NOEL and NOAEL expressed in mg/kg)
1995	CPC	Zeeland Chemicals	Acute Toxicity Male Rat Female Rat	 LD_{50} 460 LD_{50} 335
1996	CPC	Lewis	Acute Toxicity Rat Mouse Rabbit Guinea Pig Dog Cat	 LD_{50} 5080 LD_{50} 1360 LD_{50} 1000 LD_{50} 3860 LD_{50} 1000 LD_{50} 1000
1998	CPC	U.S. FDA	Ingredient in Mouthwash Products for Human Use	0.045 to 0.1% with minimally 72 to 77% chemically available CPC is safe
1999	2% CPC in repro-graphic toner product	Lin	Ames Test; Mouse Lymphoma Assay; Sister Chromatid Exchange Assay in Chinese Hampster Ovary; *In vitro* BALB/3T3 Cell Transformation Assay; Inhalation by Pregnant Rats	CPC was Inactive in all assays; no mutagenic or teratogenic response in urine, feces, or bone marrow of animals in subchronic inhalation studies (1.2 g/m^3)
2001	Cecure®	Next Century Incorporated	Bacterial Reverse Mutation Test: Plate Incorporation and Preincubation Method for Liquids	No evidence of mutagenic activity
2001	CPC	Next Century Incorporated	*In vitro* Chromosome Aberration in Chinese Hamster Ovary Cells for Liquids	No clastogenic activity detected
2002	CPC	Redfield Laboratories	14-day Palatability Study of CPC in	NOEL = 100 NOAEL = 500

Year of Study	Subject of Study	Testing Party or Author of Referenced Citation	Nature of Study	Results of Study (LD_{50} expressed in mg/kg b.w.) (NOEL and NOAEL expressed in mg/kg)
			Sprague-Dawley Rats (up to 500 mg/kg CPC)	
2002	**CPC**	**Redfield Laboratories**	**28-day Toxicity Feeding Study of CPC in Sprague-Dawley Rats (up to 1000 mg/kg CPC)**	**NOEL = 250 NOAEL = 1000**
2005	**CPC**	**Charles River Laboratories**	**28-day Toxicity Feeding Study of CPC in Beagle Dogs (up to 1500 mg/kg CPC)**	**NOEL = 500 NOAEL = 1000**
2006	**CPC**	**Charles River Laboratories**	**90-day Toxicity Feeding Study of CPC in Sprague-Dawley Rats (up to 1000 mg/kg)**	**NOEL = 250 NOAEL = 1000**
2006	**CPC**	**Charles River Laboratories**	**90-day Toxicity Feeding Study of CPC in Beagle Dogs (up to 1000 mg/kg)**	**NOEL = 250 NOAEL = 375**

NOEL = no observed effect level; NOAEL = no observable adverse effect level; mg/kg b.w. = milligrams per kilogram of body weight; mg/kg = milligrams per kilogram; g/m^3 = grams per cubic meter; U.S. FDA = United States Food and Drug Administration.

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Attachment 3

Cecure® (CPC) Product Safety Data Sheet

SAFETY DATA SHEET

Section 1. Chemical Product and Company Identification

Product Name :	**Cecure 40% Concentrate**
Product Type/Use :	Cetylpyridinium chloride in propylene glycol and water
Supplier's Name :	Safe Foods Corporation
Address (Corporate Headquarters) :	1501 E. 8th Street North Little Rock, AR 72114
Telephone Number for Information :	(501) 758-8500
Emergency Telephone Number :	(800) 424-9300 (CHEMTREC) acct. CCN19424
Date of SDS :	6/24/2019 Version 1.7

Section 2. Hazard(s) Identification

GHS classification

Acute toxicity: Oral - Category 4
Skin corrosion/irritation - Category 2
Serious eye damage/eye irritation - Category 1
Hazardous to the aquatic environment, short-term - Acute Category 1

GHS label elements

Hazard pictograms/symbols

Signal Word: Danger

Hazard Statements

H302: Harmful if swallowed.
H315: Causes skin irritation.
H318: Causes serious eye damage.
H400: Very toxic to aquatic life.

Precautionary Statements

Prevention

P260: Do not breathe dust/fume/gas/mist/vapors/spray.
P264: Wash hands thoroughly after handling.
P270: Do not eat, drink or smoke when using this product.
P273: Avoid release to the environment.
P280: Wear protective gloves/clothing/eye/face protection.
P285: In case of inadequate ventilation wear respiratory protection.

Response

P301+P312: IF SWALLOWED: Call a POISON CENTER/doctor/physician if you feel unwell.
P301+P330+P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303+P361+P353: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

Section 2. Hazard(s) Identification(Contd.)

P304+P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+PP351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312: Call a POISON CENTER/doctor/physician if you feel unwell.
P363: Wash contaminated clothing before reuse.
P403+P233: Store in a well-ventilated place. Keep container tightly close.
P501: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations.

Section 3. Composition/Information on Ingredients

Component	CAS #	Wt. %
Propylene glycol	57-55-6	trade secret
Cetylpyridinium chloride, monohydrate	6004-24-6	1-44%

Section 4. First Aid Measures

Eye contact : Immediately flush eyes with water, while lifting the eyelids, for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Seek prompt medical attention if irritation develops or persists.

Skin contact : Remove contaminated clothing and shoes. Wash off immediately with soap and plenty of water. Seek medical attention if irritation develops or persists. Wash clothing and shoes separately before reuse.

Ingestion : Do not induce vomiting unless instructed by a physician. Give several large glasses of milk, or water if not available. Do not give anything by mouth to an unconscious person. Seek medical attention. Do not leave individual unattended.

Inhalation : Move the exposed person to fresh air at once. If breathing is difficult, properly trained personnel may assist affected person by administering oxygen. If not breathing, properly trained personnel may assist affected person by performing artificial respiration. Seek prompt medical attention.

Note to physicians : All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred. Treat symptomatically. No specific antidote available.

Section 5. Fire-Fighting Measures

Suitable extinguishing media : Use carbon dioxide, dry chemicals, foam (alcohol or universal), or water spray.

Specific hazards : Emits toxic or corrosive vapors, under fire conditions. Product will not burn unless dried out.

Special protective equipment for fire-fighters : Wear a self-contained breathing apparatus with a full face piece operated in the positive pressure demand mode with appropriate turn-out gear and chemical resistant personal protective equipment. Refer to the personal protective equipment section of the SDS.

Section 6. Accidental Release Measures

Small Spill : Absorb liquid on vermiculite, floor absorbent or other absorbent inert material (e.g. dry sand, earth). Place in appropriate chemical waste container.

Large Spill : Prevent run-off to sewers, streams or other bodies of water. If run-off occurs, notify proper authorities as required, that a spill has occurred. Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed. Stop spill at source, dike area of spill to prevent spreading, pump liquid to salvage tank. Remaining liquid may be taken up on sand, clay, earth, floor absorbent, or other absorbent material and shoveled into containers. Retain all contaminated water for removal and treatment.

Section 7. Handling and Storage

Handling

Put on appropriate personal protective equipment. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor, mist or dust. Avoid release to the environment.

Storage

Store in tightly closed containers. Store in an area that is dry, well-ventilated, away from ignition sources, away from incompatible materials (see Section 10). Do not store with, or close to oxidizers.

Section 8. Exposure Controls/Personal Protection

Engineering measures

Not required under normal conditions of use. However, if unusual operating conditions exist, then provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below PEL/TLV(s).

Personal protective equipment

Eye protection : Wear safety glasses in compliance with OSHA regulations.

Skin protection : Wear resistant gloves such as: neoprene or polyvinyl chloride gloves.

Respiratory protection : Not required under normal conditions of use.

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH REL
Propylene glycol	TWA: 10 mg/m^3 (mist)		

Section 9. Physical and Chemical Properties

Appearance : Clear Liquid

Color : Colorless to light yellow

Odor : Mild organic

Boiling Point : Not determined

Vapor Pressure : Not determined

Specific Vapor Density : Not determined

Liquid Density : 8.21 lbs/gal @ 77^{o}F

% Volatiles : Not determined

% VOC : Not determined

Evaporation Rate : Not determined

Section 9. Physical and Chemical Properties (Contd.)

Physical Form : Homogeneous solution
pH : 6-8 (1% in DI water)
Viscosity : Not determined
Freezing Point : Not determined
Solubility in Water : Soluble
Flashpoint : Not determined

Section 10. Stability and Reactivity

Chemical Stability : Stable under normal conditions.
Condition to avoid : Avoid contact with open flames and incompatible materials.
Hazardous Polymerization : Product will not undergo hazardous polymerization.
Hazardous Decomposition : Carbon monoxide, nitrogen oxides, and hydrogen chloride.
Materials to avoid : Avoid strong oxidizing agents, acids, acid anhydrides, and acid chlorides.

Section 11. Toxicological Information

Acute toxicity

Product/ingredient	Results	Species	Dose	Exposure
Cetylpyridinium chloride, monohydrate	LD_{50} Oral	Rats, mice, rabbits	125-680 mg/kg	-
	4-hr inhalation LC_{50}	Rats	0.09 mg/L	-

Irritation/Corrosion

Cetylpyridinium chloride, monohydrate:
Severe eye and skin irritant.
Does not cause dermal sensitization (skin rash)

Carcinogenicity

Not available.

Sensitization

Not available.

Aspiration hazard

Not available.

Specific target organ toxicity (single exposure)

Product/ingredient name	Category	Route of exposure	Target organs
Cetylpyridinium chloride, monohydrate	Category 3	Inhalation	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Not available.

Mutagenicity

Mutagenicity tests indicate that this chemical is not mutagenic.

Reproductive toxicity

Does not cause reproductive toxicity or express anti-fertility activity.

Potential chronic health effects

A developmental toxicity test in rats found no treatment-related anomalies.

Section 12. Ecological Information

Aquatic ecotoxicity

Product/ingredient name	Toxicity
Cetylpyridinium chloride	LC50 (96h) Oncorhynchus mykiss (rainbow trout) = 0.16 mg/L
Cetylpyridinium chloride	EC50 (48h) Daphnia magna = 9.18 µg/L
Cetylpyridinium chloride	EC50 (72h) Pseudokirchneriella subcapitata (algae) = 26.9 µg/L
Cetylpyridinium chloride	NOEC (96-hr) Oncorhynchus mykiss (rainbow trout) = 0.11 mg/L
Cetylpyridinium chloride	NOEC (72-hr) Selenastrum capricornutum (algae) = 9.3 µg/L
Cetylpyridinium chloride	NOEC (48-hr) Daphnia magna = 3.2 µg/L
Cetylpyridinium chloride	EC50 (3h) Activated Sludge = 20.7 mg/L
Propylene Glycol	LC50 (96h) Oncorhynchus mykiss = 51600 mg/L
Propylene Glycol	EC50 (24h) Daphnia magna = 10000 mg/L
Propylene Glycol	EC50 (48h) Daphnia magna = 1000 mg/L
Propylene Glycol	EC50 (96h) Pseudokirchneriella subcapitata = 19000 mg/L

Persistence and degradability

25% Primary degradation after 28 days in OECD 301D closed bottle test. Does not biodegrade readily.

Bioaccumulative potential

An estimated BCF of 5.7, based on a measured Log Kow of 1.71, suggests the potential for bioconcentration in aquatic organisms is low.

Mobility in soil

Soil/water partition coefficient (Koc) : No data available

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal Consideration

Waste from residues / unused products : Dispose in accordance with all applicable local, state, and federal regulations.

Contaminated packaging : Dispose in accordance with all applicable local, state, and federal regulations.

Section 14. Transport Information

Regulatory information	14.1. UN number	14.2. Proper shipping name	14.3. Classes	14.4. Packing Group	Additional information
DOT Classification	Non-Hazardous	Chemicals, n.o.s. (Cetylpyridinium Chloride in Propylene Glycol)	Not Applicable	Not Applicable	-
TDG Classification	-	Not Regulated	-	-	-
IMDG Class	UN3082	Environmentally Hazardous substance, Liquid, n.o.s., (Cetylpyridinium Chloride in Propylene Glycol)	9	III	Shipping by boat, labels required*
IATA-DGR Class	-	Not Regulated	-	-	-

14.5. Environmental Hazards: Marine Pollutant

14.6. Special Precaution for user: For marine transport OUTSIDE the United States the proper shipping name is: UN3082, Environmentally Hazardous substance, liquid, n.o.s., (Cetylpyridinium Chloride in Propylene Glycol), 9, PG III (Marine Pollutant).

***Labels Required:** **For marine shipping only**

Section 15. Regulatory Information

Environmental Protection Agency

SARA Title III, Section 313 (Toxic Chemicals)	: None
SARA 304 Reportable Quantity (RQ)	: None
SARA 302 Threshold Planning Quantity (TPQ)	: None
SARA Title III, Section 311/312(Hazard Categories)	
Acute	: Yes
Chronic	: No
Ignitable	: No
Reactive	: No
Sudden Release of Pressure	: No

CERCLA: The Comprehensive Environmental Response, Compensation, and Liability Act of 1980:

Reportable Quantity (RQ)	: None

Other Federal Regulations

Clean Air Act, Sections	: None
Clean Water Act, Sections	: None

International Regulations

Canadian DSL/EINECS	: Cetylpyridinium chloride (CAS # 123-03-5) Propylene glycol (CAS # 57-55-6)
Canadian WHMIS	: D1A and D2B

State and Local Regulations

California Proposition 65	: None
Massachusetts Right to Know	: None
Pennsylvania Right to Know	: Cetylpyridinium chloride (CAS # 123-03-5) Propane-1,2-diol (CAS# 57-55-6)
New Jersey Right to Know	: Cetylpyridinium chloride (CAS # 123-03-5) Propane-1,2-diol (CAS# 57-55-6)
Rhode Island Right to Know	: None

Section 16. Other Information

HMIS Rating

Health	: 3
Flammability	: 1
Reactivity	: 0
PPE	: X

Notes : The PPE rating depends on circumstances of use. See Section 8 for recommended PPE. The Hazardous Material Information System(HMIS) is a voluntary, subjective alpha-numeric symbolic system for recommending hazard risk and personal protection equipment information. It is a subjective rating system based on the evaluator's understanding of the chemical associated risks. The end-user must determine if the code is appropriate for their use.

NSF : Not available

FDA/USDA/GRAS : Not available

Kosher : This product has been evaluated and approved for Kosher use.

FIFRA : Not available

Other : Not available

Section 16. Other Information (Contd.)

Abbreviations

Abbreviation	Definition
<	Less Than
>	Greater Than
ACGIH	American Conference of Governmental Industrial Hygienists
EHS	Environmental Health and Safety Dept.
N/A	Not Applicable
N/D	Not Determined
N/E	Not Established
OSHA	Occupational Safety and Health Administration
PEL	Personal Exposure Limit
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value
TWA	Time Weight Average
UNK	Unknown

Prepared by: Quality Assurance Department

Disclaimer of Liability

The information herein is presented in good faith and believed to be correct as of the date hereof. However, Safe Foods Corporation makes no representation as to completeness and accuracy thereof. Users must make their own determination as to the suitability of the product for their purpose or of any other nature with respect to the product or to the information herein is made hereunder. Safe Foods Corporation shall in no event be responsible for any damages of whatsoever nature directly or indirectly resulting from the publication or reliance upon information contained herein.

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Attachment 4

Summary of Cecure® (CPC) Research Studies

Safe Foods Corporation, 2019

SUMMARY OF RELEVANT SCIENTIFIC PUBLICATIONS ON THE EFFICACY OF CPC FOR TREATING RAW POULTRY CARCASSES AND PARTS

1. "Pre-Chill Spray of Chicken Carcasses to Reduce *Salmonella typhimurium*," Li *et al*., 1997 (See **Attachment 5**).

In this early study, pre-chill broilers were inoculated with *Salmonella typhimurium* and sprayed in a test chamber with 0.1% CPC at 207, 345 or 827 kPa pressure for either 30 or 90 seconds of exposure time. Spraying with 0.1% CPC for 90 seconds at 827 kPa pressure resulted in a 1.6 $\log_{10}$ reduction in *Salmonella.* It should be noted that in commercial practice a CPC concentration of > 0.1% is typically utilized, resulting in significantly greater reductions in all organisms, including *Salmonella*, as will be noted in the studies below.

2. "Microbial Efficacy of Commercial Application of Cecure® CPC Antimicrobial to Ingesta-Contaminated Pre-Chill Broiler Carcasses," Beers *et al*., 2006 (See **Attachment 5**).

A 12-week study was conducted under commercial processing conditions in three USDA/FSIS-inspected commercial poultry processing facilities in the U.S. In this study Cecure® was utilized as a pre-chill spray to treat raw poultry that were visibly contaminated with ingesta material. Briefly, pre-chill broilers were sprayed with 0.5% to 0.7% Cecure® in a recycling scenario for 2 to 3 seconds prior to chilling. All carcasses were microbiologically sampled prior to immersion chilling. The Cecure® treatment significantly reduced APC by at least 2.5 logs, *E. coli* by at least 1.6 logs, total coliform by at least 1.2 logs, and *Campylobacter* by at least 0.8 logs. *Salmonella* incidence was reduced from a high of 33% to less than 10% in one plant, and to less than 3% in the other two plants.

3. "Efficacy of Antimicrobials Against *Campylobacter jejuni* on Chicken Breast Skin," Arritt *et al*., 2002 (See **Attachment 5**).

This laboratory study evaluated the effects of 0.1% and 0.5% CPC, among other decontaminant treatments, on *Campylobacter jejuni* on chicken skin samples. When the organism was inoculated onto the skin surface before treatment, reductions of 1.4 and 2.9 $\log_{10}$ CFU/mL

were achieved with 0.1% and 0.5% CPC, respectively. When *Campylobacter jejuni* was inoculated onto the chicken skin after the skin had been treated with 0.5% CPC, a 4.7 $\log_{10}$ reduction was noted. The authors noted that "Cetylpyridinium chloride (0.5%) was an effective decontaminant agent for inactivating, reversing attachment, and inhibiting attachment of *Campylobacter jejuni* to chicken skin."

4. "The Effects of Cetylpyridinium Chloride (Cecure® CPC Antimicrobial) on *Campylobacter* Spp. on Raw Poultry: A Review," Waldroup *et al*., 2010 (See **Attachment 5**).

This review article is based on numerous published studies and many of the Petitioner's laboratory and commercial in-plant studies demonstrating the efficacy of Cecure® against *Campylobacter* on commercial broilers. The article states that at a concentration between 0.1% and 0.5%, the use of Cecure® will result in at least a 1 to 2.5 $\log_{10}$ reduction in *Campylobacter* levels on pre-chill broilers, with incidence rates being reduced from 80% to 90% to no greater than 7% to 9%. It should be noted that in all studies, the 0.4% and 0.5% Cecure® treatments resulted in significantly greater reductions than did the 0.1% or 0.25% Cecure® treatments, as would be expected.

5. "Efficacy of a Commercial Post-Chill Whole Carcass Cecure® Antimicrobial Application for Extending the Shelf-Life of Various Broiler Products," Baker *et al., 2010* (See **Attachment 5**).

A commercially available post-chill Cecure® rinse cabinet was installed and operated in a U.S.D.A./F.S.I.S-inspected broiler processing plant several months prior to initiation of the study. On the day the shelf-life study was conducted, a single flock of broilers was used. Control samples were collected during a 2-hour period prior to turning on the Cecure® post-chill, whole carcass drench cabinet. Six different types of broiler products were collected including boneless skinless breast meat, thighs, wings, split breasts, leg quarters and whole carcasses (n=70 per product type). All broiler parts were tray-packed and whole carcasses were bagged individually. A second group of Cecure®-treated (0.3%) product was also collected. On Day 0 all product was held at 28°F for 6 hours after which product was held at 32°F for 3 days. For the

remainder of the study, all products were held at 34°F. Regardless of product type, the Cecure® treatment resulted in initial reductions in APC on Day 0 from 0.5 to > 1.0 $\log_{10}$ CFU/mL. These initial reductions led to increases in product shelf-life as follows: boneless skinless breast meat and whole carcasses (1.5-day extension), thighs, split breasts, and wings (2-day extension), and leg quarters (1-day extension). The slope and the shape of the bacterial curves for all product types were virtually identical to those of the control product with the exception of a lower initial (Day 0) level of APC; hence, increasing the days to spoilage without a delayed technical affect.