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January 6, 2004

BY HAND DELIVERY

Linda S. Kahl, Ph.D.
Division of Biotechnology and
GRAS Notice Review
Office of Food Additive Safety
Center for Food Safety and Applied Nutrition
Food and Drug Administration
HFS-255, Room 1119
1110 Vermont Avenue, N.W.
Washington, D.C. 20005

Re: GRAS Notification for Carbon Monoxide

Dear Dr. Kahl:

On behalf of Precept Foods, LLC (Precept), attached is a notification of Precept's determination that carbon monoxide (CO) is generally recognized as safe (GRAS) when used at a target concentration of 0.4% in modified atmosphere packaging (MAP) systems for case-ready fresh meat. This GRAS notification is submitted pursuant to section 201(s) of the Federal Food, Drug, and Cosmetic Act (FFDCA) and proposed 21 C.F.R. §§ 170.30 and 170.36 (62 Fed. Reg. 18937 (Apr. 17, 1997)). An original and two copies of the notification are attached. For convenience, a disk with an electronic copy of the notification is also attached as a portable document format (PDF) file.

This GRAS determination involves meat products, which are subject to regulation by the Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture (USDA). Information substantiating the suitability of this intended use of CO was provided to FSIS by Precept in a July 2, 2003 submission identified as confidential. To preserve the confidentiality of the information provided, we ask that a Food Master File be created for this submission. It is our understanding that a copy of the submission has been provided to the Food and Drug Administration (FDA) by FSIS.

If there are any questions regarding this GRAS notification, or if additional information is required, please do not hesitate to contact us.

Sincerely,

Gary Jay Kushner
Ann Mileur Boeckman
Counsel to Precept Foods, LLC

Enclosure

cc: Lane A. Highbarger, FDA
Forrest Dryden, Ph.D.
Scott J. Eilert, Ph. D.
Michael Mullins
Jon D. Lammers
Mahlon C. Schneider

GRAS Notification for Carbon Monoxide (CO) intended for use in case-ready packaging for fresh meats

I. GRAS EXEMPTION CLAIM

A. Name and Address of Notifier:

Precept Foods, LLC
Austin, Minnesota
Care of Gary Jay Kushner and Ann M. Boeckman
Counsel to Precept Foods, LLC
555 Thirteenth Street, N.W.
Washington, D.C. 20004

B. Common or Usual Name of the Substance:

Carbon monoxide (CO)

C. Conditions of Use:

Carbon monoxide is intended for use as a component of a modified atmosphere packaging (MAP) system for case-ready fresh beef and pork. The carbon monoxide will be used at a target concentration of 0.4% or less, (with a process tolerance of 20% in the modified environment, for a CO concentration of up to .48%). CO will be used in a mixture of nitrogen (N_2) (0-80%) and carbon dioxide (CO_2) (20%-100%).

The finished MAP system is intended to provide benefits not available with currently used systems, including enhanced product quality, convenience, presentation, and reliability made possible by the use of a set open date code that will clearly communicate a validated "use or

freeze by" date for the consumer. With specific regard to product quality and presentation, use of CO offers the advantage of minimizing degradation of product color that can occur prior to microbial spoilage. The open date code established for products packed in the MAP system will not exceed 35 days following the date of pack for intact muscle cuts, and 28 days for ground beef.

D. Basis for GRAS Determination:

Scientific procedures

E. Availability of Information Supporting GRAS Determination:

The data and information that form the basis for this GRAS determination are available for FDA review and will be provided upon the agency's request.

II. DETAILED INFORMATION ON THE IDENTITY OF THE NOTIFIED SUBSTANCE

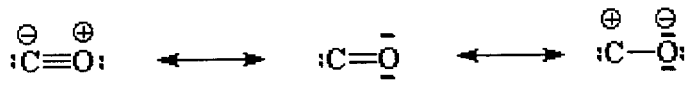
A. Chemical Abstract Service (CAS) Registry Number

The CAS Number for carbon monoxide is 630-08-0.

B. Empirical and Structural Formulas

The empirical formula of carbon monoxide is CO.

The structural formula for carbon monoxide is represented by the following:



The most stable form of the molecule is a triple bond between carbon and oxygen.

C. Properties

Relative molecule mass	28.01
Critical point	-140.2 °C at 34.5 atm (3.5 MPa)
Melting point	-205.1 °C
Boiling point	-191.5 °C
Density, at 0°C, 1 atm	1.250 g/litre
Density, at 25°C, 1 atm	1.145 g/litre
Specific gravity relative to air	0.967
Solubility in water at 0°C, 1 atm	3.54 mL/100mL
Solubility in water at 25°C, 1 atm	2.14 mL/100mL
Solubility in water at 37°C, 1 atm	1.83 mL/100mL

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D. Method of Manufacture

Carbon monoxide may be produced in a steam methane reformer, a single reactor that is used to produce a synthesis gas of hydrogen and carbon oxides. In a steam reformer, sulphur free hydrocarbons, such as methane, and superheated steam are passed over a refractory supported nickel catalyst (or nickel and lanthanum catalyst) placed in Ni-Cr alloy tubes. When passing the nickel-based catalyst the feed hydrocarbon/steam mixture converts basically to hydrogen and carbon oxides according to the following reactions:

$$C_nH_m + nH_2O \Leftrightarrow (n + m/2)\ H_2 + nCO \qquad (1)$$

$$CH_4 + H_2O \Leftrightarrow CO + 3H_2 \qquad (2)$$

$$CO + H_2O \Leftrightarrow CO_2 + H_2 \qquad (3)$$

The conversion is used to produce a mixture of the following: hydrogen (H_2), CO_2, CO, methane (CH_4), and steam (H_2O). Once the CO and H_2 are formed, the components are separated from each other via such techniques as cryogenic separation.

E. Specifications for Food Grade Material

The CO used in the Precept system will be of a purity suitable for use in contact with food. The raw material specifications for CO call for a

minimum CO content of 98%. The impurities anticipated to be present in the remaining 2% of the bulk product consist of components that may be found in the atmosphere, such as N_2, O_2, CO_2, Argon, H_2O, H_2, and/or CH_4.

III. DETAILED INFORMATION ON CONDITIONS OF USE

Case-ready packaging systems offer advantages of product quality, presentation, and convenience to both retailers and consumers. Significantly, case-ready meat programs allow for less handling of products prior to retail purchase, enhancing not just convenience and efficiency, but product safety and quality as well. Precept Foods strives in all of its case-ready work to minimize the amount of effort and involvement expended at retail in the preparation of fresh meat products for display.

Not all systems commonly described as "case ready" employ packaging that is ready for immediate display upon delivery to the retailer. Many of the programs available today do require some intermediate preparation at the retail level, and thus are not fully "case ready." For instance, primary packages of meat may be provided to retailers in a master container, or secondary packaging, that is flushed with a mixture of gases, including O_2, CO, CO_2, and/or N_2. Retailers are advised to remove these products from the MAP environment within a fixed or stated distribution shelf life, and then offer the

products for retail display for a defined period of time. A drawback is that products cannot be open code dated in such systems, as it is not known when in the distribution life the products will be placed in the retail case for display. Thus, the retailer remains responsible for applying the consumer code date on the product.

In the MAP system that Precept Foods has developed, meat will be placed on a tray within a chamber. Once the desired atmosphere is achieved, a barrier film will be affixed to the tray to ensure that the atmosphere is maintained throughout the product's distribution. The packages will be prepared and labeled with a validated open date code at a central location and will be subject to no further processing or manipulation at retail. Thus, the product will be ready for retail display and delivery to consumers upon pack, and the product label will not be altered following application of the mark of inspection by the U.S. Department of Agriculture, Food Safety and Inspection Service (FSIS). The open date code established for products packed in the MAP system will not exceed 35 days following the date of pack for intact muscle cuts, and 28 days for ground beef.

The use of a centralized packing facility for the finished retail package will eliminate all retailer discretion in the process, adding the consumer benefit of an open dating system that is scientifically established, validated, and controlled. In addition to minimizing any risk of cross

contamination that can occur in a retail establishment, the use of such a system substantially reduces any risk that the shelf life will be manipulated inappropriately at the retail level.

CO is included in the modified atmosphere to help maintain the characteristic color of fresh meat. Like O_2, CO has long been known to have a color-stabilizing effect on fresh meat. The desirable red color of fresh beef, in particular, is attributed to oxymyoglobin, which is formed when myoglobin in meat muscle fibers is exposed to oxygen. When CO comes into direct contact with meat, myoglobin is converted to carboxymyoglobin, resulting in a color that is substantially indistinguishable from that of oxymyoglobin. In the absence of a modified atmosphere, oxymyoglobin is eventually converted to metmyoglobin, which has an unappealing, brown color. This conversion can occur before microbial spoilage renders the product unfit for human consumption. Odor, gas formation and/or slime formation are also indicators of spoilage.

Indeed, although the use of CO will stabilize the characteristic color of meat, CO is not intended to affect microbial growth. Microbial shelf life will continue to be determined, as it always has been, on such considerations as anticipated microbial growth, product composition, and distribution conditions, including storage temperatures. Significantly, the proposed system is not intended to extend the shelf

life of products in excess of what has been implemented with CO in similar systems.

IV. BASIS FOR THE GRAS DETERMINATION

A. Detailed Summary of Basis for GRAS Determination

Precept Foods has determined that the use of CO in MAP systems at target levels of up to 0.4% (with a process tolerance of 20% in the modified environment, for a CO concentration of up to .48%) is GRAS. This GRAS determination is based upon the same approach used to assess the safety of other MAP systems containing CO—namely, a comparison of CO intake estimated to result from the specific modified atmosphere of interest to national health-based standards for acceptable exposure to CO in ambient air. In addition, as described more fully below, Precept Foods has also considered the safety of finished MAP system under the intended conditions of use.

1. Regulatory Precedent—CO and Fresh Meat

The Precept Foods MAP system is a variation of, and would substitute for, comparable systems that have similarly been determined to be GRAS. In 2001, Pactiv Corporation notified FDA of its conclusion that CO is GRAS when used in contact with meat as part of that company's ActiveTech 2001 ("ActiveTech") MAP system. GRAS Notification No. 000083; see also Letter from Alan M. Rulis, Ph.D., Director, Office of Food Additive Safety, Center for Food Safety and Applied Nutrition

(Feb. 21, 2002). In the ActivTech MAP system, CO is used at a target level of 0.4% in a mixture of N_2 (70%) and CO_2 (30%). The gases are flushed into a "pillow pack" that contains an inner tray upon which the meat is wrapped in a hermetically sealed permeable film. The CO in the outer packaging permeates the inner film and comes into direct contact with the meat, providing a color-stabilizing effect. Specifically, the CO converts the meat pigment oxymyoglobin (red) to carboxymyoglobin (red), which prevents formation of metmyoglobin (brown) while the atmosphere is maintained. Prior to retail display, the inner tray is removed, exposing the package to normal atmospheric conditions and allowing the CO to escape.

Pactiv based its GRAS determination upon publicly available data and information regarding the safety of CO. The information relied upon included typical "background" levels of CO in the atmosphere, typical serum carboxyhemoglobin levels that may be attributed to natural CO background, the health-based national air quality standard for CO promulgated by the U.S. Environmental Protection Agency (EPA), and occupational limitations for CO established by the U.S. Occupational Safety and Health Administration (OSHA), among other reference standards. Pactiv also cited actual experience with the use of CO in retail packaging (i.e., case ready packaging) as important evidence of safety: the Notification observes that CO has been used in Norway in

the retail packaging of fresh meats at concentrations of 0.3% to 0.5% CO.

Based on the data and information presented in GRN 000083, Pactiv concluded that consumption of meat treated with CO as part of the ActiveTech system was not expected to result in any measurable levels of carboxymyoglobin in the blood of those who consume treated meat. Pactiv estimated that the worst-case intake of CO attributable to the ActiveTech product is 1.88 mg CO/meal, and found the realistic exposure to be 0.084 mg CO/meal. Pactiv compared the estimated daily intake (EDI) with available air quality standards for CO, and characterized the anticipated consumer intake as a small fraction of the currently permitted exposures considered to be protective of health by authoritative agencies. In support of this conclusion, Pactiv cited information in the published literature regarding the safe use of CO in case-ready meats (i.e., in the retail package).

FDA responded that it had "no questions" regarding Pactiv's determination that CO is GRAS when used as intended in the ActivTech system, and when manufactured in accordance with current good manufacturing practice (CGMP) and appropriate food grade specifications. The FDA response also described FSIS's conclusion that the Pactiv MAP system is suitable for use in packaging red meat cuts and ground meat.

Subsequently, in December 2002, Cryovac sought FSIS's confirmation that a similar MAP system was acceptable for use in packaging meat products. *See* Letter from Robert C. Post, Ph.D., Director, Labeling and Consumer Protection Staff, Food Safety and Inspection Service (Feb. 5, 2003). The Cryovac system was described as comprising an oxygen-barrier polystyrene foam tray that is sealed with a multiple-layer film. The multiple-layer film in the Cryovac system contains an inner, permeable layer and an outer, barrier layer. At the point of pack, the meat product is placed on the tray within a chamber, from which the air is removed via vacuum and replaced with a mixture of CO (0.4%), N_2 (69.6%), and CO_2 (30%). At the completion of the gas flush cycle, the lid film is heat sealed on the tray, allowing the outer, barrier layer of the film to maintain the modified atmosphere. Prior to retail display, the outer, barrier layer is peeled away, exposing the inner, permeable layer and the product to normal atmospheric conditions. At the request of FSIS, FDA reviewed the Cryovac system, and found it to be consistent with the Pactiv GRAS notification. On February 5, 2003, FSIS informed Cryovac that it had determined the Cryovac system to be acceptable for use in meat products.

Like Pactiv and Cryovac, Precept Foods has developed a MAP system that employs low levels (i.e., a targeted 0.4%, with a process tolerance of 20% in the modified environment, for a CO concentration of up to

.48%) of CO in a mixture of N_2 and CO_2. The planned MAP system is similarly designed to deliver high quality case-ready meat products, and to do so in a form that is convenient for both retailers and consumers. In each system, CO serves the same intended purpose—to stabilize the color of the meat cuts and ground meat packaged therein. Although there are differences between the three systems, these differences are not of toxicological significance, as described below.

2. CO Safety Assessment for Precept Foods MAP

Detailed information establishing the GRAS status of CO intended for use in MAP systems for fresh meat is set forth in GRN 000083, which is incorporated by reference as described herein.

Consistent with previous GRAS determinations, an acceptable daily intake (ADI) has not been identified for CO. As described in GRN 000083 and summarized above, typical background levels of CO and national air quality standards provide a reference by which the safety of CO in MAP systems may be assessed.

Specifically, as described in GRN 00083, typical "background" levels of CO in the atmosphere are <20 mg/m^3 measured as an 8-hour mean. These background levels may result in typical serum CO levels (in the form of carboxyhemoglobin) of approximately 1.2 to 1.5%. Healthy

adults are expected to experience no ill health effects at levels of 4 to 5%; compromised or sensitive individuals may experience adverse health effects at levels of 2 to 3%. Background levels may be higher in urban areas or areas with significant traffic congestion.

At levels that substantially exceed background, CO is viewed as a significant air pollutant. The health-based national air quality standard for CO, as promulgated by EPA, is 9 ppm (10 mg/m^3), measured as an annual second-maximum 8-hour average concentration. This level would be expected to result in an exposure of 52 mg CO per 8 hours, based on the amount of air breathed by a typical person (15 m^3 per day or approximately 5 m^3 per 8 hours).

The federal safety standard for occupational exposure to CO, as promulgated by OSHA, is 50 ppm (58 mg/m^3), measured as an 8-hour time weighted average. This level would be expected to result in an exposure of 290 mg CO per 8 hours, based on the amount of air breathed by a typical person.

3. Estimated CO Intake

As in the Pactiv and Cryovac systems, the volume of the gas mixture in a package will vary depending upon tray size and product volume. Assuming a fresh meat portion of 454 grams and an anticipated meat

weight to gas volume ratio of approximately 0.8 to 1.0, a typical gas volume would be 363 cc, or 0.363 liter.

Assuming a maximum concentration of 0.48% CO in the modified atmosphere, CO is estimated to account for approximately 0.0017424 L, or 1.74 mL CO per package.

As explained in GRN 000083, CO is estimated to constitute 28 g per mole and 22.4 L per mole. The mass of CO per unit volume is therefore 1.25 mg/mL:

(28 g/mol)/(22.4 L/mol) = 1.25 g/L = 1.25 mg/mL.

It has been reported (Watts, 1978) that 30% of the CO present in a modified atmosphere may be absorbed into packaged meat. Assuming that 30% of the CO is taken up by the meat, the amount of CO absorbed into meat packaged in the Precept MAP is calculated as follows:

0.3 x (1.74 mL/package) x 1.25 mg/mL / 0.454 kg meat/package = 1.44 mg CO / kg meat.

If it is assumed that the CO content is reduced 85% during cooking (Sorheim et al., 1997), that a person consumes an 8.8 ounce portion of meat (250 g = 0.25 kg) at a meal, and that 100% of the ingested CO is absorbed, the estimated intake of CO is calculated as follows:

0.15 x 1.44 mg CO/kg meat x 0.25 kg meat/meal = 0.054 mg CO/meal.

Using "worst case" assumptions, if it is assumed that 100% of CO is taken up by the meat and no reduction occurs during cooking, the maximum theoretical CO content of the meat is estimated as follows:

(1.74 mL/package) x 1.25 mg/mL / 0.454 kg meat/package = 4.79 mg CO/kg meat.

Thus, the "worst case" scenario per 8.8 ounce (250 gram) portion may be calculated as follows:

4.79 mg CO/kg meat /package x 0.25 kg meat/meal = 1.2 mg CO/meal.

Similarly, if it is conservatively assumed as a worst case scenario that all of the CO in the package was respired by the consumer, it would result in the following exposure:

(1.74 mL/package) x 1.25 mg/mL = 2.18 mg CO in package released to air.

As described below, these estimated exposures to CO are negligible as compared to health-based standards for CO intake, are not

expected to significantly alter environmental exposure to CO, and therefore present no toxicological concern.[1]/

4. Comparison to CO Standards

The exposure to CO that is estimated to result from the Precept Foods MAP system is a small fraction of the exposures considered acceptable as part of health-based standards for CO. Under realistic conditions of use, inclusion of CO in the planned MAP system is expected to result in an intake of 0.054 mg CO. This level of intake corresponds to just 0.1 percent of the 8 hour exposure expected to result from air in compliance with EPA's health-based National Ambient Air Quality Standard (NAAQS) for CO of 9 ppm (10 mg/m^3):

0.054 mg CO/52 mg = 0.1%

Even the "worst case" exposure that may result from use of the Precept Foods system corresponds to only 2.3% of the likely exposure from air meeting EPA's NAAQS for CO:

1.2 mg CO/52 mg = 2.3%

In the very worst case that all CO in the package is respired by the consumer, the exposure is similarly negligible as compared to the conservative EPA NAAQS:

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[1]/ As explained in GRN 000083, a GRAS notification qualifies for a categorical exclusion from preparation of an environmental assessment pursuant to 21 C.F.R. §§ 25.32(i) and 25.32(r).

2.18 mg CO/52 mg = 4.2%

Stated differently, assuming a relatively small room of approximately 30 m^3, opening of one bag would contribute 0.073 mg/m^3 to the CO concentration in the air, or approximately 0.7% of the EPA NAQQS of 10 mg/m^3. At this rate, approximately 142 bags would need to be opened in order for the ambient air in the room to approach the EPA standard. This conservative estimate assumes that there is no exchange of air between the room where the package is opened and other rooms or the outdoors.

Similarly, the realistic and "worst case" estimates of intake are a small portion of the OSHA standard for CO. The realistic exposure is 0.019% of the intake estimated to result from exposure to air in compliance with the OSHA standard; the "worst case" scenario that may result from consumption of treated meat is 0.4% of such exposure; the worst case scenario that may result from respiration of the contents of the package is 0.8% of such exposure:

0.054 mg CO/290 mg = 0.019%

1.2 mg CO/290 mg = 0.4%

2.18 mg CO/290 mg = 0.8%

Accordingly, based on national, health-based standards for CO exposure, it may be persuasively concluded that the use of CO at 0.4% in a MAP system for fresh meats poses no health or safety concern and is not reasonably expected to result in any measurable levels of carboxymyoglobin in the blood of those who consume treated meat or who are nearby when one or more packages of case-ready meat are opened. This conclusion is consistent with the conclusion of Sorheim, et al. (1997) in the published literature that "it is highly improbable that CO exposure from meat packaged in an atmosphere containing up to 0.5% will represent a toxic threat to consumers through the formation of COHb." It is also consistent with GRN 000083 and other GRAS determinations for CO.

5. Safety of Finished System

Precept Foods has further determined that the finished MAP system does not pose a safety concern under the intended conditions of use. The finished system will utilize an environment with CO at low levels (0.48% or less) in a mixture of CO_2 (20%-100%) and N_2 (0-80%). The CO-containing environment will allow meat to maintain a desirable color, but will neither preclude microbial growth nor affect the characteristic odor or other indicators (e.g., gas or slime formation) of meat spoilage. In other words, the system does not mask spoilage.

In the literature addressing the use of CO in packaging of meat products, it has been observed that objections are sometimes raised because the color stability made possible by CO may exceed the microbiological shelf life. The specific concern that is cited in this regard is that color stability in such circumstances may mask spoilage of the CO-treated meat. Because CO does not inhibit the growth of spoilage microorganisms, however, it has no effect on characteristic signs of spoilage such as odor, gas formation, and/or slime formation. Indeed, the odor of spoiled meat will be immediately apparent, conveying to consumers any spoilage that has occurred. The ability of meat packaged in CO to spoil and to emanate off-odors has been reported in the published literature (Sorheim et al., 1999).

In addition, Precept Foods has commissioned three studies to substantiate the suitability of the planned MAP system and to corroborate its safety. These studies confirm that the use of CO in the planned system will not mask spoilage and will perform in a manner comparable to similar systems, including the Pactiv and Cryovac systems that FDA and USDA have previously deemed acceptable. The complete studies are attached to the Precept Foods submission of July 2, 2003, to Dr. Robert Post, for which creation of a Food Master File has been requested and which is hereby incorporated by reference. These studies are described briefly below.

Performance under abuse conditions. In a study conducted by the Excel Corporation (Attachment A of FSIS submission), the effects of temperature abuse on ground beef stored in different atmospheres were examined. Three MAP treatments were studied: a 0.4% CO system with "peelable" trays, a 0.4% CO lid stock system, and a low oxygen (35% CO_2 and 65% N_2) system. All trays were stored initially at 35°F for 5 days. After 5 days, trays were stored at 50°F under dark conditions; on day 7, the film on the "peelable" tray was removed and all trays were stored at 50° F under lighted conditions. Microbial analysis, odor analysis, and color scores were performed.

Spoilage characteristics were found to be similar for all three atmospheres. On day 7, all trays displayed increased microbial counts, but did not have a detectable odor. On day 9, however, the film on all trays was bulging, all samples had a detectable odor, and elevated microbial counts were measured for all treatments. It was concluded that meat stored in a CO atmosphere (0.4%) does spoil and emanate a noticeable odor.

Shelf life, bloom, and cooked color. A second study (Attachment B of FSIS submission) conducted by Excel examined shelf life, bloom, and cooked color of ground beef packaged in varying levels of CO. Four treatments were studied: three CO treatments at 0.2%, 0.3%, and 0.4% (with 35% as CO_2 and the balance as N_2) in a plastic tray with a

barrier film, and one CO treatment at 0.4% in a peelable film tray. Trays were stored in a cooler at 35° F and removed and placed under conditions simulating retail display at designated intervals. Microbial sampling was conducted "pre-display" and "post display," objective and subjective colors were read daily, residual oxygen levels and product off-odors were analyzed daily, cooked color and sensory evaluations were performed, and bloom was assessed.

Based on microbial sampling throughout the test, it was concluded that there were no major differences in counts between treatments. On day 20, a greater increase in aerobic plate count was noted for the peelable treatment than the lid stock treatments. This was described as a "trend" and attributed to removal of the product from a high CO_2 environment.

Color was deemed acceptable on the 0.3% CO and 0.4% CO lid stock treatments throughout the test. The 0.2% CO treatment received a lower color score. The peelable treatment received a higher color score than the 0.2% treatment, but a lower score than other CO treatments. Evaluations of cooked colors on days 9 and 16 showed normal cooked colors in all concentrations of CO with no pinking at 145°F or 170°F. No off or spoiled odors or flavors were noted for any treatments through day 16.

Shelf life. A Hormel Foods study (Attachment C of FSIS submission) examined the shelf life of boneless beef strip steaks and top round steaks packaged in a barrier lid stock backflushed with 0.4% CO, 35% CO_2, and the balance as N_2. A treatment simulating the Pactiv master bag concept was used as a control. Samples were stored in a 38°F cooler prior to display and placed in a 38-40°F simulated retail display case at designated intervals. Control samples were removed from the master bag prior to display. After 3-5 days in the display case, samples were photographed, opened for odor evaluation, and sent to the lab for micro and chemistry analysis. Some samples were also cooked and evaluated for flavor.

Overall, both test and control samples were found to maintain acceptable quality at least 42 days. Microbiological, chemistry, color, odor, and cooked evaluations showed no signs of spoilage over this period of time. Although total Mesophilic and Psychrophilic bacteria counts increased throughout the study, the counts were deemed acceptable and not indicative of spoilage. The pH and TBA values remained constant, suggesting that no significant microbial spoilage or oxidative rancidity, respectively, had taken place. All samples were judged to be acceptable for odor, and no cooked samples exhibited unacceptable flavors.

Other considerations. In assessing the safety of the MAP system that is the subject of this Notification, Precept Foods has also considered whether the planned system presents any unique or unusual risk of pathogenic growth or other harm to consumers. Significantly, application of a consistent "use or freeze by" date offers considerable consumer benefit, including enhanced safety, because the product will be subject to less handling than retailer-packed products and an appropriate shelf life will be objectively established and communicated via a validated open date code. Indeed, reliance on a centrally applied open date code offers a far more objective means of assessing product age and quality than highly subjective measures such as color.

With regard to the theoretical risk of pathogenic growth, Precept Foods concludes that a risk of pathogenic growth exists with any packaging system that is subject to temperature abuse or other mishandling, and that the planned system presents no particular vulnerabilities in this regard. Psychrotropic pathogens of theoretical concern for an anaerobically packaged product, such as non-proteolytic *Clostridium botulinum*, are not typically associated with fresh meats, so such organisms are not reasonably expected to be present in the first place. Moreover, the total time that product will spend in the modified atmosphere, as determined by the anticipated shelf life of 35 days for muscle cuts and 28 days for ground beef, is comparable to time that

may be spent in similar anaerobic atmospheres in systems judged to be safe. Such systems include vacuum packaging and the Pactiv master bag system that was asserted to be GRAS in GRN 000083.

In the unlikely event that product is mishandled prior to purchase, microbial spoilage can and will occur, and the fact of spoilage will be apparent through off odors or other indicators of spoilage. Thus, in addition to the certainty provided by the open date code, natural spoilage processes provide additional safeguards that will prevent consumption of spoiled meat that may contain foodborne pathogens. The fact that the system will be used to package only raw products that require safe handling instructions and cooking to appropriate temperatures offers an additional assurance of safety.

6. Other Information Supporting Safety

The safety of CO for this intended use is also supported by approvals and notifications involving food substances that contain CO as primary components, including combustion product gas (in which CO is permitted at a maximum level of 4.5% by volume) (21 C.F.R. § 173.350), and "tasteless smoke" (GRN 000015).

B. Self-Limiting Levels of Use

A target level of 0.4% CO in an MAP system has been demonstrated to be sufficient to stabilize the characteristic color of fresh meat.

Higher usage levels are considered unnecessary, although to the best knowledge of Precept Foods, self-limiting levels of use have not been identified.

C. Data Inconsistent with GRAS Position

Precept Foods is unaware of any data that would be inconsistent with a finding that carbon monoxide is GRAS when used at 0.4% as a component of a MAP system for fresh meat.

D. Suitability for use in fresh meat products

The suitability of the Precept MAP system for use in fresh meat products is addressed in a July 2, 2003 submission to the U.S. Department of Agriculture, which is hereby incorporated by reference.

* * * * *

V. CONCLUSION

Based on the above information, Precept Foods has concluded that the planned use of CO at a target concentration of 0.4% in MAP systems for fresh meat is GRAS within the meaning of section 201(s) of the Federal Food, Drug, and Cosmetic Act and applicable FDA regulations.

Respectfully submitted,

Gary Jay Kushner
Ann M. Boeckman
Counsel to Precept Foods, LLC

References:

Sorheim, O. et al., 1999. The storage life of beef and pork packaged in an atmosphere with low carbon monoxide and high carbon dioxide. Meat Sci. 52, 157-164.

Sorheim, O. et al., 1997. Technological, hygienic, and toxicological aspects of carbon monoxide used in modified atmosphere packaging of meat. Trends Food Sci. & Tech. 8, 307-312.

Watts, D.A. et al., 1978. Fate of [^{14}C] Carbon monoxide in Cooked or Stored Ground Beef Samples. J. Agric. Food Chem. 26, 210-214.

SUBMISSION END

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EXCEL

Ground beef abuse study in peelable, low oxygen and carbon monoxide lidstock tray

Liza John, Barney Wilborn, Graciel Catano

May13th, 2003

Objective: To induce spoilage in ground beef stored in three different atmospheres

- Peelable (0.4% Carbon Monoxide (CO), 35 % carbon dioxide (CO_2), 64.6% nitrogen(N_2)).
- 35% Carbon Dioxide, 65% nitrogen - Low oxygen .
- Carbon Monoxide lid stock (0.4% CO, 35% CO_2, 64.6% N_2) - Low Oxygen CO.

Justification: CO is a colorless, odorless gas used in MAP (Modified Atmospheric Packaging) of meat. CO binds stongly to myoglobin (the primary source of meat color). Studies on the use of CO in MAP prove that Carbon Monoxide helps stabilize myoglobin and has little or no anti-microbial effects. Color and odor are two important factors with which consumers evaluate spoilage. This study is designed to prove that the positive effects of meat packaged in 0.4% Carbon Monoxide will definitely not mask odor and microbial spoilage when the meat is abused.

Executive Summary: Ground Beef is packaged in three different atmospheres: peelable, low Ox and low Ox CO. All the trays were stored at 35°F. After 5 days the packages were stored at 50°F (dark), and on day 7 the peelable film is peeled off the lid and all the trays are displayed at 50°F (lighted conditions).

On day 7 after the trays had been stored at 50°F (dark) for 2 days, there was no detectable odor from all the trays. On day 9, after two days of storage at 50°F (lighted conditions), the film on the trays bulged indicating gas production and there was significantly detectable odor spoilage in all the packages and high microbial counts.

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Protocol:

- Product used for testing: Ground Beef (Chuck 81% lean, Age-8days).
- Number of packages used for each storage condition: 15 each.
- Temperatures and days of storage of product:

  1) 5 days 35°F (dark storage)

  2) 2 days 50°F (dark storage)

  3) 3 days 50°F (lighted)

Procedures:

- Ground Chuck meat is ground again through a 1/8-inch plate.
- Approximately 1lb of ground beef is packaged in peelable trays, low oxygen and in low ox CO.
- The trays are initially stored at 35°F and then are abused by placing them at 50F (dark storage) for 2 days and then shift them to 50°F lighted display.
- At the end of the storage periods the following tests would be performed on the samples.
  - Total plate count
  - Anaerobic plate count
  - Objective and subjective measurement of color
  - Odor analysis

Results:

Microbial analysis: The microbial analysis on the data showed that on day 3, the samples had acceptable microbial load. On day 7, the counts increased and were slightly lower for the CO packages. On day 10 the counts were high. The reults used for the graphs are the Aerobic CFU counts.

Odor analysis: The samples tested on day 7 did not have an objectionable odor, but on day 9 the film on the trays were bulging and all samples had detectable odor.The results shown on the graphs for day1,7, and 9 are the means of all the treatments for that day and they had similar spoilage characteristics.

Color scores: The color scores dropped noticeably for the peelable samples by day 8 and day9 (they were peeled on day7).When peeled the myoglobin converts from carboxymyoglobin (bright red) to metmyoglobin (brown) thus lowering the color scores.

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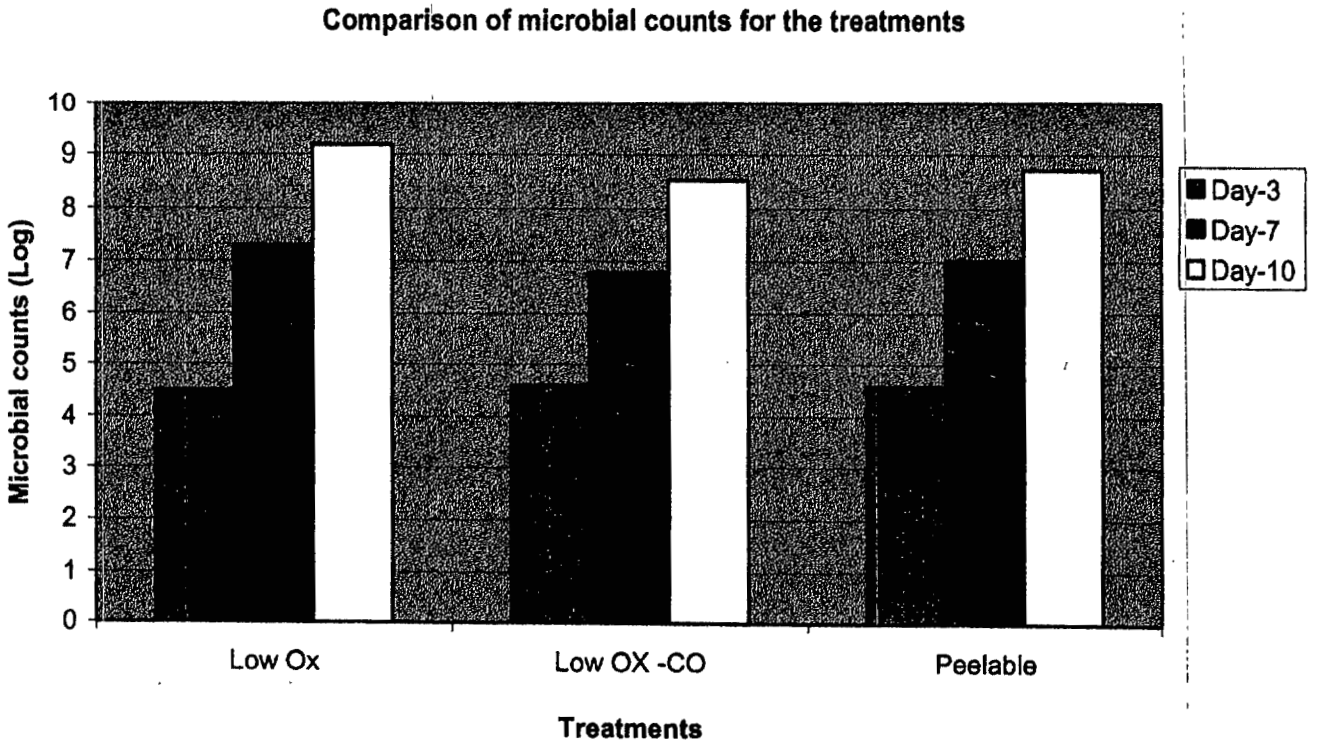
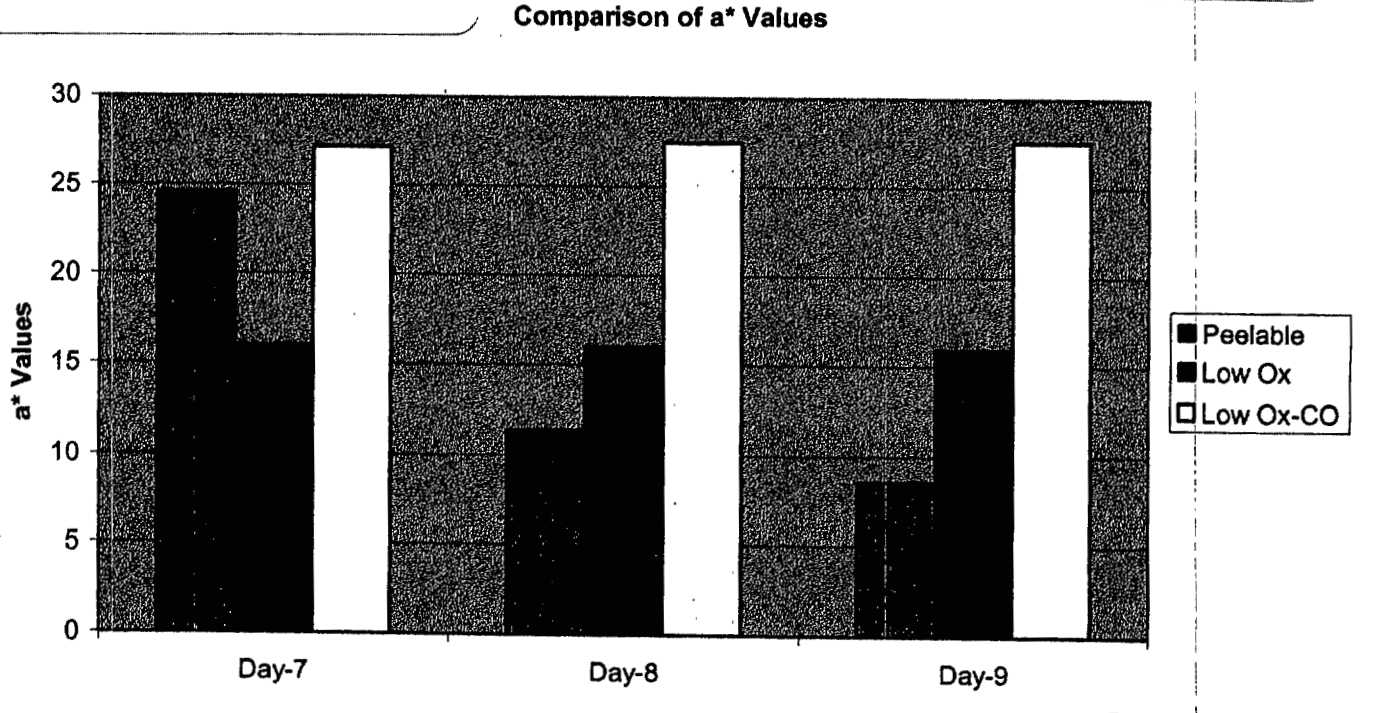
The colors for the low Ox CO remained consistent on day 7 and 8 with a slight increase on day 9.The low ox samples had consistent values too with a slight decrease on day 9.





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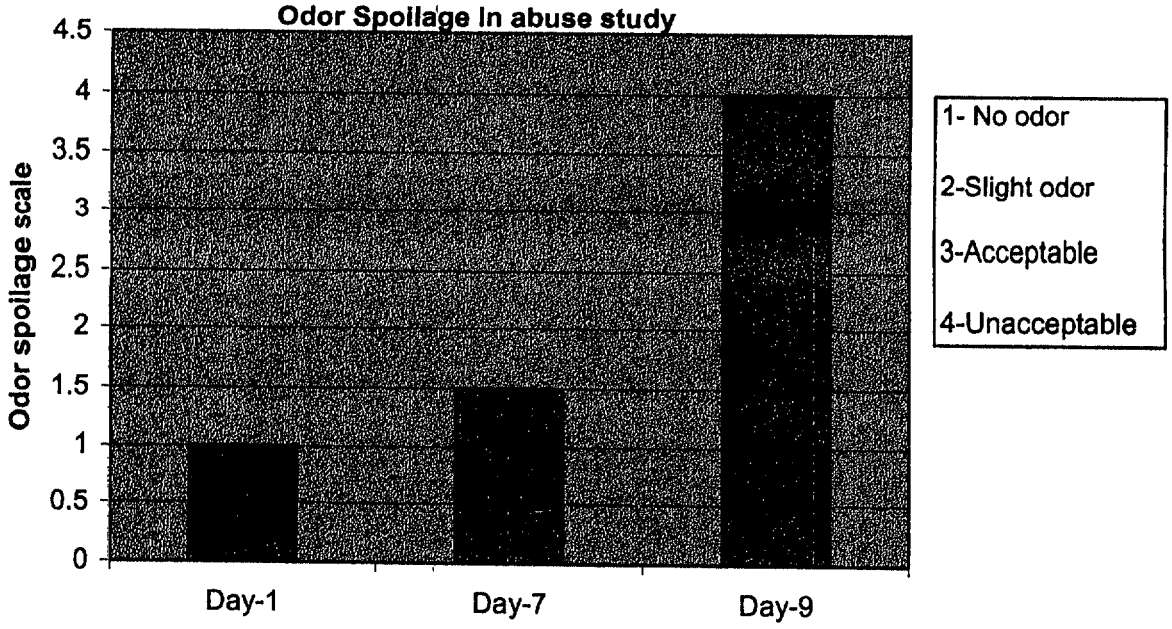

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Implications: Meat stored in a CO atmosphere does spoil and emanate noticeable odor when temperature abused. Thus the red color of meat packaged in CO does not mask spoilage.

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EXCEL

Use of Carbon Monoxide in Lid Stock on Ground Beef
Project #: 23034

Nancy Rathje, Graciel Catano
Friday, February 14, 2003

Objective: To compare shelf life, bloom, and cooked color of ground beef packaged in varying levels of Carbon Monoxide (0.2, 0.3 and 0.4%) to the approved Cryovac system. Product to be tested will be Ground Chuck.

Executive Summary: Ground Chuck meat was assigned to four packaging treatments (Tmt)

- In a plastic tray covered with a barrier film.

Tmt –1) CO-0.2%	Tmt -2)CO-0.3%	Tmt -3) CO-0.4%
CO_2-35%	CO_2-35%	CO_2-35%
balance Nitrogen	balance Nitrogen	balance Nitrogen

- In a styrofoam barrier tray covered with a peelable film, with gas concentrations of 0.4%CO, 35% CO_2 and 64.6% Nitrogen (Control).

Peelable film trays were peeled off and the other trays set at retail display conditions (35°F) on the days listed below. The microbial tests show that the counts for the different treatments were not significantly different from each other. The counts for the pre and post display periods were significantly different from each other ($p<0.0001$). The color scores indicated that meat packaged in 0.2% CO had lower color values than meat packaged in 0.3 or 0.4% CO.

Justification: Carbon Monoxide is used as a processing aid in modified atmospheric packaging of meat to stabilize the pigment myoglobin.

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The level of CO used in combination with the other gases may be a critical factor. The goal of this experiment is to determine shelf life, bloom, and cooked color effects with CO at 0.4, 0.3, 0.2% and how that compares to the approved Cryovac packaging method.

Protocol: Product to test: Ground Chuck (Age – 8 days, 81% lean)
Days of testing: 6, 13, 20 and 27days.

Number of packages of each product per day of display – 5

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Procedures

1. Microbial sampling done on the ground chub meat used to determining safe microbial counts.
2. Ground chub meat reground through a 3mm plate.
3. Portion the meat into 1 pound loafs.
4. Meat loafs placed in
   - #3 plastic Lid Stock trays and
   - #3 Cryovac Barrier Styrofoam trays, with a peelable film (control).
5. Run all #3 plastic trays through the Ross Jr. Lid Stock Machine with mixed gas containing CO, CO_2 and N_2,

1) CO-0.2%	2) CO-0.3%	3) CO-0.4%
CO_2-35%	CO_2-35%	CO_2-35%
balance Nitrogen	balance Nitrogen	balance Nitrogen

6. Run all #3 Styrofoam trays with barrier film through the Ross Jr. Lid Stock machine with peelable film and mixed gas (N_2 - 64.6%, CO_2 - 35%, CO -0.4%).
7. Store product in shelf life cooler (35°F).
8. On the designated days mentioned above, the trays are taken out of the cooler and the peelable film peeled off the trays.
9. The trays are displayed in the retail display temperatures (34°F) under lighted conditions (100 –110 foot candle).

10. Microbial sampling (APC, Anaerobic, LAB) is done on one tray of each treatment per display date (pre - display).
11. Microbial sampling (APC, Anaerobic, LAB) is done on one tray of each treatment per display date (post - display).
12. Read objective and subjective colors daily.
13. Evaluate color, bloom, and microbial growth.
14. Analyze residual oxygen levels and product off odor on all days.
15. Run cooked color and sensory evaluations on each treatment on the pull dates.

Results:

Product Color Evaluation

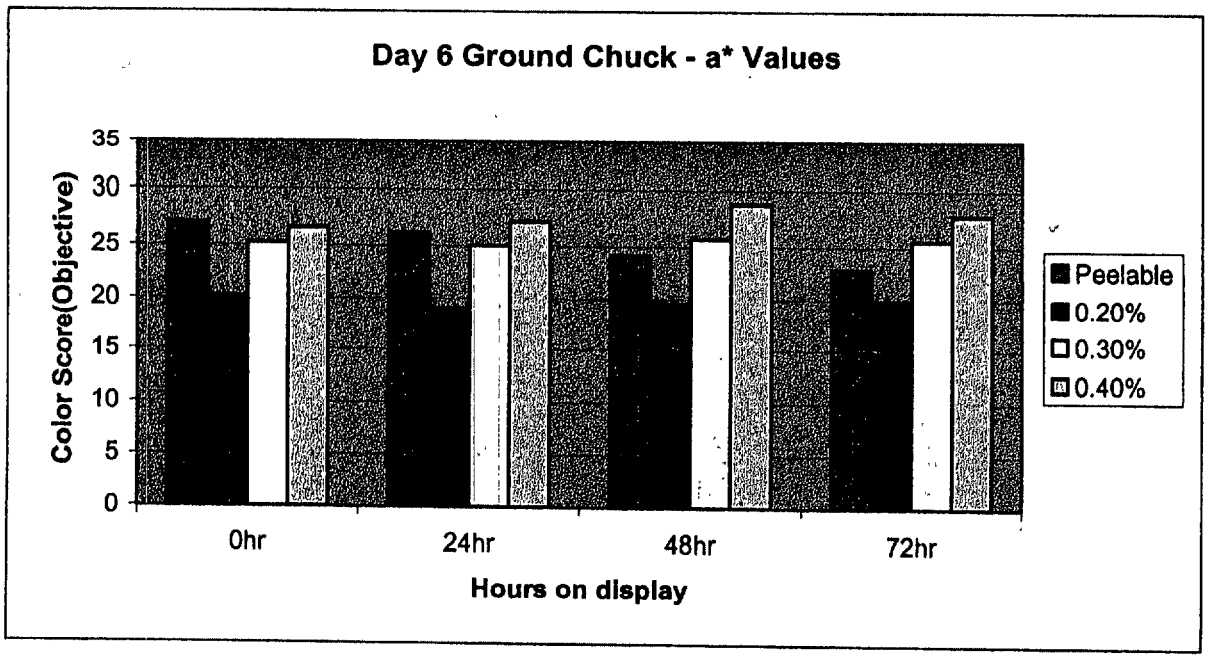
Product color was acceptable on the 0.3 and 0.4% CO treatments throughout the test. The 0.2% CO treatment had a lower color score. The peelable 0.4% CO did not hold a bright cherry red color until after day 2, but performed well days 6 through 20. The graph below shows the lower color scores for the 0.2% CO treatment and the peelable 0.4% CO treatment.

Microbial Growth Information

Microbial growth was acceptable throughout the test for all treatments. There were no major differences in counts between treatments for aerobic plate counts, anaerobic plate counts, or LAB counts. The aerobic plate counts for the different treatments were not significantly different from each other. The microbial counts for the pre and post display periods were significantly different from each other ($p<0.001$). A trend was noted on day 20, that the increase in aerobic plate count during display was greater for the Cryovac Peelable treatment than the lid stock treatments. This was due to removing the product from a low Oxygen (high CO_2) environment for display.

The following graphs are representative of the data from all display dates. Day 6 and 13 microbial counts and color scores were similar. Day 20 and 27 had comparable color scores, and the same microbial trends.

Minolta Colors



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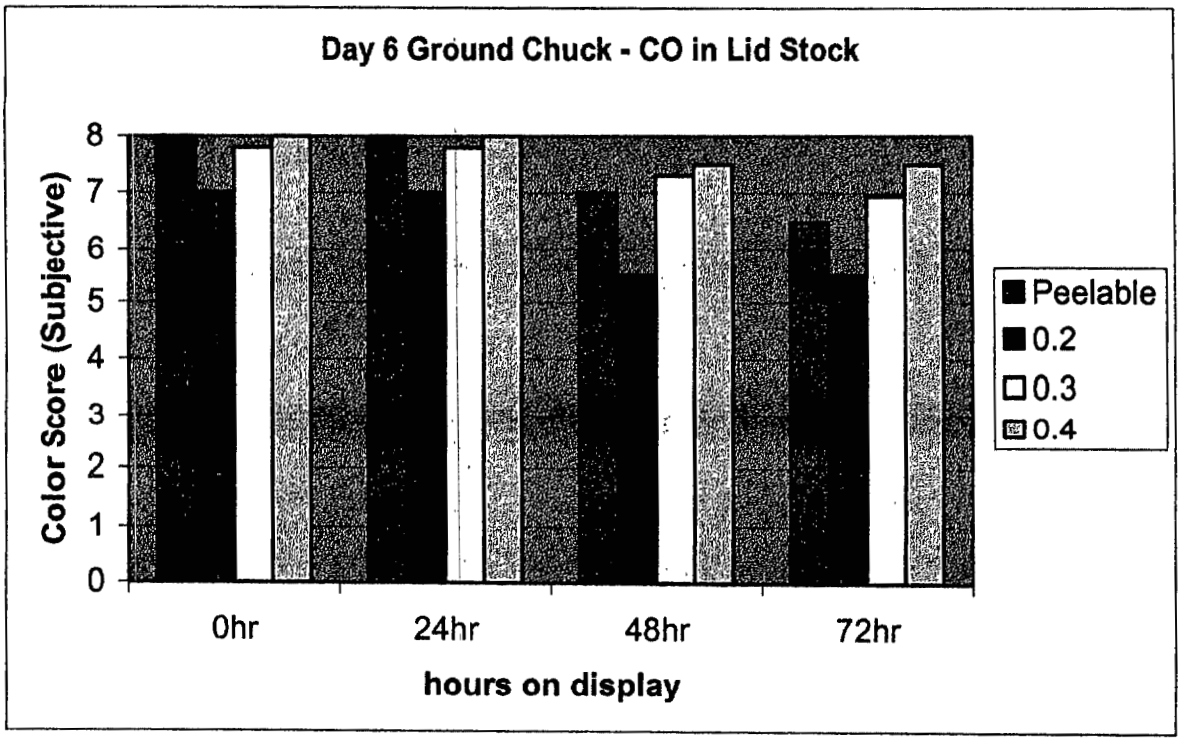
Visual Colors



Minolta Colors

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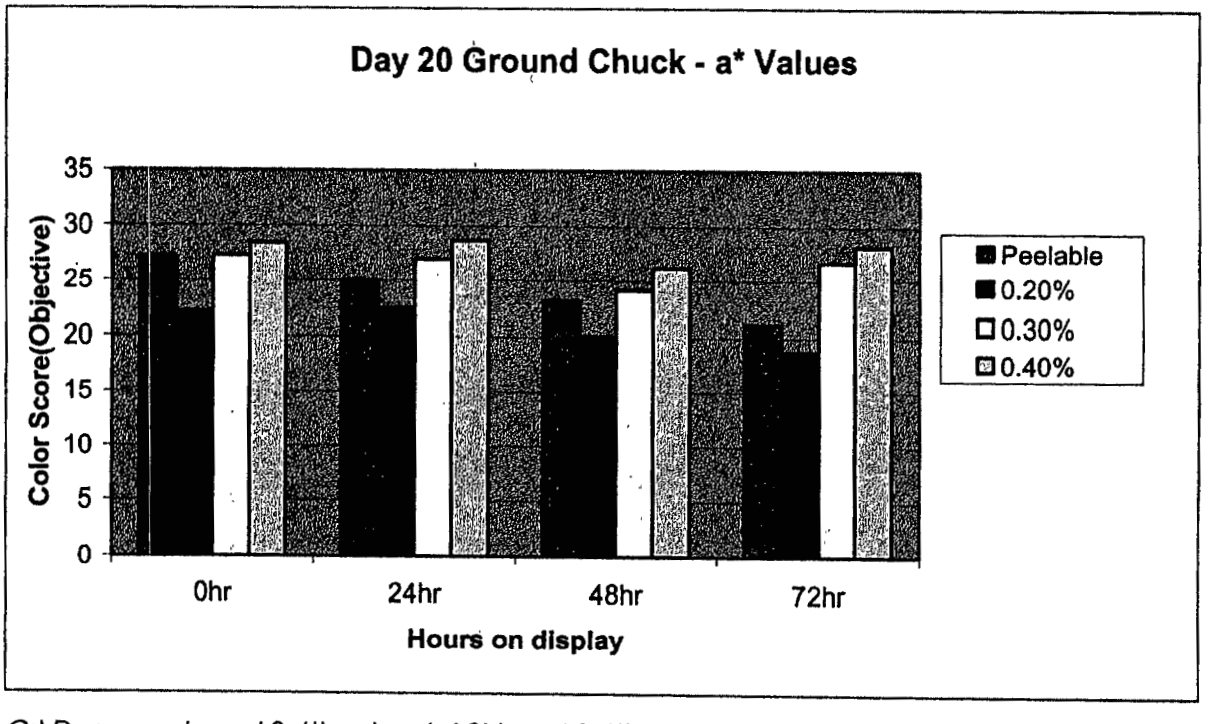

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Visual Colors

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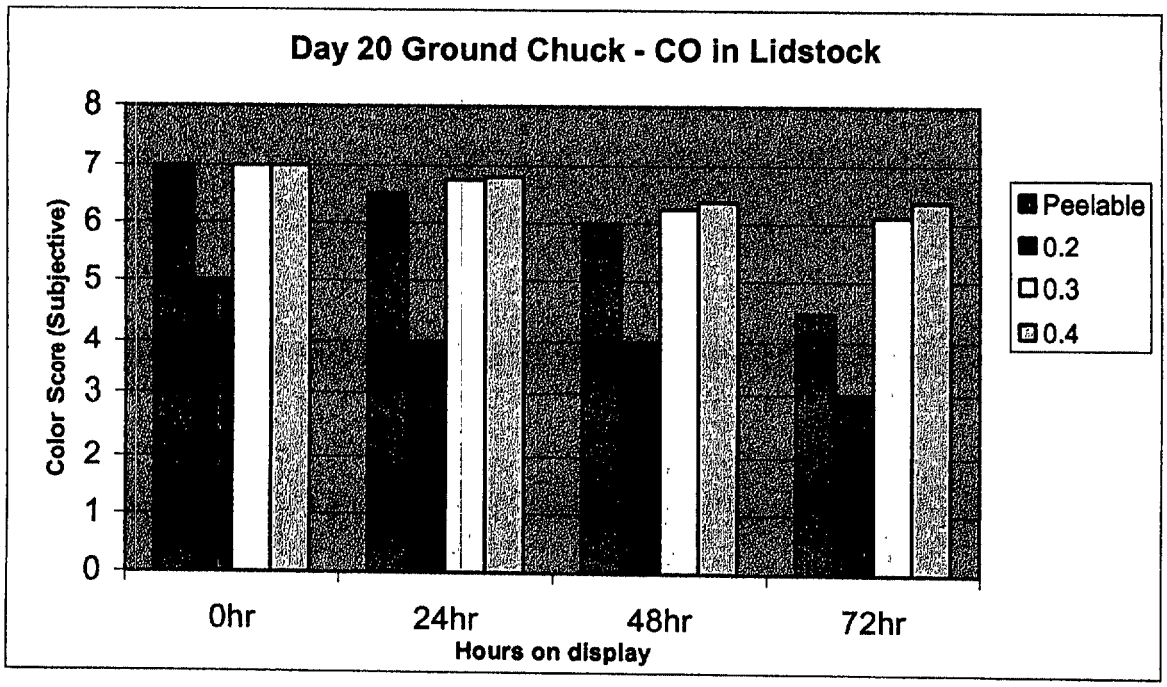
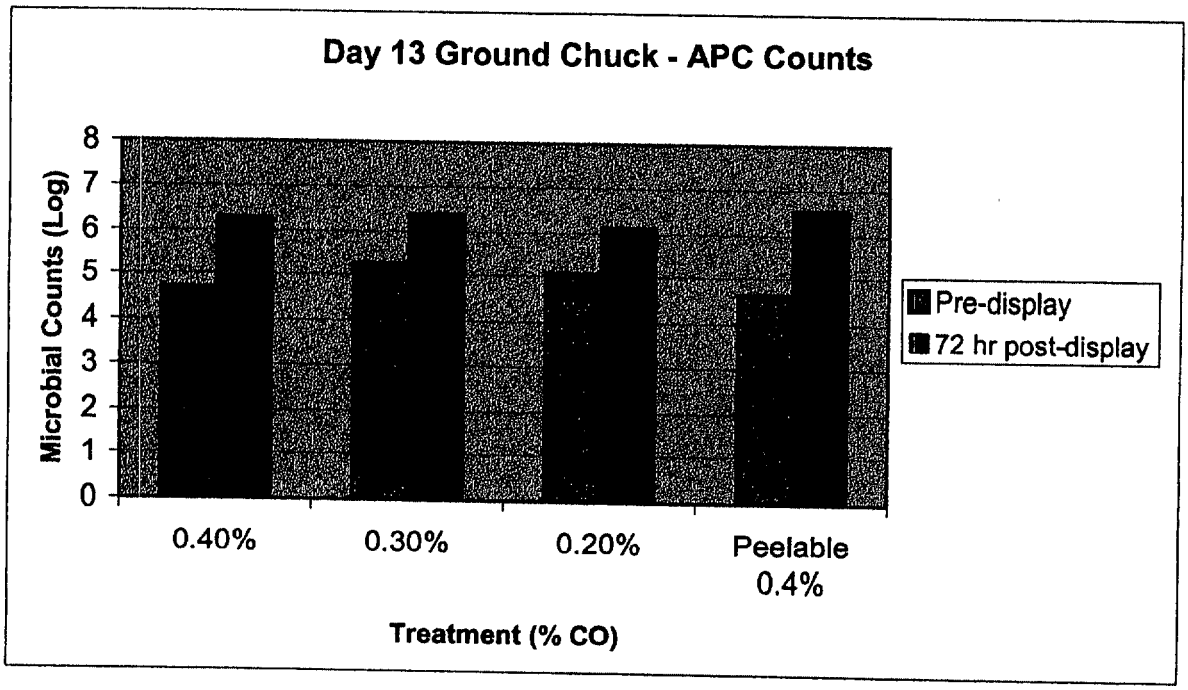


Microbial Counts



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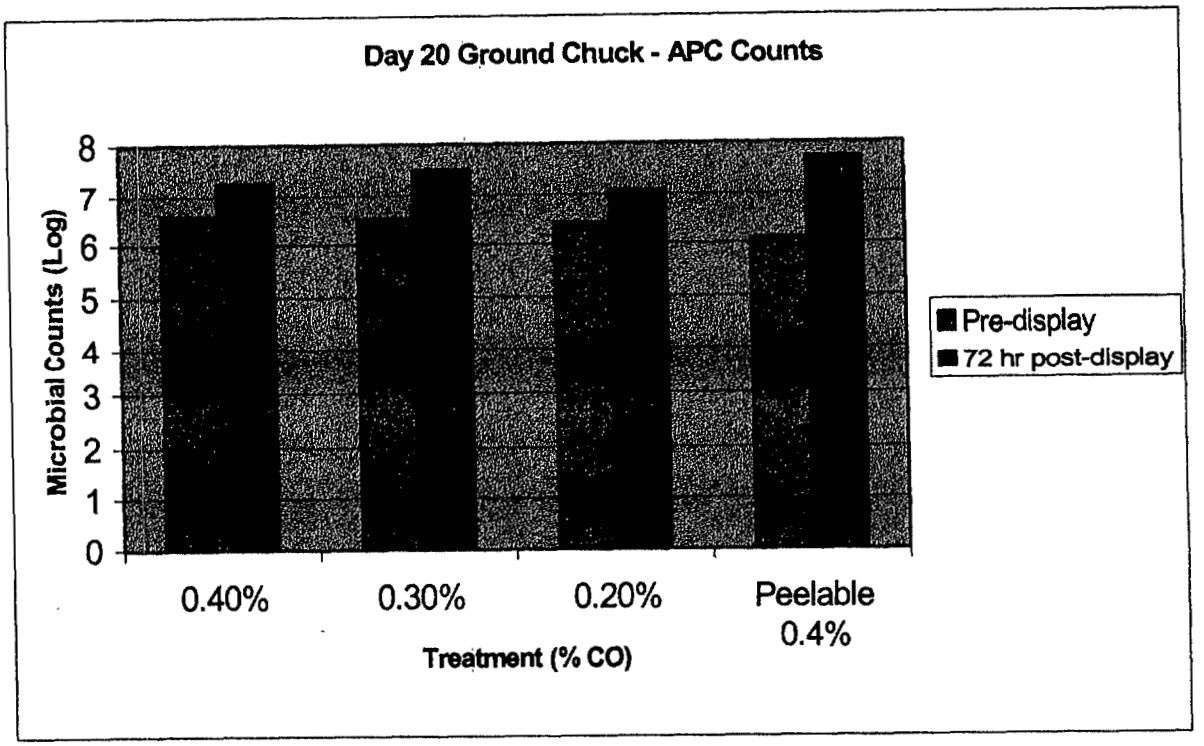

Cooked Color Evaluations

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Day 9 and Day 16 evaluations showed normal cooked colors for steaks in all concentrations of CO with no pinking at 145°F or 170°F.

Day 16 Peelable 0.4% CO cooked to 160°F

Day 16 0.3% CO cooked to 160°F

Day 16 0.4% CO cooked to 160°F

There were no off or spoiled odors or flavors on any of the product through Day 16.

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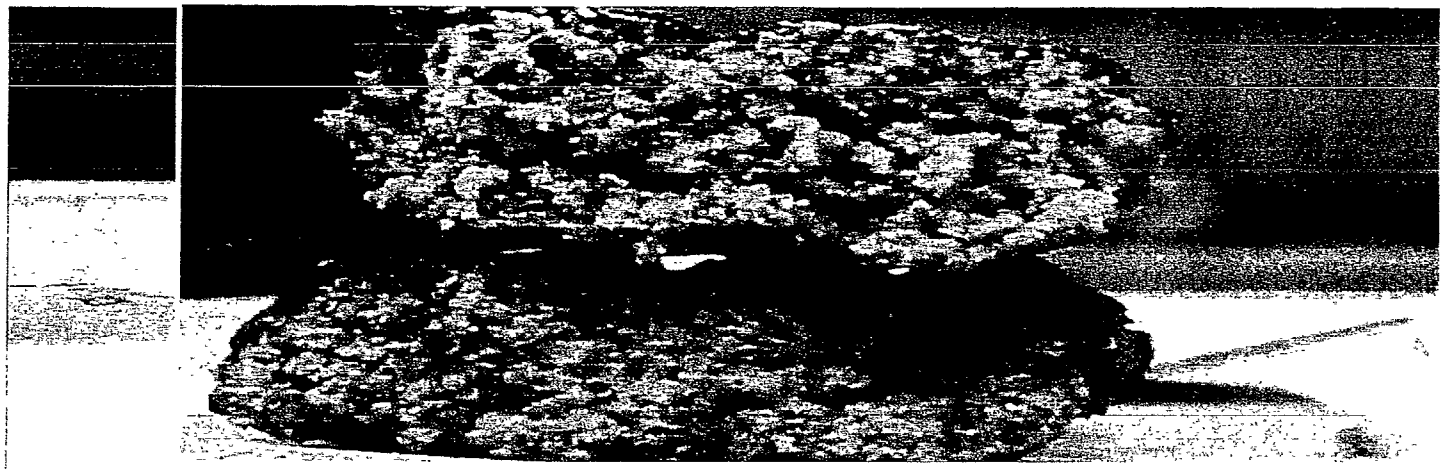

Ground Chuck
Peelable 0.4%CO, 160F

d Chuck
CO, 160F

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Hormel Foods Research Report

Attention: Dr. Forrest Dryden

Project Name: Precept Foods / MAP Packaging

Copy List: Dr. Bruce Paterson Eivind Djupedal Dr. Scott Eilert

Written By: Dave Ruzek - Ext. 5824

Objective: To determine the shelf-life of boneless beef strip steaks and top round steaks packaged in a barrier plastic tray, lid-sealed with a barrier film and backflushed with a gas mixture of 35% carbon dioxide / 0.4% carbon monoxide / balance nitrogen.

Procedure:

- Six sets of paired Select strip loins and six sets of paired Select top rounds were obtained from the Excel Corp. The vacuum packaged raw materials were about five days old at the time of the test.

- All sub-primals were injected approximately 14% for 112% retention with a solution of water, potassium lactate, sodium phosphates, salt, sodium diacetate, beef stock and flavoring, and were allowed to equilibrate for 1 - 2 hours prior to slicing. The strip loins were then cut into one-inch steaks and the top rounds were cut into 1.5 inch steaks. One set of injected sub-primals was cut at a time and immediately packaged to minimize exposure of the cut surfaces to atmospheric air and better simulate in-plant production.

- Test (T) samples contained one steak per tray (black barrier #3 plastic tray with a soaker pad). The trayed product was packaged on a ROSS/INPACK Jr. machine utilizing a barrier lid stock film (Fresh Wrap/Packaging Partners) and back-flushed with a pre-mixed test gas (Airgas) consisting of 35% carbon dioxide / 0.4% carbon monoxide / balance nitrogen.

- Control (C) samples contained one steak per tray (4P Styrofoam). The trayed product was overwrapped with PVC film, placed in a barrier master bag along with an oxygen absorbing sachet, and back-flushed with the above gas mixture utilizing a CVP machine. This simulated the PACTIV master bag concept.

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- The samples were produced and marked as shown in Table 1 -- this was replicated six times each for the strip loins and top rounds (C1 - C6, T1 - T6). All samples were stored in boxes in a 38°F cooler prior to display. Test and Control samples were placed in a 38 - 40°F simulated retail display case at various intervals as shown in Table 1. Control samples were

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removed from the master bag prior to display.

- After 3 - 5 days in the display case (the time varied to some degree depending on whether the sampling date fell on a weekend), specific samples (as outlined in Table 1) were photographed, opened for odor evaluation and sent to the lab for micro/chemistry analyses. Samples were also cooked in George Foreman grills and evaluated for flavor.

Results:

- Table 2 shows that good raw materials (low micro counts and low TBA values) were used in the study and that relatively uniform injection (reflected in the salt levels) occurred across the six replications each for the strips and top rounds.

- Overall, the results in Tables 3 & 4 show Test and Control samples maintained acceptable quality at least 42 days when stored at 38 - 40°F in a modified atmosphere of approximately 35% CO_2 / 0.4% CO / balance nitrogen. The microbiological, chemistry, color, odor and cooked evaluations showed no signs of spoilage over this period of time.

- Total Mesophilic and Psychrophilic bacteria counts for both the strip and round steaks increased in counts as the study progressed out to 42 days. These counts would still be considered acceptable and not indicative of microbial spoilage. There appears to be no correlation between micro counts and the amount of time the samples spent under the display case lights.

- The pH values remained relatively constant throughout the study, which also suggests that little microbial spoilage had taken place.

- TBA values also remained relatively constant showing no significant development of oxidative rancidity.

- At the time of lab sampling, the Test packages were opened and evaluated for odor. Control packages were evaluated at the time the product was removed from the master bag and placed in the display case. All samples were considered to be acceptable for odor throughout the study. Some samples exhibited a slight sulfide or sweet smell. There appears to be some correlation between the intensity of what odor there was and the amount of time the sample spent in the display case.

- As shown in the enclosed representative pictures, there was no significant change in color for the Test samples throughout the study (including the amount of time they spent under the display case lights). The Control samples, when removed from the master bags, did start to show some fat discoloration (yellow/grey) after three days in the display case. The pictures are identified as follows:
  C3-20-23 -- Control strip steak; 3 weeks of age
  T3-10-23 -- Test strip steak; 3 weeks of age
  C3-30-33 -- Control strip steak; 5 weeks of age
  T3-10-33 -- Test strip steak; 5 weeks of age

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Implications:

The time needed for the product to look bright cherry red is an issue with the 0.2% concentrations of CO and the peelable 0.4% treatment. There was no pinking on cooked product at any of the concentrations of CO.

Next Steps:

Test product and abuse to prove that off odors will exist when product is unsafe to eat.

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C2-20-23 -- Control top round steak; 3 weeks of age
T2-10-23 -- Test top round steak; 3 weeks of age
C2-20-33 -- Control top round steak; 5 weeks of age
T2-10-33 -- Test top round steak; 5 weeks of age

All of the above strip steak samples came from the same paired strip loins (#3), and all of the above top round samples came from the same paired top rounds (#2)

- At the time the samples were submitted to the lab, a few of the strip and top round steaks were cooked and informally evaluated for off-flavors. Throughout the study, none of the cooked samples exhibited unacceptable flavors.

Conclusion:

Under the conditions described above, boneless beef strip steaks and top round steaks can successfully be maintained for at least 42 days, during which the meat color does not mask microbial spoilage, in a modified atmosphere comprised of approximately 35% CO_2 / 0.4% CO / balance nitrogen.

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Appendix (attached)
Presents individual steak values and appropriate statistical analysis.

Table 1

USDA/FDA MAP/CARBON MONOXIDE RESEARCH PROTOCOL

CONTROL	DAY 1	DAY10	DAY 13	DAY 20	DAY 23	DAY 25	DAY 28	DAY 30	DAY 33	DAY 35	DAY 38
	C1-0-0 LAB	C1-10-13* DISP	C1-10-13 LAB	C1-20-23 DISP	C1-20-23 LAB	C1-25-28 DISP	C1-25-29 LAB	C1-30-33 DISP	C1-30-33 LAB	C1-35-38 DISP	C1-35-38 LAB
TEST	T1-0-0 LAB	T1-10-13* T1-10-23 T1-10-28 T1-10-33 T1-10-38 DISP	T1-10-13 LAB	T1-20-23 T1-20-28 T1-20-33 T1-20-38 DISP	T1-10-23 T1-20-23 LAB	T1-25-28 T1-25-33 T1-25-38 DISP	T1-10-28 T1-20-28 T1-25-28 LAB	T1-30-33 T1-30-38 DISP	T1-10-33 T1-20-33 T1-25-33 T1-30-33 LAB	T1-35-38 DISP	T1-10-38 T1-20-38 T1-25-38 T1-30-38 T1-35-38 LAB

EXPERIMENTAL DESIGN:

1. Paired Primals/Two Cuts: Strip loins, top rounds.
2. Six Replications: C1/T1, C2/T2, C3/T3, etc.
3. Control: Current PACTIV system/0.4% CO.
4. Test: Barrier lid stock plastic tray/0.4% CO.
5. 21 steaks needed per replication per subprimal.
6. Storage Temps: 36-38°F storage cooler; 38-40°F simulated retail display case.
7. Subjective Analyses: Visual color (photos), odor when submitting to lab, cooked flavor.
8. Objective Analyses: Mesophilic/psychrophilic bacteria, pH, TBA, % salt.

*C1-10-13 and T1-10-13 mean that the samples were displayed (DISP) on Day 10 and submitted to the Lab on Day 13.
T1-10-38 means the sample was displayed on Day 10 but submitted to the lab on Day 38.
T1-20-23 means the sample was displayed on Day 20 and submitted to the lab on Day 23. Etc.

The display/sampling dates varied to some extent depending on whether the target date fell on a weekend (when the lab was closed).

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INITIAL COMPOSITES

Table 2

	PSYCHRO ct/gm	% PROTEIN	% pH	TBA	% SALT
Strip Loins (3/27/03)					
1	90	18.70	6.01	0.15	0.39
2	150	16.17	5.75	2.15	0.49
3	110	18.62	5.66	0.05	0.32
4	100	18.56	5.69	0.05	0.33
5	140	16.57	5.77	0.06	0.37
6	490	19.27	5.69	0.12	0.31
AVG		17.98	5.76	0.43	0.37
Top Rounds (3/28/03)					
1	80	17.49	5.72	0.10	0.44
2	20	14.89	5.82	0.07	0.35
3	80	17.32	5.75	0.05	0.39
4	210	17.47	5.74	0.05	0.37
5	390	17.51	5.77	0.05	0.41
6	120	18.67	5.76	0.04	0.34
AVG		17.23	5.76	0.06	0.38

Psychro = Total Psychrophilic Bacteria/GM

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TABLE 3
PD 3/27/03

Strip Loins Data Summary
Means

	SAMPLE GROUP	TPC CT/G Log_{10}	PSY CT/G Log_{10}	*pH*	*TBA*	*% SALT*	*ODOR*
Day 13 04/09/03	**C-10-13**	----	2.18	5.58	0.43	0.31	1.00
	T-10-13	----	2.18	5.71	0.26	0.34	1.00
Day 22 04/18/03	**C-20-23**	2.79	2.93	5.74	0.24	0.35	1.00
	T-10-23	2.49	3.23	5.73	0.18	0.31	1.00
	T-20-23	4.45	4.07	5.73	0.19	0.34	1.00
Day 28 04/24/03	**C-25-28**	2.56	2.81	5.72	0.34	0.33	1.00
	T-10-28	4.11	4.06	5.72	0.14	0.34	1.60
	T-20-28	2.90	3.98	5.69	0.19	0.35	1.00
	T-25-28	2.36	2.80	5.71	0.11	0.36	1.00
Day 35 05/01/03	**C-30-33**	2.20	2.28	5.73	0.28	0.36	1.00
	T-10-33	2.20	2.28	5.73	0.28	0.36	1.00
	T-20-33	4.26	4.88	5.73	0.19	0.37	1.00
	T-25-33	2.45	2.51	5.71	0.18	0.35	1.00
	T-30-33	2.97	2.98	5.72	0.16	0.36	1.00
Day 42 05/08/03	**C-35-38**	2.73	4.47	5.74	0.19	0.37	1.00
	T-10-38	3.76	4.12	5.77	0.19	0.37	1.20
	T-20-38	4.83	4.74	5.75	0.15	0.35	1.00
	T-25-38	3.15	3.24	5.75	0.20	0.35	1.00
	T-30-38	4.54	4.64	5.73	0.17	0.34	1.00
	T-35-38	3.56	3.79	5.73	0.17	0.31	1.00

Sample Group:N=6 for each group
TPC= Total Mesophilic Plate Log_{10} Count/GM
PSY= Psychrophilic Plate Log_{10} Count (APT)/GM
ODOR SCALE=1-none
2-slight
3-moderate
4-strong

TABLE 4
PD 3/28/03

Top Rounds Data Summary
Means

	SAMPLE GROUP	TPC CT/G Log_{10}	PSY CT/G Log_{10}	*pH*	*TBA*	*% SALT*	*ODOR*
Day 13 04/10/03	**C-10-13**	----	1.00	5.64	0.55	0.20	1.00
	T-10-13	----	1.48	5.55	0.35	0.21	1.00
Day 21 04/18/03	**C-20-23**	3.03	2.90	5.61	0.36	0.26	1.00
	T-10-23	1.00	2.36	5.67	0.24	0.29	1.00
	T-20-23	2.86	2.73	5.66	0.18	0.28	1.00
Day 27 04/24/03	**C-25-28**	2.81	2.90	5.58	0.37	0.18	1.00
	T-10-28	3.31	3.30	5.66	0.18	0.28	1.50
	T-20-28	1.60	1.90	5.61	0.24	0.21	1.33
	T-25-28	1.60	2.38	5.63	0.23	0.24	1.50
Day 34 05/01/03	**C-30-33**	1.30	1.70	5.59	0.38	0.22	1.00
	T-10-33	1.30	2.89	5.64	0.34	0.23	1.17
	T-20-33	3.27	3.18	5.59	0.17	0.24	1.33
	T-25-33	4.87	4.68	5.58	0.36	0.24	1.33
	T-30-33	3.70	4.94	5.51	0.45	0.17	1.17
Day 42 05/09/03	**C-35-38**	1.60	1.70	5.66	0.49	0.23	1.00
	T-10-38	4.18	4.51	5.67	0.24	0.26	1.80
	T-20-38	4.48	4.89	5.68	0.35	0.26	1.00
	T-25-38	2.78	3.36	5.67	0.26	0.24	1.00
	T-30-38	5.57	5.71	5.73	0.25	0.29	1.00
	T-35-38	4.95	5.11	5.65	0.30	0.24	1.00

Sample Group:N=6 for each group
TPC= Total Mesophilic Plate Log_{10} Count/GM
PSY= Psychrophilic Plate Log_{10} Count (APT)/GM
ODOR SCALE=1-none
2-slight
3-moderate
4-strong

NYS DATA

ID DAY 13 4/9/03	0001 TPC CT/G	0265 PSY CT/G	pH	TBA	% SALT	ODOR
C1-10-13	----	70	5.96	0.52	0.25	1
C2-10-13	----	80	5.52	0.36	0.36	1
C3-10-13	----	410	5.5	0.2	0.37	1
C4-10-13	----	50	5.5	0.48	0.31	1
C5-10-13	----	80	5.55	0.48	0.25	1
C6-10-13	----	190	5.46	0.55	0.3	1
T1-10-13	----	10	5.93	0.16	0.33	1
T2-10-13	----	200	5.66	0.16	0.37	1
T3-10-13	----	90	5.64	0.31	0.28	1
T4-10-13	----	110	5.7	0.18	0.35	1
T5-10-13	----	330	5.77	0.16	0.37	1
T6-10-13	----	140	5.57	0.57	0.33	1

DAY 22 4/18/03	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
C1-20-23	70	130	5.95	0.18	0.33	1
C2-20-23	130	110	5.69	0.08	0.46	1
C3-20-23	170	180	5.66	0.2	0.31	1
C4-20-23	90	100	5.68	0.35	0.33	1
C5-20-23	2600	3800	5.7	0.41	0.31	1
C6-20-23	----	----	----	----	----	----
T1-10-23	150	2700	5.95	0.19	0.2	1
T2-10-23	1100	590	5.68	0.1	0.4	1
T3-10-23	190	210	5.64	0.3	0.29	1
T4-10-23	50	610	5.66	0.15	0.31	1
T5-10-23	40	4400	5.72	0.14	0.34	1
T6-10-23	----	----	----	----	----	----
T1-20-23	110000	49000	5.93	0.27	0.28	1
T2-20-23	32000	3900	5.71	0.16	0.41	1
T3-20-23	80	190	5.63	0.23	0.28	1
T4-20-23	50	3300	5.64	0.19	0.35	1
T5-20-23	10	1900	5.76	0.09	0.39	1
T6-20-23	----	----	----	----	----	----

DAY 28 4/24/03	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
C1-25-28	1100	1600	5.99	0.41	0.3	1
C2-25-28	30	100	5.7	0.22	0.43	1
C3-25-28	10	10	5.75	0.11	0.38	1
C4-25-28	40	10	5.63	0.31	0.32	1
C5-25-28	120	150	5.59	0.62	0.28	1
C6-25-28	880	2000	5.63	0.37	0.29	1
T1-10-28	65000	56000	5.97	0.22	0.27	2
T2-10-28	10	40	5.69	0.09	0.39	2
T3-10-28	10	10	5.6	0.14	0.3	1
T4-10-28	20	280	5.63	0.08	0.39	1
T5-10-28	----	----	----	----	----	----
T6-10-28	30	640	5.7	0.15	0.36	2
T1-20-28	4600	4200	5.96	0.42	0.3	1
T2-20-28	10	10	5.7	0.06	0.46	1
T3-20-28	30	110	5.57	0.11	0.32	1
T4-20-28	10	420	5.58	0.13	0.31	1
T5-20-28	40	22000	5.65	0.24	0.32	1
T6-20-28	100	30000	5.66	0.15	0.39	1
T1-25-28	600	530	5.91	0.09	0.32	1
T2-25-28	10	40	5.7	0.06	0.4	1
T3-25-28	10	10	5.65	0.08	0.38	1
T4-25-28	260	1700	5.63	0.17	0.35	1
T5-25-28	20	370	5.67	0.13	0.33	1
T6-25-28	480	1100	5.69	0.15	0.38	1

DAY 35 5/1/03	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
C1-30-33	90	70	6.01	0.37	0.34	1
C2-30-33	150	100	5.73	0.12	0.44	1
C3-30-33	220	290	5.64	0.2	0.36	1
C4-30-33	120	180	5.6	0.34	0.33	1
C5-30-33	120	240	5.7	0.39	0.34	1
C6-30-33	280	250	5.69	0.23	0.36	1
T1-10-33	10	20	5.97	0.15	0.32	1
T2-10-33	330	180	5.72	0.06	0.43	1
T3-10-33	1100	1400	5.66	0.12	0.34	1
T4-10-33	1100	1100	5.66	0.13	0.4	1
T5-10-33	11000	12000	5.64	0.3	0.25	1
T6-10-33	630	410	5.71	0.19	0.36	1
T1-20-33	----	----	6.05	0.23	0.29	1
T2-20-33	190	190	5.75	0.25	0.46	1
T3-20-33	50000	130000	5.65	0.13	0.4	1
T4-20-33	550	660	5.6	0.11	0.48	1
T5-20-33	41000	250000	5.68	0.23	0.3	1
T6-20-33	160	150	5.67	0.16	0.31	1
T1-25-33	70	80	5.94	0.12	0.28	1
T2-25-33	1100	1300	5.6	0.09	0.47	1
T3-25-33	140	130	5.69	0.09	0.39	1
T4-25-33	80	50	5.64	0.25	0.34	1
T5-25-33	70	80	5.69	0.34	0.32	1
T6-25-33	200	290	5.68	0.16	0.31	1
T1-30-33	1100	430	6.02	0.09	0.31	1
T2-30-33	760	1100	5.64	0.06	0.48	1
T3-30-33	160	220	5.68	0.1	0.4	1
T4-30-33	2600	3600	5.67	0.19	0.36	1
T5-30-33	10	20	5.66	0.37	0.24	1
T6-30-33	1000	350	5.66	0.13	0.35	1

DAY 42 5/8/03	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
C1-35-38	110	170000	5.98	0.19	0.33	1
C2-35-38	10	150	5.72	0.1	0.47	1
C3-35-38	20	80	5.69	0.22	0.32	1
C4-35-38	10	10	5.73	0.22	0.34	1
C5-35-38	2000	5800	5.72	0.12	0.38	1
C6-35-38	1100	210	5.62	0.26	0.35	1
T1-10-38	13000	18000	5.91	0.15	0.35	1
T2-10-38	40	70	5.72	0.08	0.43	2
T3-10-38	420	210	5.68	0.24	0.33	1
T4-10-38	15000	31000	5.74	0.26	0.41	1
T5-10-38	320	16000	5.78	0.2	0.34	1
T6-10-38	----	----	----	----	----	----
T1-20-38	110000	12000	5.96	0.12	0.37	1
T2-20-38	10	590	5.7	0.16	0.44	1
T3-20-38	20	70	5.73	0.09	0.38	1
T4-20-38	31000	47000	5.71	0.23	0.31	1
T5-20-38	260000	270000	5.75	0.19	0.31	1
T6-20-38	440	3100	5.64	0.11	0.31	1
T1-25-38	8200	7900	5.96	0.26	0.27	1
T2-25-38	20	580	5.7	0.12	0.42	1
T3-25-38	10	10	5.73	0.13	0.38	1
T4-25-38	130	1600	5.7	0.24	0.32	1
T5-25-38	30	20	5.67	0.16	0.34	1
T6-25-38	150	330	5.71	0.28	0.37	1
T1-30-38	40000	26000	5.96	0.3	0.32	1
T2-30-38	10	290	5.72	0.07	0.47	1
T3-30-38	10	60	5.67	0.18	0.3	1
T4-30-38	18000	76000	5.71	0.16	0.38	1
T5-30-38	30	2500	5.68	0.23	0.23	1
T6-30-38	150000	160000	5.65	0.1	0.32	1
T1-35-38	18000	28000	5.92	0.21	0.35	1
T2-35-38	10	390	5.71	0.09	0.41	1
T3-35-38	30	70	5.64	0.19	0.28	1
T4-35-38	----	----	----	----	----	----
T5-35-38	30	670	5.68	0.23	0.2	1
T6-35-38	70	1400	5.7	0.13	0.31	1

TR DATA

ID DAY 13 4/10/03	0001 TPC CT/G	0265 PSY CT/G	pH	TBA	% SALT	ODOR
C1-10-13	----	10	5.61	0.22	0.2	1
C2-10-13	----	10	5.64	----	0.22	1
C3-10-13	----	10	5.75	0.2	0.27	1
C4-10-13	----	10	5.57	1	0.13	1
C5-10-13	----	10	5.64	0.87	0.2	1
C6-10-13	----	10	5.63	0.48	0.17	1
T1-10-13	----	10	5.44	0.2	0.18	1
T2-10-13	----	10	5.54	0.55	0.26	1
T3-10-13	----	10	5.5	0.28	0.17	1
T4-10-13	----	10	5.56	0.4	0.17	1
T5-10-13	----	80	5.62	0.43	0.25	1
T6-10-13	----	60	5.61	0.26	0.23	1

DAY 21 4/18/03	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
C1-20-23	10	10	5.54	0.28	0.23	1
C2-20-23	10	30	5.69	0.14	0.34	1
C3-20-23	4300	150	5.59	0.68	0.24	1
C4-20-23	110	2300	5.63	0.16	0.23	1
C5-20-23	850	1500	5.62	0.52	0.26	1
C6-20-23	----	----	----	----	----	----
T1-10-23	10	130	5.5	0.27	0.18	1
T2-10-23	10	20	5.71	0.39	0.24	1
T3-10-23	20	660	5.73	0.14	0.4	1
T4-10-23	10	90	5.74	0.16	0.35	1
T5-10-23	----	----	----	----	----	----
T6-10-23	----	----	----	----	----	----

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
T1-20-23	1700	1500	5.71	0.21	0.44	1
T2-20-23	10	80	5.66	0.23	0.22	1
T3-20-23	40	50	5.55	0.13	0.13	1
T4-20-23	1800	910	5.75	0.1	0.36	1
T5-20-23	110	170	5.61	0.21	0.26	1
T6-20-23	----	----	----	----	----	----

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DAY 27 4/24/03	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
C1-25-28	10	10	5.57	0.16	0.2	1
C2-25-28	20	10	5.6	0.27	0.19	1
C3-25-28	3600	4600	5.57	0.6	0.13	1
C4-25-28	170	150	5.6	0.22	0.19	1
C5-25-28	10	10	5.61	0.38	0.19	1
C6-25-28	10	10	5.55	0.56	0.19	1
T1-10-28	10	2000	5.76	0.09	0.48	1
T2-10-28	10	10	5.79	0.1	0.3	2
T3-10-28	20	10	5.56	0.27	0.17	2
T4-10-28	40	30	5.64	0.12	0.32	1
T5-10-28	12000	9900	5.69	0.09	0.28	1
T6-10-28	10	10	5.54	0.43	0.12	2
T1-20-28	170	100	5.61	0.09	0.3	1
T2-20-28	10	10	5.59	0.33	0.15	2
T3-20-28	10	140	5.71	0.08	0.33	1
T4-20-28	10	220	5.58	0.2	0.18	1
T5-20-28	10	10	5.59	0.37	0.13	1
T6-20-28	10	10	5.6	0.34	0.17	2
T1-25-28	30	670	5.76	0.08	0.43	2
T2-25-28	10	70	5.59	0.41	0.21	1
T3-25-28	10	20	5.53	0.54	0.16	1
T4-25-28	100	510	5.55	0.12	0.15	1
T5-25-28	70	150	5.68	0.09	0.27	2
T6-25-28	10	10	5.64	0.16	0.24	2

DAY 34 5/1/03	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
C1-30-33	10	10	5.59	0.15	0.27	1
C2-30-33	10	10	5.59	0.78	0.17	1
C3-30-33	10	10	5.6	0.56	0.23	1
C4-30-33	80	160	5.6	0.19	0.2	1
C5-30-33	10	70	5.66	0.37	0.27	1
C6-30-33	10	10	5.48	0.24	0.19	1
T1-10-33	10	100	5.62	0.26	0.32	2
T2-10-33	10	10	5.65	0.46	0.23	1
T3-10-33	10	70	5.61	0.2	0.22	1
T4-10-33	20	1300	5.64	0.45	0.15	1
T5-10-33	80	3200	5.81	0.11	0.35	1
T6-10-33	10	10	5.49	0.57	0.13	1
T1-20-33	10	10	5.5	0.22	0.2	2
T2-20-33	10	10	5.66	0.23	0.28	2
T3-20-33	11000	7100	5.67	0.14	0.3	1
T4-20-33	40	1800	5.71	0.12	0.23	1
T5-20-33	60	90	5.63	0.16	0.19	1
T6-20-33	10	60	5.38	0.12	0.25	1
T1-25-33	50	50	5.67	0.11	0.38	2
T2-25-33	10	20	5.57	0.86	0.21	1
T3-25-33	20	30	5.68	0.16	0.27	2
T4-25-33	440000	290000	5.61	0.16	0.17	1
T5-25-33	10	70	5.61	0.76	0.2	1
T6-25-33	10	20	5.36	0.12	0.22	1
T1-30-33	10	10	5.46	0.14	0.18	2
T2-30-33	10	10	5.56	0.65	0.16	1
T3-30-33	10	20	5.51	0.48	0.13	1
T4-30-33	30	1400	5.56	0.43	0.14	1
T5-30-33	10	5600	5.58	0.59	0.22	1
T6-30-33	30000	510000	5.37	0.38	0.17	1

DAY 42 5/8/03	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
C1-35-38	10	20	5.6	0.23	0.27	1
C2-35-38	210	220	5.97	0.23	0.38	1
C3-35-38	10	10	5.59	0.45	0.18	1
C4-35-38	10	30	5.61	0.37	0.19	1
C5-35-38	10	10	5.63	0.64	0.17	1
C6-35-38	10	10	5.57	1.01	0.16	1
T1-10-38	10	10	5.56	0.17	0.21	2
T2-10-38	51000	100000	5.72	0.27	0.27	3
T3-10-38	3500	5100	5.77	0.1	0.35	1
T4-10-38	10	40	5.68	0.21	0.22	2
T5-10-38	22000	58000	5.63	0.43	0.24	1
T6-10-38	----	----	----	----	----	----
T1-20-38	10	10	5.64	0.15	0.32	1
T2-20-38	180000	470000	5.61	0.53	0.17	1
T3-20-38	10	320	5.77	0.39	0.31	1
T4-20-38	10	10	5.57	0.41	0.15	1
T5-20-38	40	60	5.72	0.24	0.29	1
T6-20-38	20	170	5.74	0.37	0.33	1
T1-25-38	10	10	5.52	0.17	0.16	1
T2-25-38	3400	5100	5.69	0.48	0.19	1
T3-25-38	80	5500	5.62	0.2	0.22	1
T4-25-38	70	120	5.74	0.17	0.31	1
T5-25-38	10	2800	5.7	0.19	0.27	1
T6-25-38	10	60	5.73	0.32	0.31	1
T1-30-38	10	10	5.72	0.12	0.37	1
T2-30-38	2200000	2900000	5.95	0.16	0.38	1
T3-30-38	10	1700	5.6	0.59	0.18	1
T4-30-38	10	180	5.69	0.18	0.27	1
T5-30-38	24000	110000	5.76	0.27	0.32	1
T6-30-38	1300	37000	5.65	0.2	0.23	1
T1-35-38	10	10	5.53	0.22	0.15	1
T2-35-38	10	10000	5.84	0.43	0.31	1
T3-35-38	10	10	5.59	0.44	0.12	1
T4-35-38	10	120	5.7	0.16	0.28	1
T5-35-38	540000	760000	5.7	0.16	0.39	1
T6-35-38	10	1900	5.53	0.41	0.2	1

NYS STATS

DAY 13 C 10 13

	PSY CT/G	pH	TBA	% SALT
Mean	146.67	5.58	0.43	0.31
Standard Error	56.37	0.08	0.05	0.02
Median	80	5.51	0.48	0.305
Mode	80	5.5	0.48	0.25
Standard Deviation	138.08	0.19	0.13	0.05
Sample Variance	19066.67	0.04	0.02	0.00
Kurtosis	3.33	5.50	1.39	-1.84
Skewness	1.87	2.31	-1.38	0.09
Range	360	0.5	0.35	0.12
Minimum	50	5.46	0.2	0.25
Maximum	410	5.96	0.55	0.37
Sum	880	33.49	2.59	1.84
Count	6	6	6	6

DAY 13 T 10 13

	PSY CT/G	pH	TBA	% SALT
Mean	146.67	5.71	0.26	0.34
Standard Error	44.62	0.05	0.07	0.01
Median	125.00	5.68	0.17	0.34
Mode	#N/A	#N/A	0.16	0.33
Standard Deviation	109.30	0.13	0.16	0.03
Sample Variance	11946.67	0.02	0.03	0.00
Kurtosis	1.10	1.36	3.31	1.13
Skewness	0.81	1.09	1.88	-1.05
Range	320.00	0.36	0.41	0.09
Minimum	10.00	5.57	0.16	0.28
Maximum	330.00	5.93	0.57	0.37
Sum	880.00	34.27	1.54	2.03
Count	6.00	6.00	6.00	6.00

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DAY 22 G 20-23

	TPC CT/G	PSY CT/G	pH	TBA	% SALT
Mean	612.00	864.00	5.74	0.24	0.35
Standard Error	497.30	734.13	0.05	0.06	0.03
Median	130.00	130.00	5.69	0.20	0.33
Mode	#N/A	#N/A	#N/A	#N/A	0.33
Standard Deviation	1111.99	1641.56	0.12	0.13	0.06
Sample Variance	1236520.00	2694730.00	0.01	0.02	0.00
Kurtosis	4.98	4.99	4.71	-1.66	4.51
Skewness	2.23	2.23	2.15	0.17	2.10
Range	2530.00	3700.00	0.29	0.33	0.15
Minimum	70.00	100.00	5.66	0.08	0.31
Maximum	2600.00	3800.00	5.95	0.41	0.46
Sum	3060.00	4320.00	28.68	1.22	1.74
Count	5.00	5.00	5.00	5.00	5.00

DAY 22 H 10-23

	TPC CT/G	PSY CT/G	pH	TBA	% SALT
Mean	306.00	1702.00	5.73	0.18	0.31
Standard Error	200.56	804.06	0.06	0.03	0.03
Median	150.00	610.00	5.68	0.15	0.31
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	448.48	1797.93	0.13	0.08	0.07
Sample Variance	201130.00	3232570.00	0.02	0.01	0.01
Kurtosis	4.59	-0.60	3.91	2.00	1.05
Skewness	2.12	1.05	1.95	1.32	-0.48
Range	1060.00	4190.00	0.31	0.20	0.20
Minimum	40.00	210.00	5.64	0.10	0.20
Maximum	1100.00	4400.00	5.95	0.30	0.40
Sum	1530.00	8510.00	28.65	0.88	1.54
Count	5.00	5.00	5.00	5.00	5.00

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DAY 22 [illegible] 1: 20-23

	TPC CT/G	PSY CT/G	pH	TBA	% SALT
Mean	28428.00	11658.00	5.73	0.19	0.34
Standard Error	21311.09	9357.35	0.05	0.03	0.03
Median	80.00	3300.00	5.71	0.19	0.35
Mode	#N/A	#N/A	#N/A	#N/A	0.28
Standard Deviation	47653.05	20923.68	0.12	0.07	0.06
Sample Variance	2270813270.00	437800320.00	0.01	0.00	0.00
Kurtosis	3.20	4.91	1.50	-0.08	-2.78
Skewness	1.83	2.21	1.29	-0.43	-0.10
Range	109990.00	48810.00	0.30	0.18	0.13
Minimum	10.00	190.00	5.63	0.09	0.28
Maximum	110000.00	49000.00	5.93	0.27	0.41
Sum	142140.00	58290.00	28.67	0.94	1.71
Count	5.00	5.00	5.00	5.00	5.00

DAY 28 [illegible] C: 25-28

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	363.33	645.00	5.72	0.34	0.33	1.00
Standard Error	200.78	369.53	0.06	0.07	0.02	0.00
Median	80.00	125.00	5.67	0.34	0.31	1.00
Mode	#N/A	10.00	5.63	#N/A	#N/A	1.00
Standard Deviation	491.80	905.16	0.15	0.17	0.06	0.00
Sample Variance	241866.67	819310.00	0.02	0.03	0.00	0.00
Kurtosis	-1.37	-1.37	3.00	0.67	-0.28	#DIV/0!
Skewness	1.03	1.04	1.69	0.47	1.06	#DIV/0!
Range	1090.00	1990.00	0.40	0.51	0.15	0.00
Minimum	10.00	10.00	5.59	0.11	0.28	1.00
Maximum	1100.00	2000.00	5.99	0.62	0.43	1.00
Sum	2180.00	3870.00	34.29	2.04	2.00	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

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DAY 28 T-10-28

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	13014.00	11394.00	5.72	0.14	0.34	1.60
Standard Error	12996.50	11152.07	0.07	0.03	0.02	0.24
Median	20.00	280.00	5.69	0.14	0.36	2.00
Mode	10.00	#N/A	#N/A	#N/A	0.39	2.00
Standard Deviation	29061.06	24936.79	0.15	0.06	0.05	0.55
Sample Variance	844545130.00	621843380.00	0.02	0.00	0.00	0.30
Kurtosis	5.00	5.00	3.52	0.18	-2.23	-3.33
Skewness	2.24	2.24	1.80	0.77	-0.57	-0.61
Range	64990.00	55990.00	0.37	0.14	0.12	1.00
Minimum	10.00	10.00	5.60	0.08	0.27	1.00
Maximum	65000.00	56000.00	5.97	0.22	0.39	2.00
Sum	65070.00	56970.00	28.59	0.68	1.71	8.00
Count	5.00	5.00	5.00	5.00	5.00	5.00

DAY 28 T-20-28

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	798.33	9456.67	5.69	0.19	0.35	1.00
Standard Error	760.45	5370.47	0.06	0.05	0.03	0.00
Median	35.00	2310.00	5.66	0.14	0.32	1.00
Mode	10.00	#N/A	#N/A	#N/A	0.32	1.00
Standard Deviation	1862.72	13154.90	0.14	0.13	0.06	0.00
Sample Variance	3469736.67	173051466.67	0.02	0.02	0.00	0.00
Kurtosis	5.99	-0.97	3.69	2.10	1.01	#DIV/0!
Skewness	2.45	1.07	1.81	1.46	1.41	#DIV/0!
Range	4590.00	29990.00	0.39	0.36	0.16	0.00
Minimum	10.00	10.00	5.57	0.06	0.30	1.00
Maximum	4600.00	30000.00	5.96	0.42	0.46	1.00
Sum	4790.00	56740.00	34.12	1.11	2.10	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

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DAY 28 T-25-28

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	230.00	625.00	5.71	0.11	0.36	1.00
Standard Error	106.65	269.30	0.04	0.02	0.01	0.00
Median	140.00	450.00	5.68	0.11	0.37	1.00
Mode	10.00	#N/A	#N/A	#N/A	0.38	1.00
Standard Deviation	261.23	659.66	0.10	0.04	0.03	0.00
Sample Variance	68240.00	435150.00	0.01	0.00	0.00	0.00
Kurtosis	-1.85	-0.15	4.75	-1.87	-1.87	#DIV/0!
Skewness	0.60	0.94	2.10	0.13	-0.11	#DIV/0!
Range	590.00	1690.00	0.28	0.11	0.08	0.00
Minimum	10.00	10.00	5.63	0.06	0.32	1.00
Maximum	600.00	1700.00	5.91	0.17	0.40	1.00
Sum	1380.00	3750.00	34.25	0.68	2.16	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

DAY 35 C-30-33

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	163.33	188.33	5.73	0.28	0.36	1.00
Standard Error	29.51	35.91	0.06	0.04	0.02	0.00
Median	135.00	210.00	5.70	0.29	0.35	1.00
Mode	120.00	#N/A	#N/A	#N/A	0.34	1.00
Standard Deviation	72.30	87.96	0.15	0.11	0.04	0.00
Sample Variance	5226.67	7736.67	0.02	0.01	0.00	0.00
Kurtosis	-0.32	-1.74	4.10	-1.66	4.22	#DIV/0!
Skewness	0.96	-0.41	1.89	-0.38	1.98	#DIV/0!
Range	190.00	220.00	0.41	0.27	0.11	0.00
Minimum	90.00	70.00	5.60	0.12	0.33	1.00
Maximum	280.00	290.00	6.01	0.39	0.44	1.00
Sum	980.00	1130.00	34.37	1.65	2.17	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

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DAY [illegible] [illegible] 10 33

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	163.33	188.33	5.73	0.28	0.36	1.00
Standard Error	29.51	35.91	0.06	0.04	0.02	0.00
Median	135.00	210.00	5.70	0.29	0.35	1.00
Mode	120.00	#N/A	#N/A	#N/A	0.34	1.00
Standard Deviation	72.30	87.96	0.15	0.11	0.04	0.00
Sample Variance	5226.67	7736.67	0.02	0.01	0.00	0.00
Kurtosis	-0.32	-1.74	4.10	-1.66	4.22	#DIV/0!
Skewness	0.96	-0.41	1.89	-0.38	1.98	#DIV/0!
Range	190.00	220.00	0.41	0.27	0.11	0.00
Minimum	90.00	70.00	5.60	0.12	0.33	1.00
Maximum	280.00	290.00	6.01	0.39	0.44	1.00
Sum	980.00	1130.00	34.37	1.65	2.17	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

DAY [illegible] 1 20 33

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	18380.00	76200.00	5.73	0.19	0.37	1.00
Standard Error	11162.98	50183.81	0.07	0.02	0.03	0.00
Median	550.00	660.00	5.68	0.20	0.36	1.00
Mode	#N/A	#N/A	#N/A	0.23	#N/A	1.00
Standard Deviation	24961.18	112214.41	0.16	0.06	0.08	0.00
Sample Variance	623060550.00	12592073550.00	0.03	0.00	0.01	0.00
Kurtosis	-2.91	0.04	4.22	-2.43	-2.46	#DIV/0!
Skewness	0.68	1.21	1.98	-0.21	0.32	#DIV/0!
Range	49840.00	249850.00	0.45	0.14	0.19	0.00
Minimum	160.00	150.00	5.60	0.11	0.29	1.00
Maximum	50000.00	250000.00	6.05	0.25	0.48	1.00
Sum	91900.00	381000.00	34.40	1.11	2.24	6.00
Count	5.00	5.00	6.00	6.00	6.00	6.00

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DAY 35 T-25-33

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	276.67	321.67	5.71	0.18	0.35	1.00
Standard Error	165.99	198.79	0.05	0.04	0.03	0.00
Median	110.00	105.00	5.69	0.14	0.33	1.00
Mode	70.00	80.00	5.69	0.09	#N/A	1.00
Standard Deviation	406.58	486.93	0.12	0.10	0.07	0.00
Sample Variance	165306.67	237096.67	0.01	0.01	0.00	0.00
Kurtosis	5.66	5.33	4.40	-0.18	1.01	#DIV/0!
Skewness	2.37	2.29	1.96	1.04	1.16	#DIV/0!
Range	1030.00	1250.00	0.34	0.25	0.19	0.00
Minimum	70.00	50.00	5.60	0.09	0.28	1.00
Maximum	1100.00	1300.00	5.94	0.34	0.47	1.00
Sum	1660.00	1930.00	34.24	1.05	2.11	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

DAY 35 T-30-33

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	938.33	953.33	5.72	0.16	0.36	1.00
Standard Error	378.17	549.94	0.06	0.05	0.03	0.00
Median	880.00	390.00	5.67	0.12	0.36	1.00
Mode	#N/A	#N/A	5.66	#N/A	#N/A	1.00
Standard Deviation	926.34	1347.08	0.15	0.11	0.08	0.00
Sample Variance	858096.67	1814626.67	0.02	0.01	0.01	0.00
Kurtosis	2.05	4.45	5.83	3.01	0.61	#DIV/0!
Skewness	1.25	2.08	2.40	1.72	0.15	#DIV/0!
Range	2590.00	3580.00	0.38	0.31	0.24	0.00
Minimum	10.00	20.00	5.64	0.06	0.24	1.00
Maximum	2600.00	3600.00	6.02	0.37	0.48	1.00
Sum	5630.00	5720.00	34.33	0.94	2.14	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

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DAY 42 C 35-38

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	541.67	29375.00	5.74	0.19	0.37	1.00
Standard Error	339.72	28140.34	0.05	0.03	0.02	0.00
Median	65.00	180.00	5.72	0.21	0.35	1.00
Mode	10.00	#N/A	5.72	0.22	#N/A	1.00
Standard Deviation	832.14	68929.48	0.12	0.06	0.06	0.00
Sample Variance	692456.67	4751273870.00	0.02	0.00	0.00	0.00
Kurtosis	0.89	5.98	4.16	-1.46	3.23	#DIV/0!
Skewness	1.43	2.44	1.82	-0.47	1.78	#DIV/0!
Range	1990.00	169990.00	0.36	0.16	0.15	0.00
Minimum	10.00	10.00	5.62	0.10	0.32	1.00
Maximum	2000.00	170000.00	5.98	0.26	0.47	1.00
Sum	3250.00	176250.00	34.46	1.11	2.19	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

DAY 42 T 10-33

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	5756.00	13056.00	5.77	0.19	0.37	1.20
Standard Error	3381.00	5868.36	0.04	0.03	0.02	0.20
Median	420.00	16000.00	5.74	0.20	0.35	1.00
Mode	#N/A	#N/A	#N/A	#N/A	#N/A	1.00
Standard Deviation	7560.14	13122.06	0.09	0.07	0.04	0.45
Sample Variance	57155680.00	172188330.00	0.01	0.01	0.00	0.20
Kurtosis	-3.10	-1.25	2.11	-0.54	-2.55	5.00
Skewness	0.65	0.30	1.36	-0.73	0.61	2.24
Range	14960.00	30930.00	0.23	0.18	0.10	1.00
Minimum	40.00	70.00	5.68	0.08	0.33	1.00
Maximum	15000.00	31000.00	5.91	0.26	0.43	2.00
Sum	28780.00	65280.00	28.83	0.93	1.86	6.00
Count	5.00	5.00	5.00	5.00	5.00	5.00

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DAY 42 T 20 38

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	66911.67	55460.00	5.75	0.15	0.35	1.00
Standard Error	42347.05	43515.55	0.04	0.02	0.02	0.00
Median	15720.00	7550.00	5.72	0.14	0.34	1.00
Mode	#N/A	#N/A	#N/A	#N/A	0.31	1.00
Standard Deviation	103728.65	106590.89	0.11	0.05	0.05	0.00
Sample Variance	10759633456.67	11361618680.00	0.01	0.00	0.00	0.00
Kurtosis	2.55	5.40	3.98	-1.05	-0.33	#DIV/0!
Skewness	1.70	2.31	1.80	0.54	0.86	#DIV/0!
Range	259990.00	269930.00	0.32	0.14	0.13	0.00
Minimum	10.00	70.00	5.64	0.09	0.31	1.00
Maximum	260000.00	270000.00	5.96	0.23	0.44	1.00
Sum	401470.00	332760.00	34.49	0.90	2.12	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

DAY 42 T 25 38

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	1423.33	1740.00	5.75	0.20	0.35	1.00
Standard Error	1355.55	1254.99	0.04	0.03	0.02	0.00
Median	80.00	455.00	5.71	0.20	0.36	1.00
Mode	#N/A	#N/A	5.70	#N/A	#N/A	1.00
Standard Deviation	3320.41	3074.09	0.11	0.07	0.05	0.00
Sample Variance	11025106.67	9450040.00	0.01	0.00	0.00	0.00
Kurtosis	5.99	5.22	5.34	-2.64	0.07	#DIV/0!
Skewness	2.45	2.26	2.27	0.00	-0.34	#DIV/0!
Range	8190.00	7890.00	0.29	0.16	0.15	0.00
Minimum	10.00	10.00	5.67	0.12	0.27	1.00
Maximum	8200.00	7900.00	5.96	0.28	0.42	1.00
Sum	8540.00	10440.00	34.47	1.19	2.10	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

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DAY 42 T-60-68

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	34675.00	44141.67	5.73	0.17	0.34	1.00
Standard Error	23951.25	26055.98	0.05	0.03	0.03	0.00
Median	9015.00	14250.00	5.70	0.17	0.32	1.00
Mode	10.00	#N/A	#N/A	#N/A	0.32	1.00
Standard Deviation	58668.33	63823.85	0.11	0.08	0.08	0.00
Sample Variance	3441973470.00	4073483456.67	0.01	0.01	0.01	0.00
Kurtosis	4.46	1.84	4.98	-0.56	1.03	#DIV/0!
Skewness	2.09	1.55	2.18	0.36	0.66	#DIV/0!
Range	149990.00	159940.00	0.31	0.23	0.24	0.00
Minimum	10.00	60.00	5.65	0.07	0.23	1.00
Maximum	150000.00	160000.00	5.96	0.30	0.47	1.00
Sum	208050.00	264850.00	34.39	1.04	2.02	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

DAY 42 T-65-68

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	3628.00	6106.00	5.73	0.17	0.31	1.00
Standard Error	3593.01	5477.91	0.05	0.03	0.04	0.00
Median	30.00	670.00	5.70	0.19	0.31	1.00
Mode	30.00	#N/A	#N/A	#N/A	#N/A	1.00
Standard Deviation	8034.22	12248.98	0.11	0.06	0.08	0.00
Sample Variance	64548720.00	150037430.00	0.01	0.00	0.01	0.00
Kurtosis	5.00	4.97	3.94	-1.60	0.26	#DIV/0!
Skewness	2.24	2.23	1.89	-0.61	-0.25	#DIV/0!
Range	17990.00	27930.00	0.28	0.14	0.21	0.00
Minimum	10.00	70.00	5.64	0.09	0.20	1.00
Maximum	18000.00	28000.00	5.92	0.23	0.41	1.00
Sum	18140.00	30530.00	28.65	0.85	1.55	5.00
Count	5.00	5.00	5.00	5.00	5.00	5.00

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TRISTATS DAY 13 C 10-13

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	#DIV/0!	10.00	5.64	0.55	0.20	1.00
Standard Error	65535.00	0.00	0.02	0.16	0.02	0.00
Median	#NUM!	10.00	5.64	0.48	0.20	1.00
Mode	#N/A	10.00	5.64	#N/A	0.20	1.00
Standard Deviation	#DIV/0!	0.00	0.06	0.37	0.05	0.00
Sample Variance	#DIV/0!	0.00	0.00	0.14	0.00	0.00
Kurtosis	#DIV/0!	#DIV/0!	3.00	-2.69	0.74	#DIV/0!
Skewness	#DIV/0!	#DIV/0!	1.33	0.32	0.10	#DIV/0!
Range	0.00	0.00	0.18	0.80	0.14	0.00
Minimum	0.00	10.00	5.57	0.20	0.13	1.00
Maximum	0.00	10.00	5.75	1.00	0.27	1.00
Sum	0.00	60.00	33.84	2.77	1.19	6.00
Count	0.00	6.00	6.00	5.00	6.00	6.00

DAY 13 T 10-13

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	#DIV/0!	30.00	5.55	0.35	0.21	1.00
Standard Error	65535.00	12.91	0.03	0.05	0.02	0.00
Median	#NUM!	10.00	5.55	0.34	0.21	1.00
Mode	#N/A	10.00	#N/A	#N/A	0.17	1.00
Standard Deviation	#DIV/0!	31.62	0.07	0.13	0.04	0.00
Sample Variance	#DIV/0!	1000.00	0.00	0.02	0.00	0.00
Kurtosis	#DIV/0!	-0.86	-0.53	-0.85	-2.72	#DIV/0!
Skewness	#DIV/0!	1.14	-0.52	0.46	0.18	#DIV/0!
Range	0.00	70.00	0.18	0.35	0.09	0.00
Minimum	0.00	10.00	5.44	0.20	0.17	1.00
Maximum	0.00	80.00	5.62	0.55	0.26	1.00
Sum	0.00	180.00	33.27	2.12	1.26	6.00
Count	0.00	6.00	6.00	6.00	6.00	6.00

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DAY 21 C 20 23

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	1056.00	798.00	5.61	0.36	0.26	1.00
Standard Error	826.11	467.95	0.02	0.11	0.02	0.00
Median	110.00	150.00	5.62	0.28	0.24	1.00
Mode	10.00	#N/A	#N/A	#N/A	0.23	1.00
Standard Deviation	1847.24	1046.36	0.06	0.24	0.05	0.00
Sample Variance	3412280.00	1094870.00	0.00	0.06	0.00	0.00
Kurtosis	4.23	-1.49	0.68	-1.78	3.56	#DIV/0!
Skewness	2.05	0.92	0.06	0.65	1.88	#DIV/0!
Range	4290.00	2290.00	0.15	0.54	0.11	0.00
Minimum	10.00	10.00	5.54	0.14	0.23	1.00
Maximum	4300.00	2300.00	5.69	0.68	0.34	1.00
Sum	5280.00	3990.00	28.07	1.78	1.30	5.00
Count	5.00	5.00	5.00	5.00	5.00	5.00

DAY 21 T 10 23

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	12.50	225.00	5.67	0.24	0.29	1.00
Standard Error	2.50	146.77	0.06	0.06	0.05	0.00
Median	10.00	110.00	5.72	0.22	0.30	1.00
Mode	10.00	#N/A	#N/A	#N/A	#N/A	1.00
Standard Deviation	5.00	293.54	0.11	0.12	0.10	0.00
Sample Variance	25.00	86166.67	0.01	0.01	0.01	0.00
Kurtosis	4.00	3.55	3.75	-1.23	-3.28	#DIV/0!
Skewness	2.00	1.86	-1.93	0.82	-0.09	#DIV/0!
Range	10.00	640.00	0.24	0.25	0.22	0.00
Minimum	10.00	20.00	5.50	0.14	0.18	1.00
Maximum	20.00	660.00	5.74	0.39	0.40	1.00
Sum	50.00	900.00	22.68	0.96	1.17	4.00
Count	4.00	4.00	4.00	4.00	4.00	4.00

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DAY 21 [redacted] G 20 24

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	732.00	542.00	5.66	0.18	0.28	1.00
Standard Error	416.21	286.97	0.04	0.03	0.05	0.00
Median	110.00	170.00	5.66	0.21	0.26	1.00
Mode	#N/A	#N/A	#N/A	0.21	#N/A	1.00
Standard Deviation	930.68	641.69	0.08	0.06	0.12	0.00
Sample Variance	866170.00	411770.00	0.01	0.00	0.01	0.00
Kurtosis	-3.29	-0.75	-1.11	-2.30	-0.93	#DIV/0!
Skewness	0.61	1.04	-0.25	-0.67	0.16	#DIV/0!
Range	1790.00	1450.00	0.20	0.13	0.31	0.00
Minimum	10.00	50.00	5.55	0.10	0.13	1.00
Maximum	1800.00	1500.00	5.75	0.23	0.44	1.00
Sum	3660.00	2710.00	28.28	0.88	1.41	5.00
Count	5.00	5.00	5.00	5.00	5.00	5.00

DAY 27 [redacted] G 25 28

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	636.67	798.33	5.58	0.37	0.18	1.00
Standard Error	593.23	760.68	0.01	0.07	0.01	0.00
Median	15.00	10.00	5.59	0.33	0.19	1.00
Mode	10.00	10.00	5.57	#N/A	0.19	1.00
Standard Deviation	1453.10	1863.27	0.02	0.18	0.03	0.00
Sample Variance	2111506.67	3471776.67	0.00	0.03	0.00	0.00
Kurtosis	5.96	5.98	-1.66	-1.92	5.53	#DIV/0!
Skewness	2.44	2.44	-0.32	0.39	-2.31	#DIV/0!
Range	3590.00	4590.00	0.06	0.44	0.07	0.00
Minimum	10.00	10.00	5.55	0.16	0.13	1.00
Maximum	3600.00	4600.00	5.61	0.60	0.20	1.00
Sum	3820.00	4790.00	33.50	2.19	1.09	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

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DAY 27 T-10-28

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	2015.00	1993.33	5.66	0.18	0.28	1.50
Standard Error	1997.01	1614.22	0.04	0.06	0.05	0.22
Median	15.00	20.00	5.67	0.11	0.29	1.50
Mode	10.00	10.00	#N/A	0.09	#N/A	1.00
Standard Deviation	4891.64	3954.01	0.10	0.14	0.13	0.55
Sample Variance	23928190.00	15634186.67	0.01	0.02	0.02	0.30
Kurtosis	6.00	5.12	-1.87	1.18	0.43	-3.33
Skewness	2.45	2.25	-0.01	1.47	0.45	0.00
Range	11990.00	9890.00	0.25	0.34	0.36	1.00
Minimum	10.00	10.00	5.54	0.09	0.12	1.00
Maximum	12000.00	9900.00	5.79	0.43	0.48	2.00
Sum	12090.00	11960.00	33.98	1.10	1.67	9.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

DAY 27 T-20-28

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	36.67	81.67	5.61	0.24	0.21	1.33
Standard Error	26.67	35.72	0.02	0.05	0.03	0.21
Median	10.00	55.00	5.60	0.27	0.18	1.00
Mode	10.00	10.00	5.59	#N/A	#N/A	1.00
Standard Deviation	65.32	87.50	0.05	0.13	0.08	0.52
Sample Variance	4266.67	7656.67	0.00	0.02	0.01	0.27
Kurtosis	6.00	-0.79	5.09	-2.44	-1.53	-1.88
Skewness	2.45	0.78	2.21	-0.32	0.84	0.97
Range	160.00	210.00	0.13	0.29	0.20	1.00
Minimum	10.00	10.00	5.58	0.08	0.13	1.00
Maximum	170.00	220.00	5.71	0.37	0.33	2.00
Sum	220.00	490.00	33.68	1.41	1.26	8.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

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DAY 27 [illegible] T-25,28

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	38.33	238.33	5.63	0.23	0.24	1.50
Standard Error	15.58	114.90	0.04	0.08	0.04	0.22
Median	20.00	110.00	5.62	0.14	0.23	1.50
Mode	10.00	#N/A	#N/A	#N/A	#N/A	2.00
Standard Deviation	38.17	281.45	0.09	0.19	0.10	0.55
Sample Variance	1456.67	79216.67	0.01	0.04	0.01	0.30
Kurtosis	-0.51	-1.12	-0.53	-0.78	2.31	-3.33
Skewness	1.07	0.98	0.61	1.07	1.43	0.00
Range	90.00	660.00	0.23	0.46	0.28	1.00
Minimum	10.00	10.00	5.53	0.08	0.15	1.00
Maximum	100.00	670.00	5.76	0.54	0.43	2.00
Sum	230.00	1430.00	33.75	1.40	1.46	9.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

DAY 34 [illegible] C-30,33

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	21.67	45.00	5.59	0.38	0.22	1.00
Standard Error	11.67	25.00	0.02	0.10	0.02	0.00
Median	10.00	10.00	5.60	0.31	0.22	1.00
Mode	10.00	10.00	5.59	#N/A	0.27	1.00
Standard Deviation	28.58	61.24	0.06	0.25	0.04	0.00
Sample Variance	816.67	3750.00	0.00	0.06	0.00	0.00
Kurtosis	6.00	2.77	3.20	-0.30	-1.98	#DIV/0!
Skewness	2.45	1.78	-1.22	0.95	0.19	#DIV/0!
Range	70.00	150.00	0.18	0.63	0.10	0.00
Minimum	10.00	10.00	5.48	0.15	0.17	1.00
Maximum	80.00	160.00	5.66	0.78	0.27	1.00
Sum	130.00	270.00	33.52	2.29	1.33	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

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DAY 34 T-10-33

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	23.33	781.67	5.64	0.34	0.23	1.17
Standard Error	11.45	525.33	0.04	0.07	0.04	0.17
Median	10.00	85.00	5.63	0.36	0.23	1.00
Mode	10.00	10.00	#N/A	#N/A	#N/A	1.00
Standard Deviation	28.05	1286.79	0.10	0.18	0.09	0.41
Sample Variance	786.67	1655816.67	0.01	0.03	0.01	0.17
Kurtosis	5.56	2.80	2.35	-1.79	-1.59	6.00
Skewness	2.34	1.79	0.56	-0.05	0.24	2.45
Range	70.00	3190.00	0.32	0.46	0.22	1.00
Minimum	10.00	10.00	5.49	0.11	0.13	1.00
Maximum	80.00	3200.00	5.81	0.57	0.35	2.00
Sum	140.00	4690.00	33.82	2.05	1.40	7.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

DAY 34 T-20-33

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	1855.00	1511.67	5.59	0.17	0.24	1.33
Standard Error	1829.02	1153.99	0.05	0.02	0.02	0.21
Median	25.00	75.00	5.65	0.15	0.24	1.00
Mode	10.00	10.00	#N/A	0.12	#N/A	1.00
Standard Deviation	4480.16	2826.70	0.13	0.05	0.04	0.52
Sample Variance	20071870.00	7990216.67	0.02	0.00	0.00	0.27
Kurtosis	6.00	4.65	0.22	-1.89	-1.60	-1.88
Skewness	2.45	2.15	-1.16	0.62	0.16	0.97
Range	10990.00	7090.00	0.33	0.11	0.11	1.00
Minimum	10.00	10.00	5.38	0.12	0.19	1.00
Maximum	11000.00	7100.00	5.71	0.23	0.30	2.00
Sum	11130.00	9070.00	33.55	0.99	1.45	8.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

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DAY 34 T-25-33

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	73350.00	48365.00	5.58	0.36	0.24	1.33
Standard Error	73330.00	48327.00	0.05	0.14	0.03	0.21
Median	15.00	40.00	5.61	0.16	0.22	1.00
Mode	10.00	20.00	5.61	0.16	#N/A	1.00
Standard Deviation	179621.08	118376.49	0.12	0.35	0.08	0.52
Sample Variance	32263733640.00	14012993950.00	0.01	0.12	0.01	0.27
Kurtosis	6.00	6.00	3.62	-1.66	2.44	-1.88
Skewness	2.45	2.45	-1.79	0.99	1.54	0.97
Range	439990.00	289980.00	0.32	0.75	0.21	1.00
Minimum	10.00	20.00	5.36	0.11	0.17	1.00
Maximum	440000.00	290000.00	5.68	0.86	0.38	2.00
Sum	440100.00	290190.00	33.50	2.17	1.45	8.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

DAY 34 T-30-33

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	5011.67	86173.33	5.51	0.45	0.17	1.17
Standard Error	4997.67	84769.94	0.03	0.07	0.01	0.17
Median	10.00	710.00	5.54	0.46	0.17	1.00
Mode	10.00	10.00	5.56	#N/A	#N/A	1.00
Standard Deviation	12241.74	207643.09	0.08	0.18	0.03	0.41
Sample Variance	149860096.67	43115652066.67	0.01	0.03	0.00	0.17
Kurtosis	6.00	6.00	0.59	1.03	0.68	6.00
Skewness	2.45	2.45	-1.15	-0.87	0.78	2.45
Range	29990.00	509990.00	0.21	0.51	0.09	1.00
Minimum	10.00	10.00	5.37	0.14	0.13	1.00
Maximum	30000.00	510000.00	5.58	0.65	0.22	2.00
Sum	30070.00	517040.00	33.04	2.67	1.00	7.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

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DAY 42 C-35-38

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	43.33	50.00	5.66	0.49	0.23	1.00
Standard Error	33.33	34.16	0.06	0.12	0.03	0.00
Median	10.00	15.00	5.61	0.41	0.19	1.00
Mode	10.00	10.00	#N/A	0.23	#N/A	1.00
Standard Deviation	81.65	83.67	0.15	0.30	0.09	0.00
Sample Variance	6666.67	7000.00	0.02	0.09	0.01	0.00
Kurtosis	6.00	5.81	5.64	1.18	1.79	#DIV/0!
Skewness	2.45	2.40	2.36	1.24	1.56	#DIV/0!
Range	200.00	210.00	0.40	0.78	0.22	0.00
Minimum	10.00	10.00	5.57	0.23	0.16	1.00
Maximum	210.00	220.00	5.97	1.01	0.38	1.00
Sum	260.00	300.00	33.97	2.93	1.35	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

DAY 42 T-10-38

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	15304.00	32630.00	5.67	0.24	0.26	1.80
Standard Error	9813.74	20082.86	0.04	0.06	0.03	0.37
Median	3500.00	5100.00	5.68	0.21	0.24	2.00
Mode	10.00	#N/A	#N/A	#N/A	#N/A	2.00
Standard Deviation	21944.18	44906.65	0.08	0.12	0.06	0.84
Sample Variance	481547030.00	2016606800.00	0.01	0.02	0.00	0.70
Kurtosis	1.46	-0.67	-0.53	1.16	1.85	-0.61
Skewness	1.46	1.07	-0.33	0.97	1.42	0.51
Range	50990.00	99990.00	0.21	0.33	0.14	2.00
Minimum	10.00	10.00	5.56	0.10	0.21	1.00
Maximum	51000.00	100000.00	5.77	0.43	0.35	3.00
Sum	76520.00	163150.00	28.36	1.18	1.29	9.00
Count	5.00	5.00	5.00	5.00	5.00	5.00

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DAY 42 T 20-38

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	30015.00	78428.33	5.68	0.35	0.26	1.00
Standard Error	29997.00	78314.35	0.03	0.05	0.03	0.00
Median	15.00	115.00	5.68	0.38	0.30	1.00
Mode	10.00	10.00	#N/A	#N/A	#N/A	1.00
Standard Deviation	73477.34	191830.19	0.08	0.13	0.08	0.00
Sample Variance	5398920190.00	36798822856.67	0.01	0.02	0.01	0.00
Kurtosis	6.00	6.00	-2.01	-0.23	-1.73	#DIV/0!
Skewness	2.45	2.45	-0.15	-0.34	-0.88	#DIV/0!
Range	179990.00	469990.00	0.20	0.38	0.18	0.00
Minimum	10.00	10.00	5.57	0.15	0.15	1.00
Maximum	180000.00	470000.00	5.77	0.53	0.33	1.00
Sum	180090.00	470570.00	34.05	2.09	1.57	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

DAY 42 T 25-38

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	596.67	2265.00	5.67	0.26	0.24	1.00
Standard Error	560.82	1054.15	0.03	0.05	0.03	0.00
Median	40.00	1460.00	5.70	0.20	0.25	1.00
Mode	10.00	#N/A	#N/A	0.17	0.31	1.00
Standard Deviation	1373.72	2582.12	0.08	0.12	0.06	0.00
Sample Variance	1887106.67	6667350.00	0.01	0.02	0.00	0.00
Kurtosis	5.99	-2.39	1.21	1.85	-1.99	#DIV/0!
Skewness	2.45	0.43	-1.33	1.58	-0.16	#DIV/0!
Range	3390.00	5490.00	0.22	0.31	0.15	0.00
Minimum	10.00	10.00	5.52	0.17	0.16	1.00
Maximum	3400.00	5500.00	5.74	0.48	0.31	1.00
Sum	3580.00	13590.00	34.00	1.53	1.46	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

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DAY 42 T-30-38

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	370888.33	508148.33	5.73	0.25	0.29	1.00
Standard Error	365842.81	478685.13	0.05	0.07	0.03	0.00
Median	655.00	19350.00	5.71	0.19	0.30	1.00
Mode	10.00	#N/A	#N/A	#N/A	#N/A	1.00
Standard Deviation	896128.20	1172534.31	0.12	0.17	0.08	0.00
Sample Variance	803045751096.67	##############	0.01	0.03	0.01	0.00
Kurtosis	6.00	5.97	2.40	4.31	-1.49	#DIV/0!
Skewness	2.45	2.44	1.37	2.02	-0.27	#DIV/0!
Range	2199990.00	2899990.00	0.35	0.47	0.20	0.00
Minimum	10.00	10.00	5.60	0.12	0.18	1.00
Maximum	2200000.00	2900000.00	5.95	0.59	0.38	1.00
Sum	2225330.00	3048890.00	34.37	1.52	1.75	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

DAY 42 T-35-38

	TPC CT/G	PSY CT/G	pH	TBA	% SALT	ODOR
Mean	90008.33	128673.33	5.65	0.30	0.24	1.00
Standard Error	89998.33	126275.18	0.05	0.06	0.04	0.00
Median	10.00	1010.00	5.65	0.32	0.24	1.00
Mode	10.00	10.00	5.53	0.16	#N/A	1.00
Standard Deviation	220449.99	309309.77	0.12	0.14	0.10	0.00
Sample Variance	48598200016.67	95672532866.67	0.01	0.02	0.01	0.00
Kurtosis	6.00	6.00	-0.52	-3.03	-1.28	#DIV/0!
Skewness	2.45	2.45	0.64	-0.08	0.27	#DIV/0!
Range	539990.00	759990.00	0.31	0.28	0.27	0.00
Minimum	10.00	10.00	5.53	0.16	0.12	1.00
Maximum	540000.00	760000.00	5.84	0.44	0.39	1.00
Sum	540050.00	772040.00	33.89	1.82	1.45	6.00
Count	6.00	6.00	6.00	6.00	6.00	6.00

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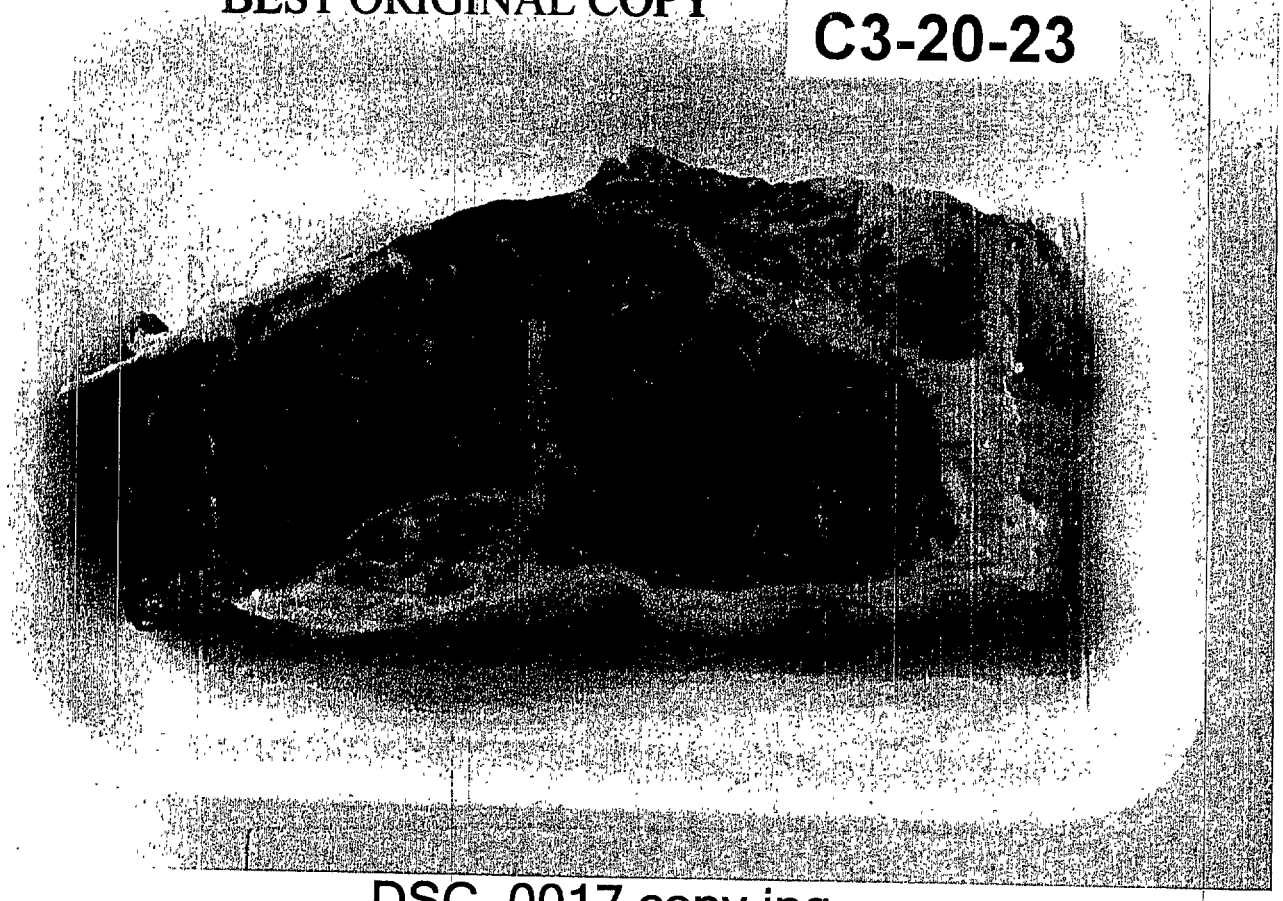
C3-20-23



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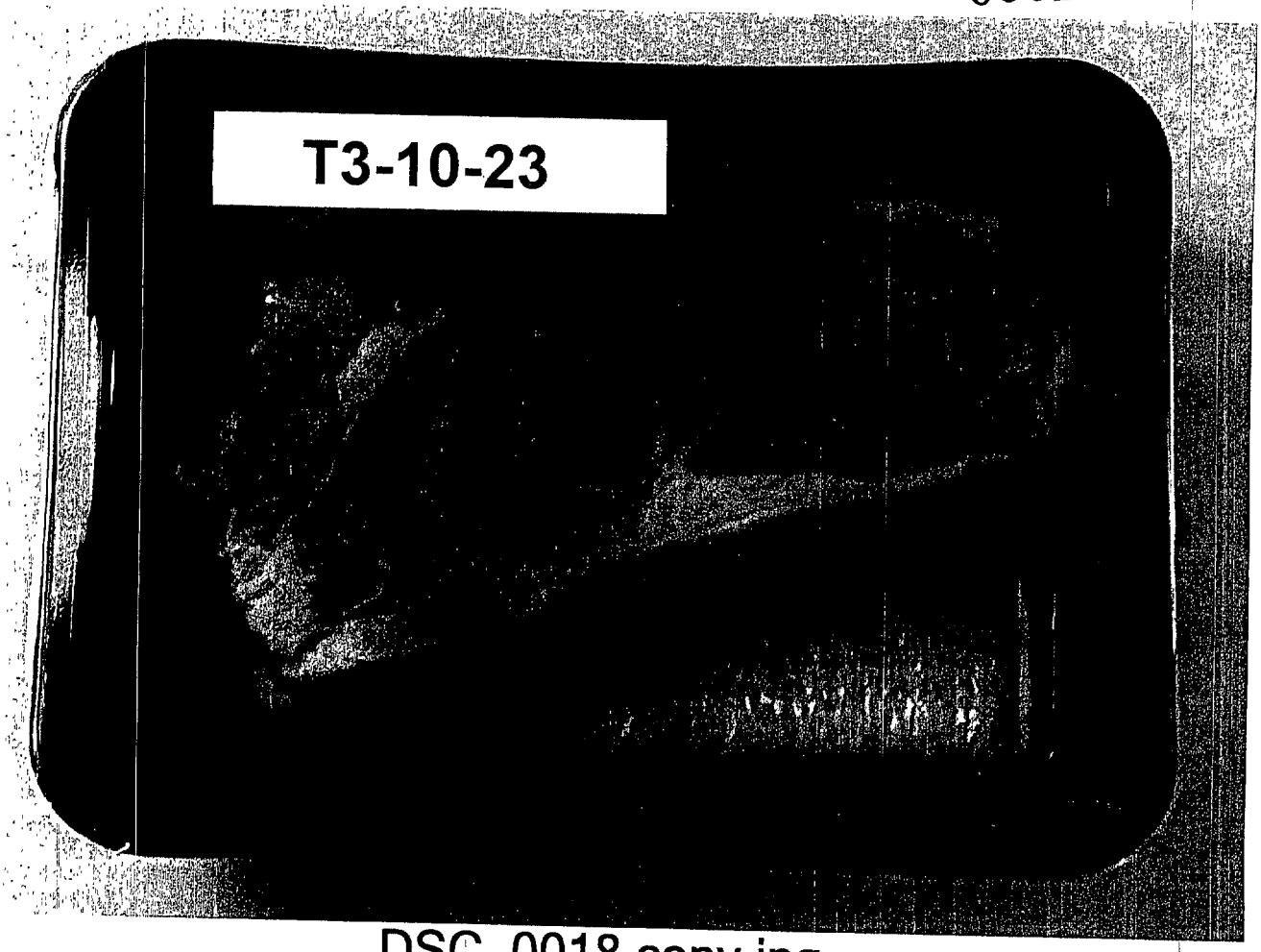

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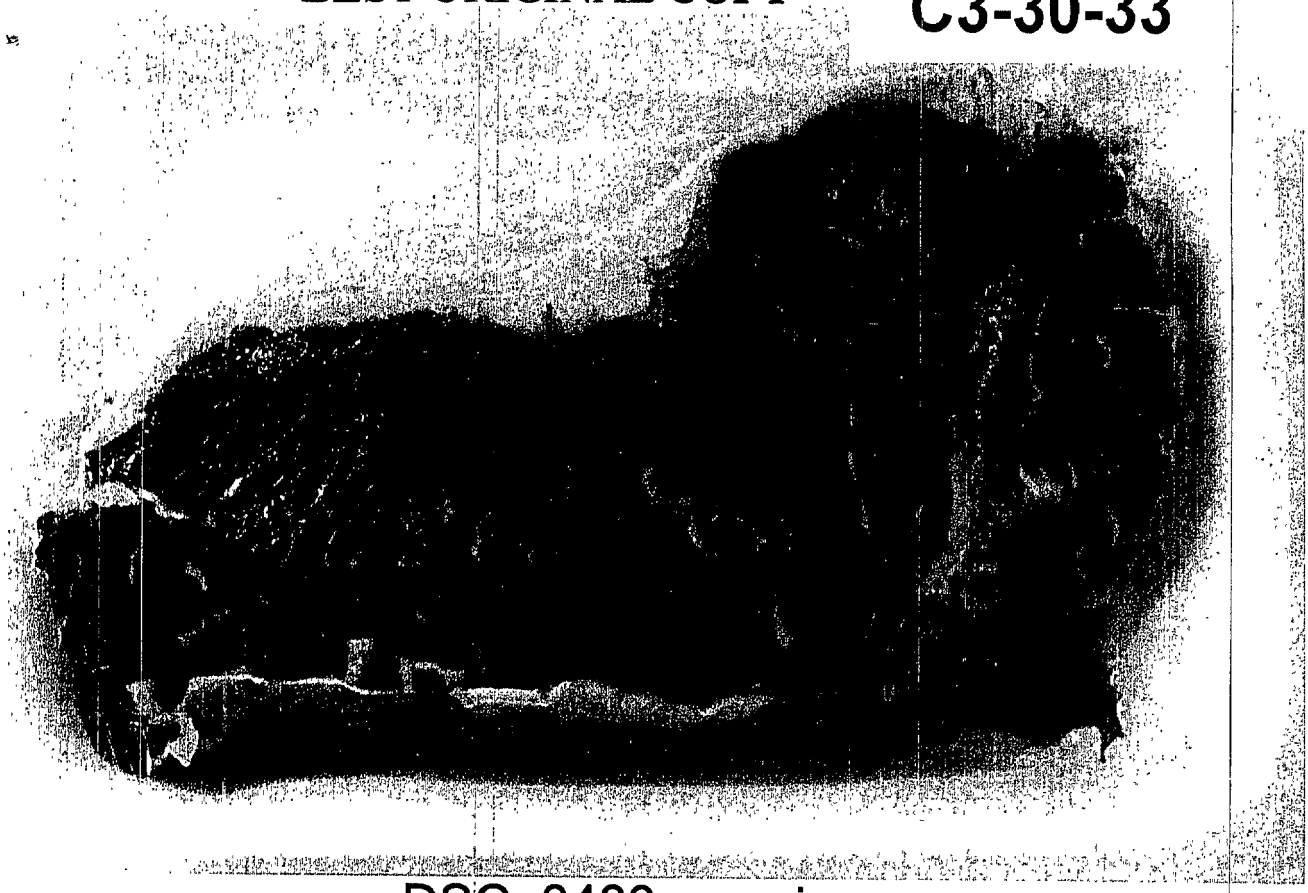

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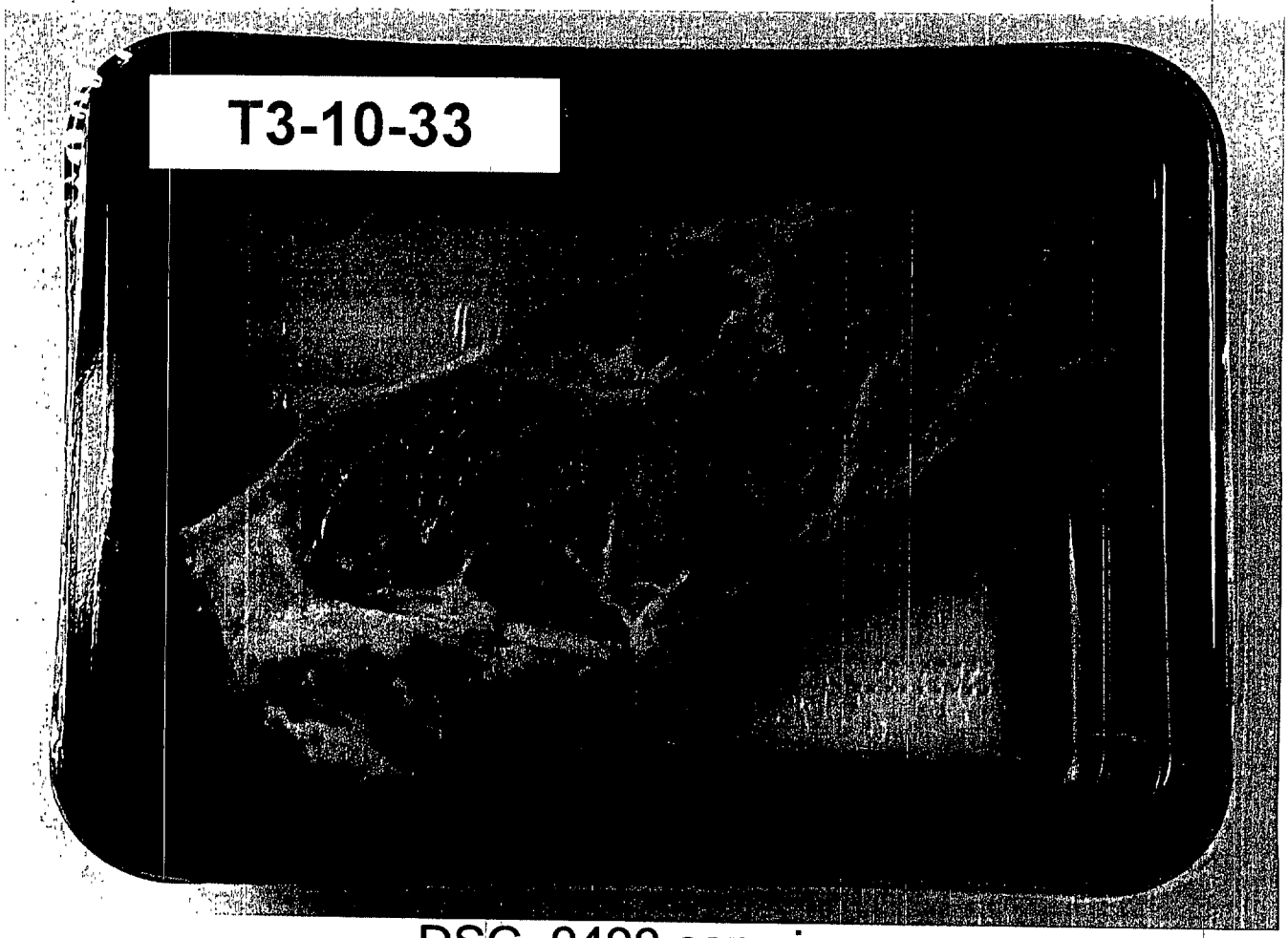

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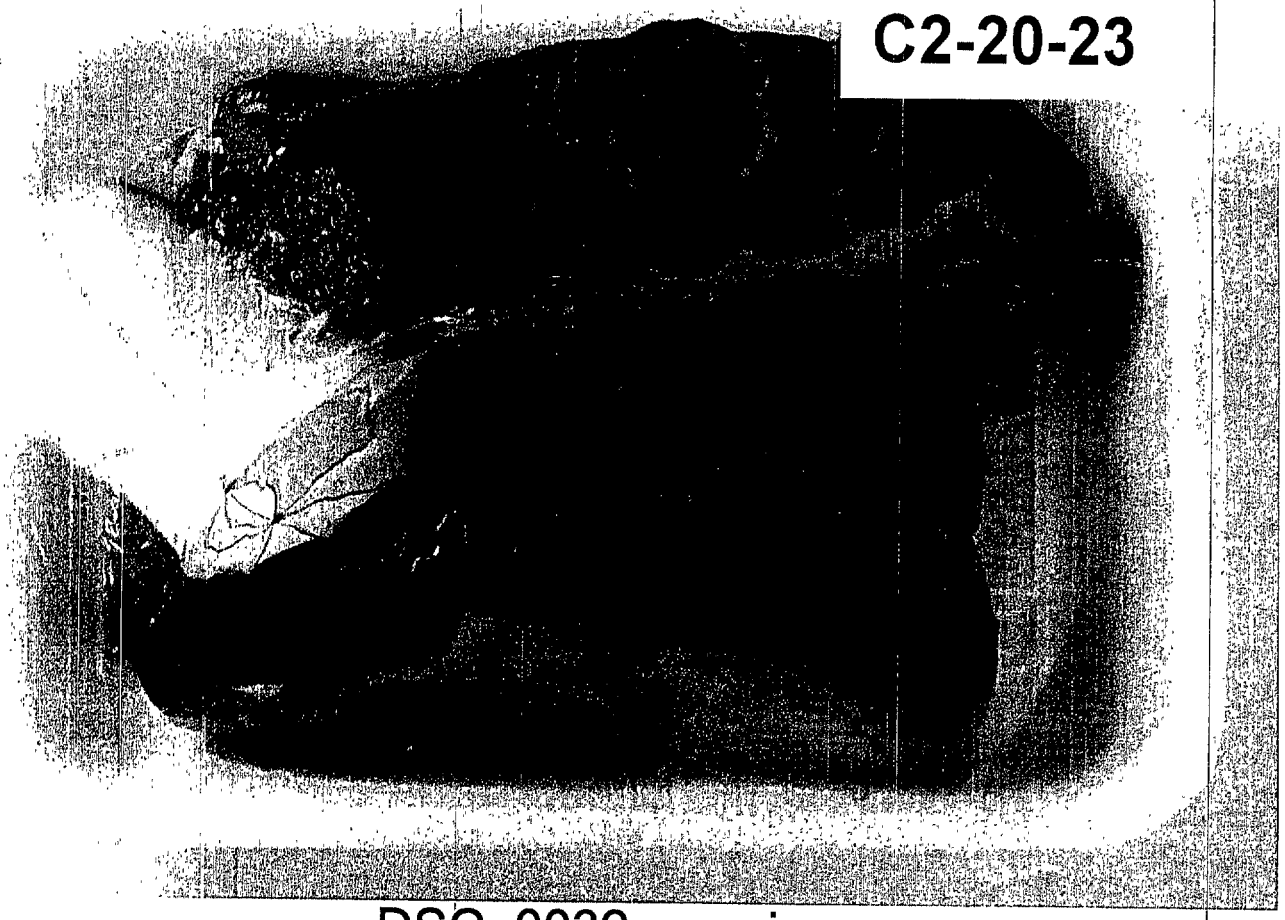

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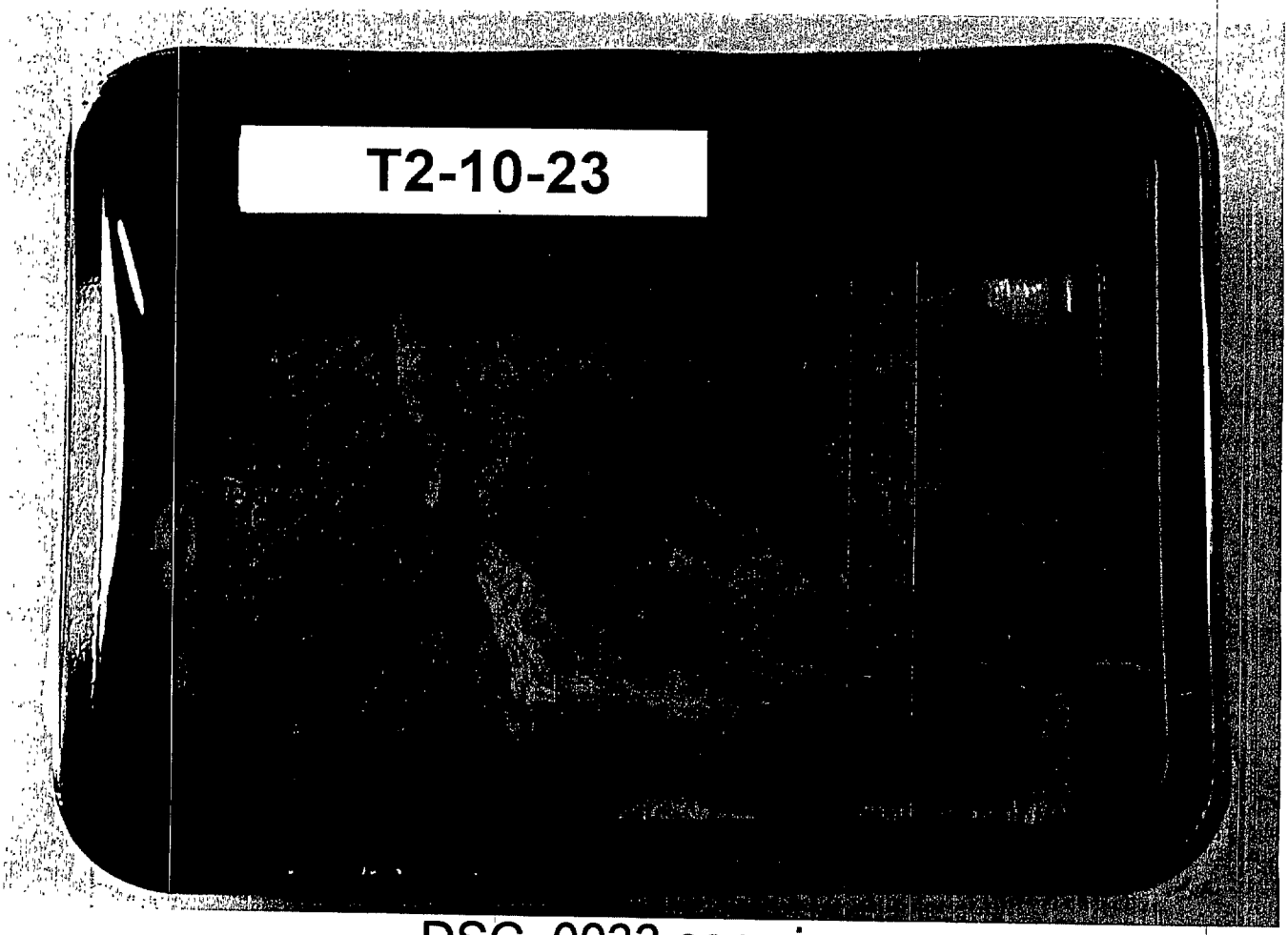

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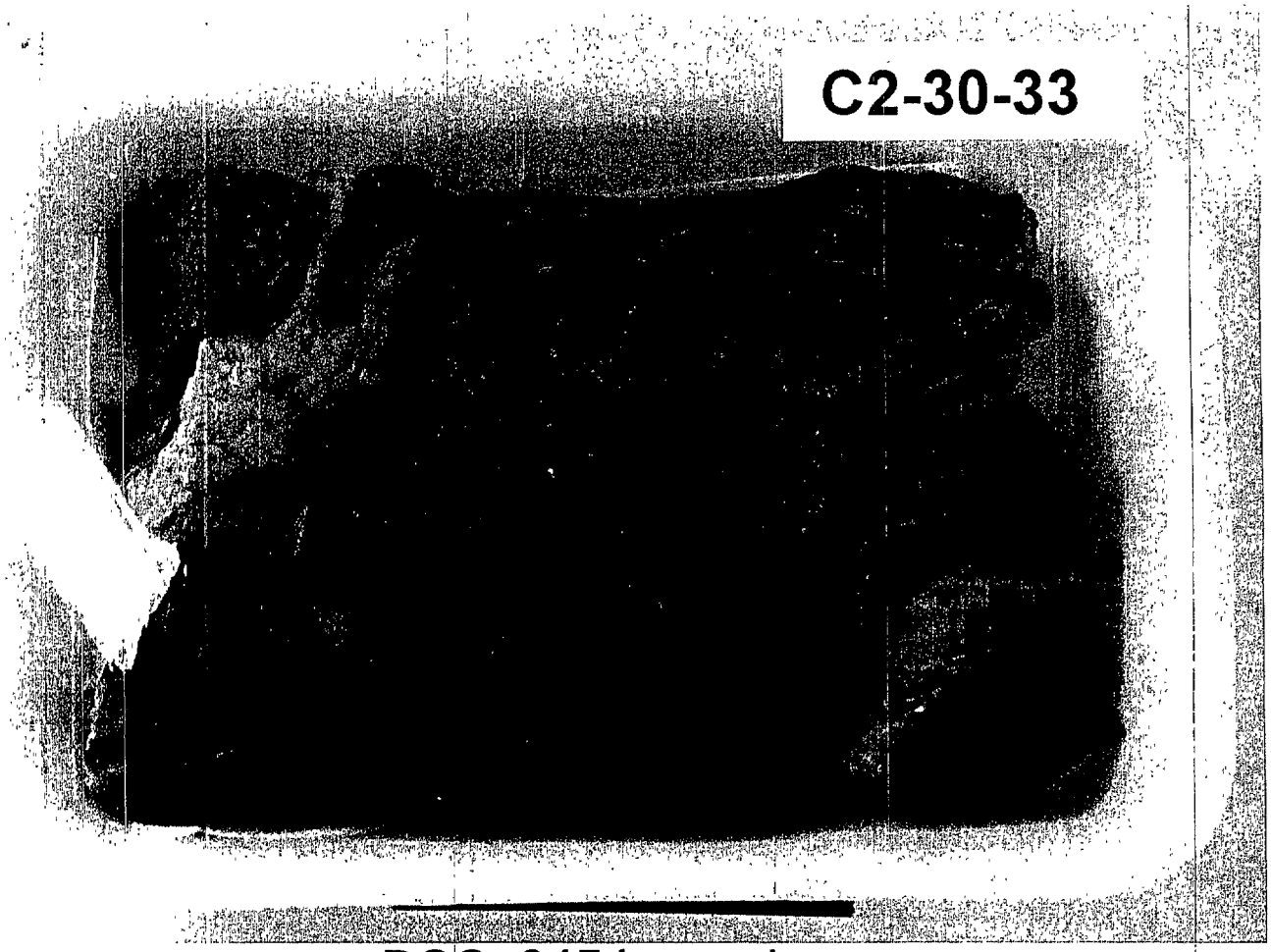

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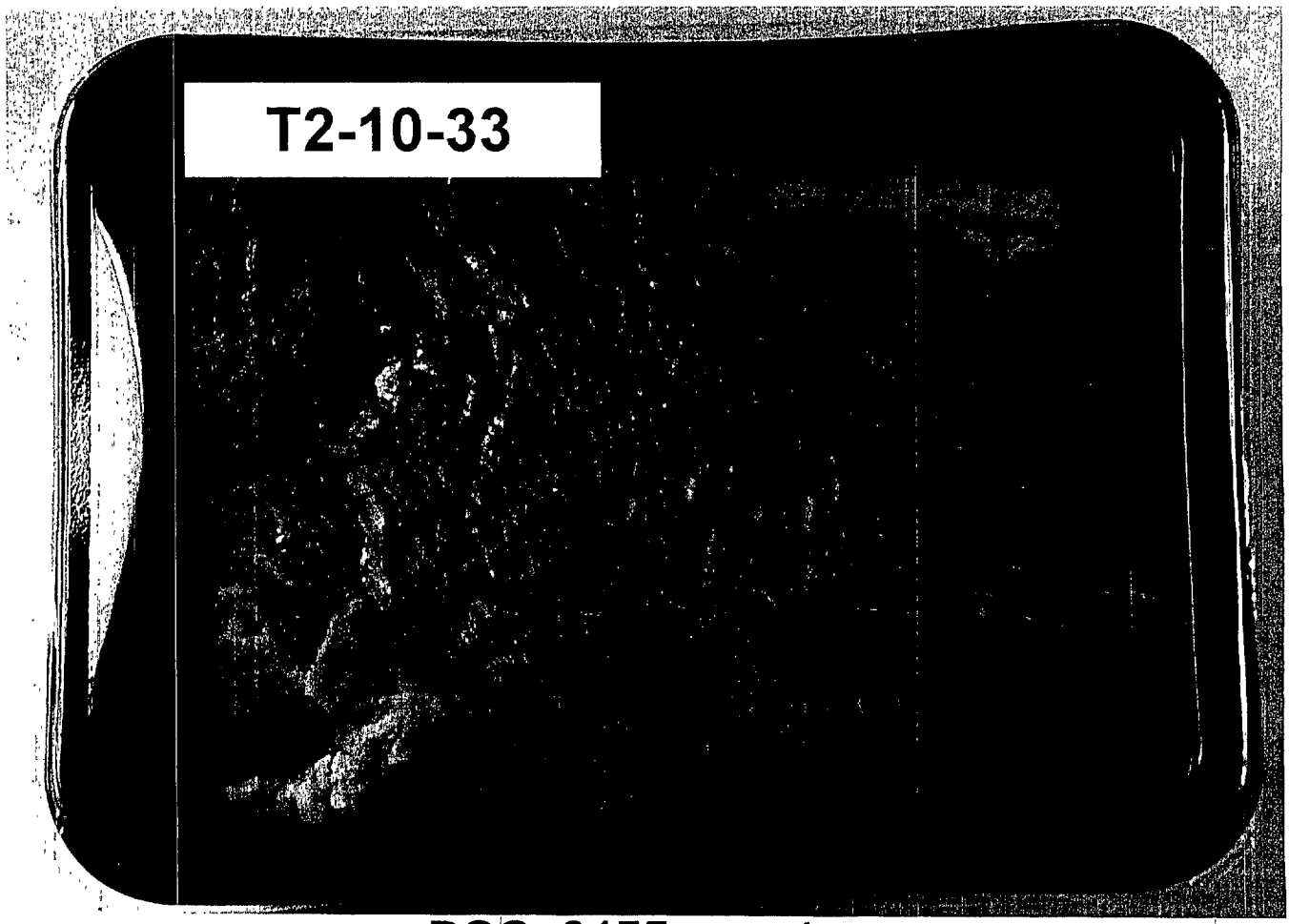

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