Food Processors Role in Pollution Control
Michigan State University
Cooperative Extension Service
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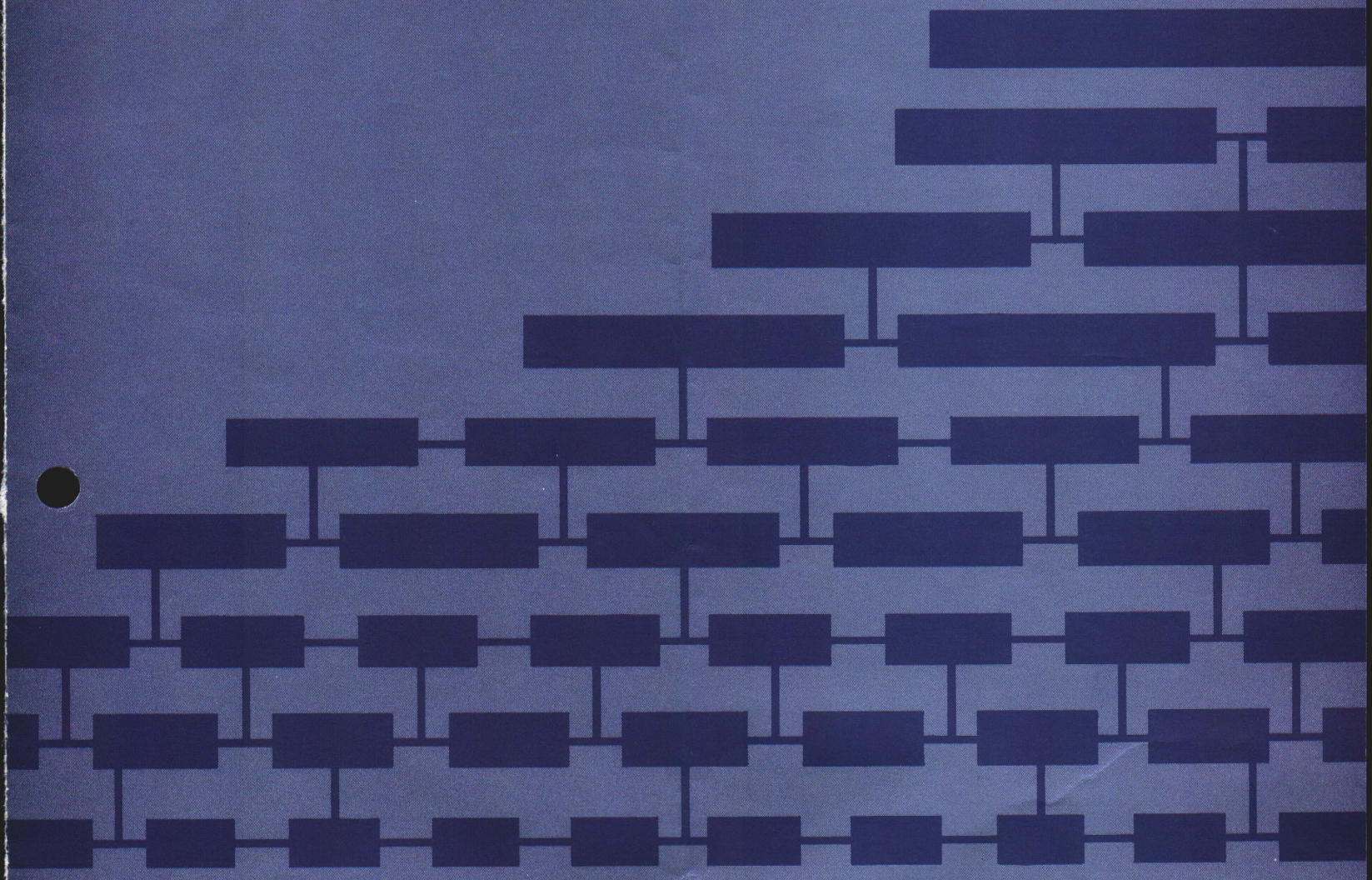

PREPARED BY:

Michigan State University Departments of Food Science and Human Nutrition and Agricultural Engineering.
Cooperative Extension Service.

IN COOPERATION WITH:

Michigan Department of Agriculture
Michigan Department of Natural Resources

Divisions of:
- Air Pollution Control
- Solid Waste Management
- Water Quality Control
- Municipal Wastewater

Food Processors Role in Pollution Control

Prepared by staff members of the agencies listed below—A. L. Rippen, Food Science and Human Nutrition Dept., MSU, Coordinator.

Sources of Information and Help

- Michigan Department of Natural Resources
Divisions of Municipal Wastewater, Water Quality Control, Air Pollution Control and Solid Waste Management.
Lansing, Michigan 48926
- Michigan Department of Agriculture
Lewis Cass Building, Lansing, Michigan 48913
- Agricultural Engineering Department
Michigan State University
East Lansing, Michigan 48823
- Food Science and Human Nutrition Department
Michigan State University
East Lansing, Michigan 48823
- Local Department of Health.

Contributors: The following persons ably assisted the coordinator in supplying the information for this publication: Albert Hafner and Kenneth Van Patten—Michigan Dept. of Agriculture; Robert Courchaine, Fred Kellow, Rodney Mosier, Milo Smith and Thomas Wasbotten—Michigan Dept. of Natural Resources; Robert Maddex—Michigan State University.

This publication was prepared to provide answers to selected questions of concern to food processors relative to pollution and the handling of processing plant wastes. Because of the various kinds of wastes which may affect the environment, several groups and agencies participated in preparing answers to pertinent questions. Hopefully, this publication will provide useful guidelines and information regarding the responsibilities and procedures for meeting the challenges posed by wastes resulting from commercial food processing operations.

General Considerations

1. How can pollutants from food handling and processing operations such as a slaughterhouse, dairy, canning plant, pickling plant, sausage plant or food packing line affect the environment?

Almost every process involving a change in a product or in the utilization or conversion of energy will affect the environment. Environmental implications of food processing plants usually are related to the liquid and solid waste handling and disposal processes used. Generally there are not insurmountable problems in controlling food processing wastes such as toxic chemicals; organic substances and nutrients are the prime concern. Solid wastes usually include cans, paper, food wastes and cardboard. If this material is burned, air pollution may result. If the solid waste is put into the ground, soil and water pollution may result unless properly handled. Odors, as they may affect the plant personnel and adjoining residents, may have an environmental impact if they are disagreeable or obnoxious regardless of their nature.

2. What are the responsibilities of food processors and handlers in controlling pollution?

Food processors have the responsibility of possessing knowledge of and complying with the laws and legal requirements for handling of all wastes.

3. How can one become informed about the applicable laws?

Contact the appropriate regulatory agency and obtain a copy of the Public Laws governing air, water, and solid waste disposal. Refer to questions 6, 10, 11, 26, and 43.

AIR POLLUTION

4. What is air pollution?

Air pollution is the presence in the outdoor atmosphere of air contaminants (dust, fumes, gas, mist, odor, smoke, vapor, or any combination thereof) in such quantities and characteristics and under such conditions, circumstances and duration which are injurious to human life or property or which unreasonably interfere with the enjoyment of life and property, and which are reasonably detrimental to plant and animal life in this state. (336.12 Section 2c, Act 348, Public Acts of 1965).

5. What state agency is responsible for determining air pollution and maintaining air quality in Michigan?

The Michigan Air Pollution Control Commission. All investigative, surveillance, technical, scientific and other services are performed for the commission by the Air Pollution Control Division of the Michigan Department of Natural Resources.

6. What assistance can food processors or manufacturers expect from the Michigan Air Pollution Control Commission?

The Michigan Air Pollution Control staff is available to provide guidance and assistance to any company or person who needs assistance in air pollution matters. Additionally, the Michigan Air Pollution Control Commission rules and regulations require that an air use permit be issued for all installations, alterations, or modifications to air pollution control equipment or sources of air pollution.
Contact should be made with the district air pollution control office in Lansing. Write or call:

Michigan Department of Natural Resources
Air Pollution Control Division
3500 North Logan Street
Lansing, Michigan 48914
Telephone: 517-373-7573

7. What are some typical sources of air pollution that are related to the food processing industry?

—Nuisance dust problems often occur in grain processing, grain drying and loading.

—Odors from improperly designed or operated waste water treatment facilities or from the improper disposal of food processing solid wastes.

—Malodorous emissions from certain food processing operations.

—Open burning (prohibited by state regulations) of waste materials.

8. Will all industries in Michigan be investigated by the Michigan Air Pollution Control Commssion?

It is expected that all significant sources (or potential sources) of air pollutants in Michigan will be investigated by the Air Pollution Control Division on a regular schedule. Sources of lesser significance will be investigated on a random basis. Additionally, all air pollution complaints are investigated.

9. Who approves the plans for incinerators and air pollution control devices?

The Michigan Air Pollution Control Division Staff.

SOLID WASTES

10. What is included in solid wastes?

By definition (Act 87, P.A. 1965, as amended by Act 89, P.A. 1971), "refuse" means solid wastes, except body wastes, and includes garbage, rubbish, ashes, incinerator ash, incinerator residue, street cleanings and solid industrial wastes. Garbage is further defined to include "rejected food wastes including waste accumulation of animal, fruit or vegetable matter used or intended for food or that attend the preparation, use, cooking, dealing in or storing of meat, fish, fowl, fruit or vegetable."

11. Where can a processor locate specific information relating to solid waste disposal?

Contact your local health department or the Michigan Department of Natural Resources, Division of Solid Waste Management, Lansing, Michigan 48926.

12. Where can a processor locate newsletters, magazines or publications pertaining to solid waste disposal?

Probably the best source of reference material is the Federal Environmental Protection Agency's reference entitled "A List of Available Literature" available from Solid Waste Management Publications Distribution Unit, U. S. Environmental Protection Agency, Cincinnati, Ohio 45268.

13. What are the recommended storage and handling methods for solid waste generated in the operation of a food processing plant?

Solid waste accumulations around a food processing plant should be closely controlled and not permitted to become: a breeding or harborage area for insects and rodents, odor producing, or a fire hazard. Specially constructed areas for the storage of refuse containers are preferred. The area should be well lighted and capable of being easily cleaned. The nature of the waste material determines the period of removal. In general, daily removal is a must when located near the food operation. Nondegradable materials may be stored for longer periods if rodent harborage is eliminated and a fire hazard is not created.
Storage areas should be designed to prevent easy access of rodents and containers should be of the vermin-proof variety. Reduction techniques at the plant may include compactors, dry or wet pulverizers, or incinerators.
The disposal techniques may include off-site salvage, compaction, transfer, incineration or sanitary landfill.

14. What controls are in effect for refuse hauling from food processing plants?

Act 87, Public Acts of 1965, as amended, requires that all refuse transporting units be licensed by the Solid Waste Management Division, Department of Natural Resources. If such units are hauling a moisture laden garbage they must be water tight. The waste carrying portion of the unit must be covered to prevent littering. The license fee for a refuse transporting unit is $10/year. Application forms are available through the local health department.

15. Are there concerns in the liquid content of waste generated within a food processing plant that are to be delivered to conventional solid waste land disposal facilities?

Plant waste directed to sanitary landfills for disposal is required to be dry enough to prevent visible moisture release during discharge in the fill and during the compaction process. Adherence to this procedure minimizes the chances of pollution.

16. If a food processing plant disposes of solid waste on the premises on which it is generated, is it necessary to utilize a licensed refuse transporting vehicle and secure a solid waste disposal license from the state?

Under the general operating procedure at the present time a plant that does not have to transport its solid waste along a public road to their own disposal site would be exempt from licensing the hauling vehicle and the disposal site. The site must be approved and must not be available for public use and it must be maintained so that it is not a nuisance or a hazard to health.

17. Are garbage grinders an acceptable means of processing food wastes within the plant?

Dry grinding and shredding for animal feeding or landfill disposal is acceptable. Wet grinding is not generally acceptable for landfill disposal or disposal to a municipal sewer system or waste treatment facility. Wet grinding can be utilized when followed by proper spreading on the land surface.

18. How should concentrated or semi-solid waste such as tomato pulp, apple pomace, and similar material be handled?

Processes should be implemented to dry or dewater the heavily moisture-laden material prior to disposal in a sanitary landfill. Land disposal of wet loads may be approved provided it is in an area separate from the regular disposal. It is vital that moisture be kept out of landfills, as much as possible, to minimize the possibility of water-carried contaminants leaching from the landfill.

19. Are there procedures that should be followed in the disposal of large volumes of contaminated foods?

It is required that the disposal of contaminated food be cleared with the Michigan Department of Agriculture, however, the final disposal site should be cleared with the local health department. Special precautions may have to be initiated to prevent a hazard to health or the environment.

20. Who does the food processor contact for assistance in insect and rodent problems in regard to refuse handling?

The Entomology Department at Michigan State University, and the Entomologists with the Bureau of Environmental Health of the Michigan Department of Public Health and with the Michigan Department of Agriculture are ready to assist in insect and rodent problems. Heavy infestations may require the services of a licensed pest control operator. Such operators are available on a single service or contractual basis.

21. Can solid waste such as cardboard be burned?

Open burning is prohibited by state regulation, however, incineration can be satisfactorily done in an approved incinerator. See question 9.

22. How may industry and the local governing unit share the responsibility for providing a solid waste disposal system?

Under existing laws the local governing body if it has a population of over 10,000 must develop a solid waste management plan. For those areas under 10,000 the required county plan will provide the desired coverage. There are no statutory obligations that local government must provide disposal facilities for their area or the industry within their jurisdiction. It is suggested that industry and local government work together to solve the disposal problem.

23. What organizations are available on a consultant basis to answer questions concerning solid waste management for the food processing industry?

A number of private consultants are available to develop and design both solid and liquid waste handling facilities. A list of these consultants is available through the Division of Solid Waste Management, Department of Natural Resources. Some information can be obtained from local health departments.

WASTEWATER FROM PROCESSING

24. What is water pollution?

Pollution is the addition of substances which degrade water quality. Michigan Law says: It is unlawful for any person directly or indirectly to discharge into the ground or surface waters any substance which is or may become injurious to public health, safety or welfare or which will impair or prevent the use of those waters by others or which is or may become injurious to plant and animal life or which impairs the value and utility of property. Sec. 6A—Act 245, Public Acts of 1929 as amended. (6, 7)

25. How can the food industry's use of water result in water pollution?

Large amounts of water are used for cooling, cleaning, peeling, cooking and conveying. In the process, water accumulates dissolved and suspended organic and inorganic solids and heat which if discharged untreated to a surface or ground water can injuriously affect the quality of those waters. Organic solids can deplete dissolved oxygen in a surface stream making it unsuitable for fish and other aquatic life and can result in odor nuisance. Suspended solids can create turbidity and bottom deposits making the stream unfit for aquatic life and for recreational uses. Acids or alkalis if used in the processing operation can render the wastewater toxic to aquatic life. Dissolved substances such as chlorides and nitrates can render a ground water supply unfit for domestic uses.

26. What are the laws regulating water pollution control in Michigan?

Michigan Act 245, P.A. 1929, as amended, administered by the Michigan Water Resources Commission and Act 98, P.A. 1913 as amended, administered by the Municipal Wastewater Division, Department of Natural Resources are the laws controlling water pollution in this state. Act 245 requires a permit to discharge wastewaters to the ground or surface waters.

27. What are the responsibilities of the food industry in controlling water pollution?

The law places responsibility on any individual, partnership or corporation having a wastewater discharge to provide the necessary waste treatment and controls to prevent unlawful pollution and to make any such discharges in accordance with the applicable requirements of Federal, State and Local laws and regulations. See question 26.

28. Who is responsible for controlling wastewater discharges to municipal sewer systems?

The municipality is responsible for controlling all wastewater discharges to a municipal sanitary sewer system. The Municipal Wastewater Division of the Department of Natural Resources in turn is the responsible agency for the control of all municipal wastes, sanitary sewer systems and wastewater treatment facilities to assure that all regulations are met.

29. Have state or local agencies established a sewer use ordinance which regulates the quality of wastes discharged to municipal wastewater treatment plants?

All municipalities have sewer use ordinances, but because of the great number of industrial wastes that can be dis-

charged they are generally written to cover specific existing industrial discharges to the sewer system. Prior to making use of a municipal sanitary sewer, approval must be obtained from the local unit of government. It is recommended that food processors inquire or request an evaluation by the municipality's wastewater treatment plant superintendent and/or consulting engineer with respect to compliance.

30. How are waste controls and treatment needs determined?

The Water Resources Commission establishes limiting amounts of pollutants that can be discharged to a surface or ground water of the state. Knowledge of waste strength, quantity, and variability is necessary. Studies of treatability may be required. Treatment must be designed to meet the requirements of law relating to the particular discharge. Local municipal sewer ordinances limit the amount of pollutants which can be discharged to a municipal sanitary sewer system. The municipality may also establish a surcharge to recover the cost of treating the wastewater.

31. How can wastes be treated and controlled to prevent water pollution?

Treatment methods and technology are available for removing solids and stabilizing organic material to improve the quality of wastewater. Waste treatment, however, is a highly technical and specialized field and what may be the best choice for handling a particular waste at one plant may not be the proper choice at another location. Treatment methods include screening, grit removal, clarification, chemical addition for pH control and waste conditioning, biological stabilization, filtering, solids digestion and disposal and land disposal. Pretreatment and disposal to a municipal system is another possibility.

32. What should a processing plant provide for sampling its effluent?

Local municipal sewer ordinances generally require that a sampling manhole accessible to city personnel be located on the wastewater sewer service prior to discharge to the municipal sanitary sewer system. It would be prudent for food processing plants to locate additional in-plant sampling points to evaluate wastewater sources from various operations.

33. Are there conditions which greatly increase the cost of wastewater treatment?

Excessive water usage and high losses of product and processing chemicals cause the greatest waste control problems and increase the costs of wastewater treatment. Do not attempt to dilute wastes.
Very strong wastes may require special steps in treatment or may require separation and special handling and disposal. Conversion of certain waste materials to by-products for use as animal feed may be more economical than attempting treatment and disposal.

34. What pretreatment methods may be considered on liquid wastes to reduce BOD (biochemical oxygen demand) to acceptable levels for discharge to a municipal sewage treatment plant?

Typical pretreatment facilities may include screening, settling, pre-aeration, equalization, pH neutralization, and sometimes more complete wastewater treatment including physical, biological and/or chemical processes. Where the industry contributes a significant portion of the waste load the industry pretreatment facilities and the municipal wastewater facility would best be custom designed under the coordination of the municipality's consulting engineer so that the most effective and economical system can be provided.

35. If a processing plant is discharging to a city sewer with no apparent disposal problems should the plant operator take any voluntary pollution abatement action regarding his liquid wastes?

Communication between the food processing plant manager and the municipal wastewater treatment plant superintendent is very important so that both have a good understanding of each others facilities. Accidents resulting in waste spills or excessive product losses do occur in food processing plants and corrective measures can be made at the wastewater treatment plant if personnel are alerted. Reduction or prevention of water pollution can often be achieved by good cooperation. Wastewater treatment plants also have mechanical or other breakdowns and cooperation in turn can be requested of the food processor. A processor should inquire at the treatment plant about future requirements, operational difficulties, benefits which could be accomplished through equalization of discharges from the plant and others.

36. What wastes from a food processing plant can be disposed of as a liquid or as a solid waste?

As a general rule all solid product wastes should be separated and disposed of in a sanitary landfill to reduce disposal costs. Hydraulic flushing of solids into a sewer and garbage grinding usually requires wastewater treatment to separate the liquid from solids and only transfers and complicates the solids handling problem. Consideration should also be given to separate handling, disposal and treatment of concentrated liquid wastes. See also questions 10, 15, 17, 18.

37. Can liquid wastes be disposed of on land?

Land disposal of wastewater from the food processing industry offers a preferred method of disposal for many of the wastewaters which consist primarily of dissolved and suspended organic compounds and nutrients.

38. What factors should be considered in disposal of food processing wastes to the land?

Availability and type of land, site location, hauling conditions, weather conditions, volume and type of waste, creation of nuisances including odors, possibility of contaminating surface or ground waters, soils, slope, drainage, ground water conditions, application rates.

39. Can wastewater from a food processing plant, or water from a lagoon where food processing wastes have been accumulated, be used to spray irrigate forage crops which in turn will be used for cattle feed, including milk cows?

A complete answer to this question is not available at this time. It must be recognized that any undesirable element, or compound, in the wastewater will likely remain on the foliage of the crop. A cow eating the crop may pass some of the undesirable elements, or compounds, into her milk such as: pesticides, heavy metals, and possibly other

undesirable compounds that may be present. It would appear that the wastewater from each specific processing plant would have to be analyzed before using it for spray irrigation of forage crops intended for animal feed.

40. How should a waste disposal system for a food processing plant be planned and designed?

A waste disposal system for a food processing plant should be designed and planned as an integral part of the plant with special concern given to water conservation and reduction of product loss. Unless a food processor has an experienced person or staff with competencies in sanitary engineering it is advisable to hire a capable consultant to assist with the planning and design of a treatment system.

41. How should human wastes be handled from a food processing plant?

Human wastes must be discharged to a municipal sanitary sewer system if available. If a municipal system is not available the local County Health Department should be contacted to determine the procedures to be followed.

42. What technical assistance is available to the food industry in the design, construction and operation of waste control facilities?

Assistance may be obtained from several sources. Probably the most complete and thorough help may be obtaind by hiring a consulting firm for planning and designing waste control systems. Useful information and/or guidance may be available from federal, state and local agency people, industrial associations, equipment manufacturers, universities, and private laboratories.

TOXIC MATERIALS

43. What procedures should the industry follow in the disposal of containers used for toxic materials and containing some toxic residues?

If you have a toxic material for disposal, discuss the formulation and handling of these materials with the state health departments, and the State Dept. of Agriculture, Plant Industry Division.

CONSERVATION AND RECYCLING

44. What should a food processing plant operator do to reduce the amount of waste generated by the plant?

Depending on the products produced in the processing plant, the plant operator may do several things to reduce the amount of wastes generated by the plant. For example, cherry pits may be dried and used for fuel, glue or other items. By-products from processing may sometimes be utilized in producing human food, animal feeds or fertilizer. If salvage markets are available for pallets, cardboard, glass or metal containers, they should be used. In some instances the separation of certain wastes and volume reduction (compaction) might be necessary to minimize the storage areas needed and the frequency of hauling solid wastes. Water conservation practices such as the use of high pressure spray for raw food washing and equipment cleaning are recommended where applicable. The re-use of uncontaminated cooling waters and other water saving and conservation practices is encouraged.

45. Can some of the waste products generated at a food processing plant be utilized or recycled as a useful product?

Sometimes waste products can be utilized as secondary products. Some examples include both sweet and sour whey from cheese processing as either animal food or as an ingredient in other food products. Some vegetable wastes such as potatoes can be used for animal food. A county agriculture extension agent can often provide information about farmers who may desire food processing plant wastes for animal food. Generally, cardboard and clean paper have some recycling value. Glassware if separated by color may have a market if a glass plant is located nearby. The can recycling market is developing and may be an avenue for volume reduction in the near future.

46. What are the possibilities of developing recycling programs for paper and cardboard wastes generated within the plant?

There will be a great deal of interest and attention given to recycling of many waste products over the next few years. In a few areas of the state, recycling centers have been developed by private enterprise and the materials are being handled at a profit. If your plant has large volumes of cardboard that do not normally become contaminated, it may be worthwhile to investigate a local paper market and the feasibility of using a baler to provide economical storage and shipping to a processing plant.

Caution

Note: Complying with all regulations and securing all necessary permits and licenses does not guaranty freedom from legal action; it merely assures that no criminal actions can be instituted. Private citizens (neighbors, for example) can file civil actions under the Environmental Protection Act of 1970 if they believe that the activity impairs the quality of the environment; and, if a court agrees, an injunction could be issued prohibiting the activity. When contemplating a new activity or program, it is suggested that neighbors' opinions be solicited during the planning stage.

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