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Profile of the Agricultural Livestock Production Industry

SECTOR EPA 33 NOTEBOOKS

EPA Office of Compliance Sector Notebook Project

EPA/310-R-00-002

EPA Office of Compliance Sector Notebook Project

Profile of the Agricultural Livestock Production Industry

September 2000

U.S. Environmental Protection Agency
Ariel Rios Building
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Washington, DC 20460

GENERAL INFORMATION

This report is one in a series of volumes published by the U.S. Environmental Protection Agency (EPA) to provide information of general interest regarding environmental issues associated with specific industrial sectors. The documents were developed under contract by GeoLogics Corporation (Alexandria, VA), Abt Associates (Cambridge, MA), Science Applications International Corporation (McLean, VA), and Booz-Allen & Hamilton, Inc. (McLean, VA). A listing of available Sector Notebooks is included on the following page.

Obtaining copies:

Electronic versions of all sector notebooks are available via Internet on the Enviroene World Wide Web at **www.epa.gov/oeca/sector**. Enviroene is a free, public, environmental exchange system operated by EPA's Office of Enforcement and Compliance Assurance and Office of Research and Development. The Network allows regulators, the regulated community, technical experts, and the general public to share information regarding: pollution prevention and innovative technologies; environmental enforcement and compliance assistance; laws, executive orders, regulations, and policies; points of contact for services and equipment; and other related topics. The Network welcomes receipt of environmental messages, information, and data from any public or private person or organization. Direct technical questions to the "Feedback" button on the bottom of the web page.

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Complimentary volumes are available to certain groups or subscribers, including public and academic libraries; federal, state, tribal, and local governments; and the media from EPA's National Service Center for Environmental Publications at **(800) 490-9198.** When ordering, use the EPA publication number found on the following page.

The Sector Notebooks were developed by the EPA's Office of Compliance. Direct general questions about the Sector Notebook Project to:

Seth Heminway, Coordinator, Sector Notebook Project
US EPA Office of Compliance
Ariel Rios Building
1200 Pennsylvania Avenue, NW
Washington, DC 20460
(202) 564-7017

For further information, and for answers to questions pertaining to these documents, please refer to the contact names listed on the following page.

SECTOR NOTEBOOK CONTACTS

Questions and comments regarding the individual documents should be directed to the specialists listed below. **See the Notebook web page at: *www.epa.gov/oeca/sector* for the most recent titles and staff contacts.**

EPA Publication Number	Industry	Contact	Phone
EPA/310-R-95-001.	Profile of the Dry Cleaning Industry	Joyce Chandler	202-564-7073
EPA/310-R-95-002.	Profile of the Electronics and Computer Industry*	Steve Hoover	202-564-7007
EPA/310-R-95-003.	Profile of the Wood Furniture and Fixtures Industry	Bob Marshall	202-564-7021
EPA/310-R-95-004.	Profile of the Inorganic Chemical Industry*	Walter DeRieux	202-564-7067
EPA/310-R-95-005.	Profile of the Iron and Steel Industry	Maria Malave	202-564-7027
EPA/310-R-95-006.	Profile of the Lumber and Wood Products Industry	Seth Heminway	202-564-7017
EPA/310-R-95-007.	Profile of the Fabricated Metal Products Industry*	Scott Throwe	202-564-7013
EPA/310-R-95-008.	Profile of the Metal Mining Industry	Maria Malave	202-564-5027
EPA/310-R-95-009.	Profile of the Motor Vehicle Assembly Industry	Anthony Raia	202-564-6045
EPA/310-R-95-010.	Profile of the Nonferrous Metals Industry	Debbie Thomas	202-564-5041
EPA/310-R-95-011.	Profile of the Non-Fuel, Non-Metal Mining Industry	Rob Lischinsky	202-564-2628
EPA/310-R-95-012.	Profile of the Organic Chemical Industry *	Walter DeRieux	202-564-7067
EPA/310-R-95-013.	Profile of the Petroleum Refining Industry	Tom Ripp	202-564-7003
EPA/310-R-95-014.	Profile of the Printing Industry	Ginger Gotliffe	202-564-7072
EPA/310-R-95-015.	Profile of the Pulp and Paper Industry	Seth Heminway	202-564-7017
EPA/310-R-95-016.	Profile of the Rubber and Plastic Industry		202-564-2310
EPA/310-R-95-017.	Profile of the Stone, Clay, Glass, and Concrete Ind.	Scott Throwe	202-564-7013
EPA/310-R-95-018.	Profile of the Transportation Equipment Cleaning Ind.	Virginia Lathrop	202-564-7057
EPA/310-R-97-001.	Profile of the Air Transportation Industry	Virginia Lathrop	202-564-7057
EPA/310-R-97-002.	Profile of the Ground Transportation Industry	Virginia Lathrop	202-564-7057
EPA/310-R-97-003.	Profile of the Water Transportation Industry	Virginia Lathrop	202-564-7057
EPA/310-R-97-004.	Profile of the Metal Casting Industry	Steve Hoover	202-564-7007
EPA/310-R-97-005.	Profile of the Pharmaceuticals Industry	Emily Chow	202-564-7071
EPA/310-R-97-006.	Profile of the Plastic Resin and Man-made Fiber Ind.	Sally Sasnett	202-564-7074
EPA/310-R-97-007.	Profile of the Fossil Fuel Electric Power Generation Industry	Rafael Sanchez	202-564-7028
EPA/310-R-97-008.	Profile of the Shipbuilding and Repair Industry	Anthony Raia	202-564-6045
EPA/310-R-97-009.	Profile of the Textile Industry		202-564-2310
EPA/310-R-97-010.	Sector Notebook Data Refresh-1997 **	Seth Heminway	202-564-7017
EPA/310-R-98-001.	Profile of the Aerospace Industry	Anthony Raia	202-564-6045
EPA/310-R-99-006.	Profile of the Oil and Gas Extraction Industry	Dan Chadwick	202-564-7054
EPA/310-R-00-001.	Profile of the Agricultural Crop Production Industry	Ginah Mortensen	913-551-5211
EPA/310-R-00-002.	Profile of the Agricultural Livestock Production Industry	Ginah Mortensen	913-551-5211
EPA/310-R-00-003.	Profile of the Agricultural Chemical, Pesticide and Fertilizer Industry	Michelle Yaras	202-564-4153

Government Series

EPA/310-R-99-001.	Profile of Local Government Operations		202-564-2310

* Spanish translations available.

** This document revises compliance, enforcement, and toxic release inventory data for all profiles published in 1995.

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LIST OF EXHIBITS

LIST OF ACRONYMS

ACM	Asbestos-Containing Material
AFS	AIRS Facility Subsystem (CAA database)
AFO	Animal Feeding Operation
ANSI	American National Standards Institute
APO	Administrative Penalty Order
AU	Animal Unit
BIF	Boiler and Industrial Furnace
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CAFO	Concentrated Animal Feeding Operation
CCAP	Climate Change Action Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	CERCLA Information System (CERCLA database)
CESQG	Conditionally Exempt Small Quantity Generator
CFC	Chlorofluorocarbon
CFO	Conservation Farm Option
CFR	Code of Federal Regulations
CNMP	Comprehensive Nutrient Management Plans
COD	Chemical Oxygen Demand
CPA	Conservation Priority Areas
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CWA	Clean Water Act
CWAP	Clean Water Action Plan
CZARA	Coastal Zone Act Reauthorization Amendments
DOT	United States Department of Transportation
DUN	Dun and Bradstreet
EBI	Environmental Benefits Index
EMS	Environmental Management Standards
EPA	United States Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EQIP	Environmental Quality Incentives Program
ESPP	Endangered Species Protection Program
FDA	United States Food and Drug Administration
FFDCA	Federal Food, Drug, and Cosmetic Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FINDS	Facility Indexing System
FQPA	Food Quality Protection Act
FSA	Farm Services Agency

LIST OF ACRONYMS (CONTINUED)

FWS	Fish and Wildlife Service
FY	Fiscal Year
HAP	Hazardous Air Pollutant (CAA)
HSWA	Hazardous and Solid Waste Amendments
HUD	United States Department of Housing and Urban Development
IDEA	Integrated Data for Enforcement Analysis
IPM	Integrated Pest Management
ISO	International Organization for Standardization
LDR	Land Disposal Restrictions (RCRA)
LEPC	Local Emergency Planning Committee
LQG	Large Quantity Generator
MACT	Maximum Achievable Control Technology (CAA)
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MSDS	Material Safety Data Sheet
NAAQS	National Ambient Air Quality Standards (CAA)
NAICS	North American Industrial Classification System
NASS	National Agricultural Statistics Service
NCBD	National Compliance Database, Office of Prevention, Pesticides and Toxic Substances
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NESHAP	National Emission Standards for Hazardous Air Pollutants
NICE	National Industrial Competitiveness Through Energy, Environment and Economics
NOA	Notice of Arrival
NOAA	National Oceanic and Atmospheric Agency
NPDES	National Pollutant Discharge Elimination System (CWA)
NPL	National Priorities List
NPS	Nonpoint Source Management Program
NRC	National Response Center
NRCS	Natural Resources Conservation Service
NSPS	New Source Performance Standards (CAA)
OECA	Office of Enforcement and Compliance Assurance
OMB	Office of Management and Budget
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyl
PCS	Permit Compliance System
PESP	Pesticide Environmental Stewardship Program
PMN	Premanufacture Notice
POTW	Publicly Owned Treatment Works
PWS	Public Water System
RCRA	Resource Conservation and Recovery Act

LIST OF ACRONYMS (CONTINUED)

RCRIS	RCRA Information System (RCRA database)
RLEP	Ruminant Livestock Efficiency Program
RMP	Risk Management Plan
RQ	Reportable Quantity
RUP	Restricted Use Pesticides
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SEP	Supplemental Environmental Project
SERC	State Emergency Response Commission
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SPCC	Spill Prevention, Control, and Countermeasure
SQG	Small Quantity Generator
TMDL	Total Maximum Daily Load
TRI	Toxic Release Inventory
TRIS	Toxic Release Inventory System
TSCA	Toxic Substances Control Act
TSD	Treatment, Storage, and Disposal
TSS	Total Suspended Solids
UIC	Underground Injection Control (SDWA)
USDA	U.S. Department of Agriculture
UST	Underground Storage Tank (RCRA)
WHIP	Wildlife Habitat Incentives Program
WPS	Worker Protection Standards
WRP	Wetlands Reserve Program

I. INTRODUCTION TO THE SECTOR NOTEBOOK PROJECT

I.A. Summary of the Sector Notebook Project

Environmental policies based upon comprehensive analysis of air, water and land pollution (such as economic sector, and community-based approaches) are becoming an important supplement to traditional single-media approaches to environmental protection. Environmental regulatory agencies are beginning to embrace comprehensive, multi-statute solutions to facility permitting, compliance assurance, education/outreach, research, and regulatory development issues. The central concepts driving the new policy direction are that pollutant releases to each environmental medium (air, water and land) affect each other, and that environmental strategies must actively identify and address these interrelationships by designing policies for the "whole" facility. One way to achieve a whole facility focus is to design environmental policies addressing all media for similar industrial facilities. By doing so, environmental concerns that are common to the manufacturing of similar products can be addressed in a comprehensive manner. Recognition by the EPA Office of Compliance of the need to develop the industrial “sector-based” approach led to the creation of this document.

The Sector Notebook Project was initiated by the Office of Compliance within the Office of Enforcement and Compliance Assurance (OECA) to provide its staff and managers with summary information for eighteen specific industrial sectors. As other EPA offices, states, the regulated community, environmental groups, and the public became interested in this project, the scope of the original project was expanded. The ability to design comprehensive, common sense environmental protection measures for specific industries is dependent on knowledge of several interrelated topics. For the purposes of this project, the key elements chosen for inclusion are: general industry information (economic and geographic); a description of industrial processes; pollution outputs; pollution prevention opportunities; federal statutory and regulatory framework; compliance history; and a description of partnerships that have been formed between regulatory agencies, the regulated community and the public.

For any given industry, each topic listed above alone could be the subject of a lengthy volume. However, to produce a manageable document, this project focuses on providing summary information for each topic. This format provides the reader with a synopsis of each issue, and references where more in-depth information is available. Text within each profile was researched from a variety of sources, and was usually condensed from more detailed sources pertaining to specific topics. This approach allows for a wide coverage of activities that can be explored further based upon the references listed at the end of this profile. As a check on the information included, each notebook went through an external document review process. The Office of

Compliance appreciates the efforts of all those that participated in this process and enabled us to develop more complete, accurate and up-to-date summaries.

I.B. Additional Information

Providing Comments

OECA's Office of Compliance plans to periodically review and update notebooks and will make these updates available both in hard copy and electronically. If you have any comments on the existing notebook, or if you would like to provide additional information, please send a hard copy and computer disk to the EPA Office of Compliance, Sector Notebook Project, 401 M St., SW (2223-A), Washington, DC 20460. Comments can also be sent via the web page.

Adapting Notebooks to Particular Needs

The scope of the industry sector described in this notebook approximates the relative national occurrence of facility types within the sector. In many instances, industries within specific geographic regions or states may have unique characteristics that are not fully captured in these profiles. For this reason, the Office of Compliance encourages state and local environmental agencies and other groups to supplement or re-package the information included in this notebook to include more specific industrial and regulatory information that may be available. Additionally, interested states may want to supplement the "Summary of Applicable Federal Statutes and Regulations" section with state and local requirements. Compliance or technical assistance providers also may want to develop the "Pollution Prevention" section in more detail. Please contact the appropriate specialist listed on the opening page of this notebook if your office is interested in assisting us in the further development of the information or policies addressed within this volume. If you are interested in assisting the development of new notebooks, please contact the Office of Compliance at 202-564-2310.

II. INTRODUCTION TO THE AGRICULTURAL LIVESTOCK PRODUCTION INDUSTRY

This section provides background information on the agricultural livestock production industry. It presents the types of facilities described within this document and defines them in terms of their North American Industrial Classification System (NAICS) codes.

Establishments that produce livestock are classified in ***NAICS code 112 (Animal Production)***. Data for the notebook, specifically in this chapter, were obtained from the U.S. Department of Agriculture (USDA) and the 1997 Agriculture Census (Ag Census). All data are the most recent publicly available data for the source cited.

The Office of Management and Budget (OMB) has replaced the Standard Industrial Classification (SIC) system, which was used to track the flow of goods and services within the economy, with the NAICS. The NAICS, which is based on similar production processes to the SIC system, is being implemented by OMB.

It should be noted that the data on the number of livestock establishments presented in the following sections do not represent the number of animal feeding operations (AFOs) or concentrated animal feeding operations (CAFOs) in the U.S. The data simply represent numbers of livestock establishments only. Additional information on AFOs and CAFOs is presented in Section II.C.

Establishments primarily engaged in livestock production are classified in subgroups up to six digits in length, based on the total value of sales of agricultural products. An establishment would be placed in the group that represents 50 percent or more of its total sales. For example, if 51 percent of the total sales of an establishment are from sales of beef cattle, that establishment would first be classified under NAICS code 1121 (Cattle Ranching and Farming), then 11211 (Beef cattle ranching and farming, including feedlots), and finally under 112111 (Beef cattle ranching and farming).

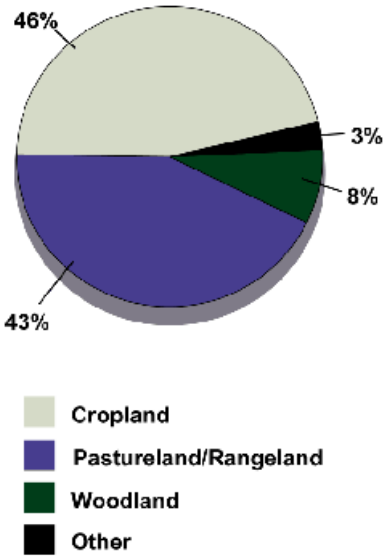
II.A. General Overview of Agricultural Establishments

This section presents a general overview of all agricultural establishments to provide the reader with background information regarding the number and organization of such establishments and production data. The USDA's National Agricultural Statistics Service (NASS) defines an *agricultural establishment* (farm) based on production. It defines an agricultural establishment as a place which produced or sold, or normally would have produced or sold, $1,000 or more of agricultural products during the year. Agricultural products include all products grown by establishments under NAICS codes 111 - Crop Production and 112 - Animal Production.

According to the 1997 Ag Census, there were more than 1.9 million farms (i.e., agricultural establishments) in the United States. Of these, approximately 53 percent (1,009,487 farms) were classified as NAICS code 112 - Animal Production. The other 47 percent (902,372 farms) were classified as NAICS code 111 - Crop Production. These 1.9 million agricultural establishments represent nearly 932 million acres of land, with the average agricultural establishment consisting of 487 acres. (Note: 1 acre is approximately the size of a football field.) Both of these numbers--932 million acres and 487 acres--are smaller than those for 1992, which were 946 million acres and 491 acres, respectively.

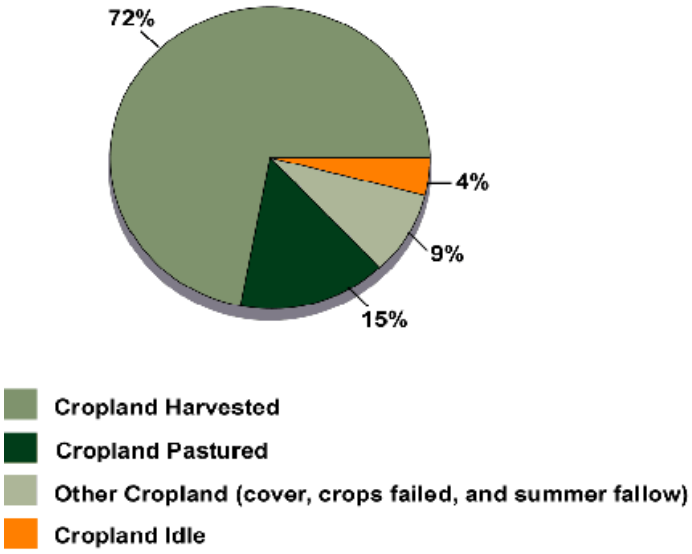
As shown in Exhibit 1, of the 932 million acres of agricultural land, the overwhelming majority (89%) consists of cropland and pastureland/rangeland.

Exhibit 1. Agricultural Land Use in the U.S. (1997 Ag Census)



As presented in Exhibit 2, the 1997 Ag Census describes cropland as:

Exhibit 2. Types of Cropland (1997 Ag Census)



- *Harvested cropland* -- Includes all acreage from which crops are harvested, such as: (1) corn, wheat, barley, oats, sorghum, soybeans, cotton, and tobacco; (2) wild or tame harvested hay, silage, and green chop; and (3) vegetables. It also includes land in orchards and vineyards; all acres in greenhouses, nurseries, Christmas trees, and sod; and any other acreage from which a crop is harvested even if the crop is considered a partial failure and the yield is very low.

- *Cropland used only for pasture or grazing* -- Includes land pastured or grazed which could be used for crops without any additional improvement, and land in planted crops that is pastured or grazed before reaching maturity.

- *Cropland used for cover crops* -- Includes land used only to grow cover crops for controlling erosion or to be plowed under for improving the soil.

- *Cropland on which all crops failed* -- Includes: (1) all land from which a crop failed (except fruit or nuts in an orchard, grove, or vineyard being maintained for production) and no other crop is harvested and which is not pastured or grazed, and (2) acreage not harvested due to low prices or labor shortages.

- *Cultivated summer fallow* -- Includes cropland left unseeded for harvest, and cultivated or treated with herbicides to control weeds and conserve moisture.

- *Idle cropland* -- Includes any other acreage which could be used for crops without any additional improvement and which is not included in one of the above categories of cropland.

The 1997 Ag Census describes pastureland and rangeland as land, other than cropland or woodland pasture, that is normally used for pasture or grazing. This land, sometimes called "meadow" or "prairie," may be composed of bunchgrass, shortgrass, buffalo grass, bluestem, bluegrass, switchgrass, desert shrubs, sagebrush, mesquite, greasewood, mountain browse, salt brush, cactus, juniper, and pinion. It also can be predominantly covered with brush or browse.

As presented in Exhibit 3, approximately 82 percent of agricultural establishments in 1997 consisted of fewer than 500 acres; only 4 percent consisted of 2,000 or more acres.

According to the 1997 Ag Census, all agricultural establishments combined to produce approximately $197 billion worth of agricultural products.

Exhibit 3. Acreage of Agricultural Establishments in the U.S. (1997 Ag Census)

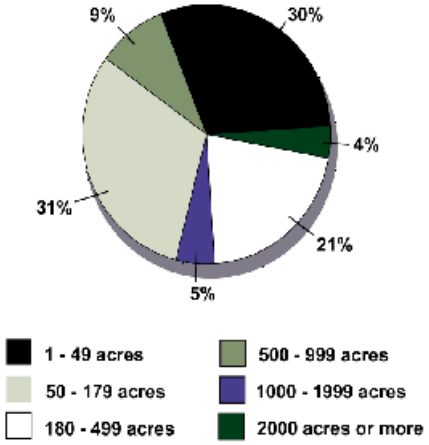
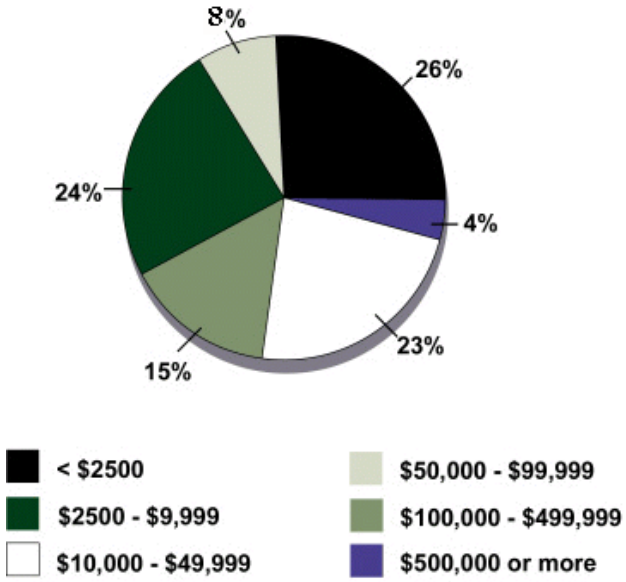


Exhibit 4. Agricultural Establishments by Value of Sales (1997 Ag Census)



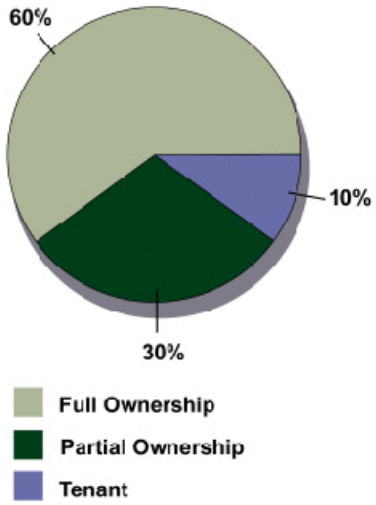
The market value of the agricultural products sold was split almost evenly between crop production, including nursery and greenhouse crops (49.6%) and livestock production (50.4%).

As shown in Exhibit 4, approximately 73 percent of all agricultural establishments produced less than $50,000 worth of agricultural products.

In addition to tracking the number of agricultural establishments and the value of products sold, the Ag Census tracks and identifies other characteristics of agricultural establishments, such as ownership and organization. Exhibit 5 presents a breakdown of the ownership status of agricultural establishments in the U.S. The Ag Census basically identifies the ownership status of agricultural establishments by one of three categories:

- Full ownership, in which full owners operate only the land they own.
- Partial ownership, in which partial owners operate land they own and also land they rent from others.
- Tenant/rental arrangement, in which tenants operate only land they rent from others or work on shares for others.

Exhibit 5. Ownership Status of Agricultural Establishments in the U.S.
(1997 Ag Census)



The Census further classifies agricultural establishment ownership by the person or entity who owns the establishment. There are four distinct types of organization: (1) individual or family (sole proprietorship), (2) partnership, including family partnership, (3) corporation, including family corporation, and (4) other, including cooperatives, estate or trust, and institutional. Approximately 86 percent of all establishments are owned and operated by individuals or families. Partnerships account for another 9 percent of the establishments and corporations own just more than 4 percent of the establishments. Fewer than 1 percent of all farms are owned by other organizations (1997 Ag Census).

II.B. Characterization of the Livestock Production Industry

This section provides data and information on the livestock production industry. For the purposes of this profile, livestock production includes the six categories of livestock presented in Exhibit 6. It should be noted that this profile does not include the processing of agricultural livestock products (e.g., meat processing plants, milk processing, etc.), and only discusses livestock production to the point of sending the livestock to the processing point (e.g., beyond the feedlot).

This notebook follows the structure provided by the 1997 Ag Census, which classifies all of these livestock production operations within NAICS code 112.

Exhibit 6. 1997 NAICS Descriptions for Animal Production (NAICS 112)

Type of Establishment	NAICS Code	SIC Code	
Cattle ranching and farming, dairy farming	1121	0211, 0212, 0241	Establishments primarily engaged in raising cattle, milking dairy cattle, or feeding cattle for fattening.
Hog and pig farming	1122	0213	Establishments primarily engaged in raising hogs and pigs. These establishments may include farming activities, such as breeding, farrowing, and the raising of weaning pigs, feeder pigs, or market size hogs.
Poultry and egg production	1123	0251, 0252, 0253, 0254, 0259	Establishments primarily engaged in breeding, hatching, and raising poultry for meat or egg production.
Sheep and goat farming	1124	0214	Establishments primarily engaged in raising sheep, lambs, and goats, or feeding lambs for fattening.
Animal aquaculture	1125	0273, 0279, 0919, 0921	Establishments primarily engaged in the farm raising of finfish, shellfish, or any other kind of animal aquaculture. These establishments use some form of intervention in the rearing process to enhance production, such as holding in captivity, regular stocking, feeding, and protecting from predators.
Other animal production	1129	0271, 0272, 0279	Establishments primarily engaged in raising animals and insects for sale or product production (except those listed above), including bees, horses and other equines, rabbits and other fur-bearing animals and associated products (e.g., honey). Also includes those establishments for which no one animal or animal family represents one-half of production.

According to the 1997 Ag Census, there were 1,009,487 establishments producing the six categories of livestock referenced above (see Exhibit 7). Of the 1,009,487 livestock producing establishments, approximately 78 percent were classified as cattle ranching and farming.

All livestock producing establishments combined covered nearly 530 million acres of land.
Based on the number of establishments and total acreage for each NAICS code, Exhibit 8 presents the average size of each type of establishment.

Exhibit 7. Number of Livestock-Producing Establishments by NAICS Code
(1997 Ag Census)

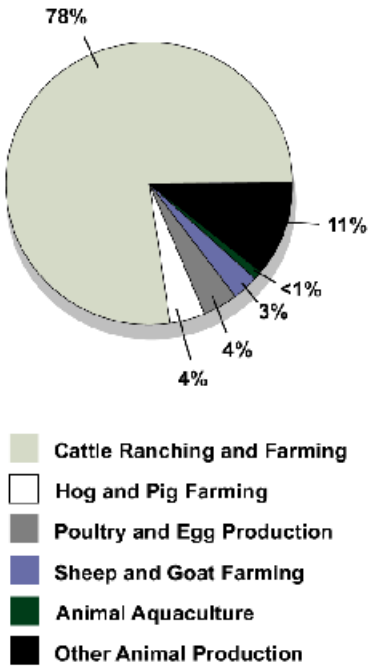
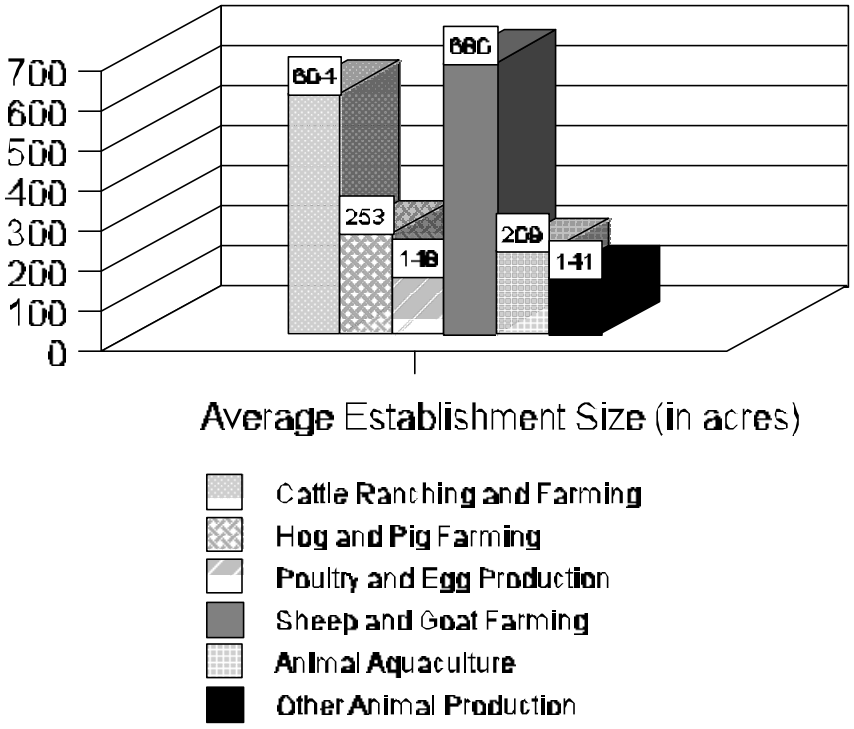


Exhibit 8. Average Establishment Size (1997 Ag Census)



The six types of livestock producing establishments defined above accounted for approximately $99 billion worth of products sold in 1997. Exhibit 9 presents the distribution of total sales among the six types of establishments compared to the total number of establishments. EPA's *Preliminary Data Summary Feedlots Point Source Category Study* released in January 1999 contains additional detailed information for beef cattle, dairy, pork, sheep, and poultry operations.

Exhibit 9. Percentage of Establishments & Sales by Type (1997 Ag Census)

Type of Livestock Establishment	Percent of Establishments	Percent of Sales
Cattle Ranching and Farming	78	60
Hog and Pig Farming	4	14
Poultry and Egg Production	4	23
Sheep and Goat Farming	3	<1
Animal Aquaculture	<1	<1
Other Animal Production	11	2

II.B.1. Cattle Ranching and Farming

Cattle ranching and farming establishments (NAICS code 1121) comprise the overwhelming majority of all establishments categorized under NAICS code 112 by accounting for 77.9 percent of all livestock establishments. In the U.S. in 1997, there were 785,672 cattle ranching and farming establishments. Of these, approximately 89 percent (699,650 establishments) were categorized as beef cattle establishments, including feedlots. The remaining 11 percent (86,022 establishments) were categorized as dairy cattle and milk production facilities. In 1997, the average beef cattle establishment was nearly 635 acres in size. Establishments raising dairy cattle and producing milk averaged approximately 356 acres.

Cattle ranching and farming establishments accounted for approximately $60 billion of sales in 1997. Of that $60 billion, beef cattle establishments had sales of approximately $38 billion (approximately 65 percent of sales), while dairy cattle and milk production accounted for the remaining $21 billion. Exhibit 10 compares the percentage sales of each subcategory to the percentage of establishments.

Exhibit 10. Percentage of Establishments & Sales in the Cattle Ranching and Farming Industry (1997 Ag Census)

Type of Establishment	Percent of Establishments	Percent of Sales
Beef cattle ranch and farming, including feedlots	89	65
Dairy cattle and milk production	11	35

II.B.2. Hog and Pig Farming

Hog and pig farming (NAICS code 1122) comprised approximately 4.6 percent (46,353 establishments) of all the livestock producing establishments in the U.S. in 1997. These establishments accounted for nearly $14 billion in total sales, or approximately 14 percent of total livestock producing establishment sales in 1997.

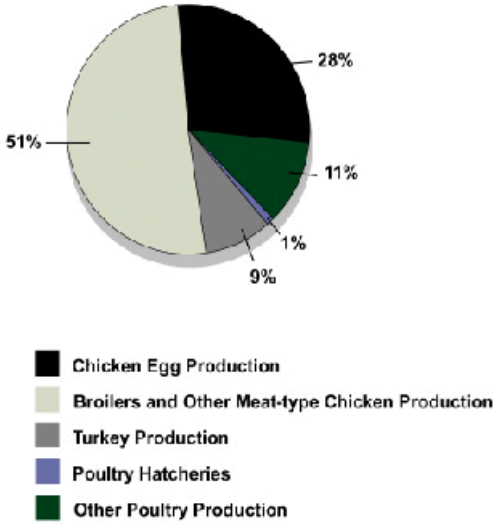
II.B.3. Poultry and Egg Production

Poultry and egg production is classified in NAICS code 1123. In 1997, this category included 36,944 establishments, or approximately 4 percent of all livestock producing establishments in the U.S. Poultry and egg production is divided into 5 subclassifications:

- Chicken egg production (NAICS code 11231)
- Broilers and other meat-type chicken production (NAICS code 11232)
- Turkey production (NAICS code 11233)
- Poultry hatcheries (NAICS code 11234)
- Other poultry production, including ducks, emus, geese, ostrich, pheasant, quail, and ratite (NAICS code 11239)

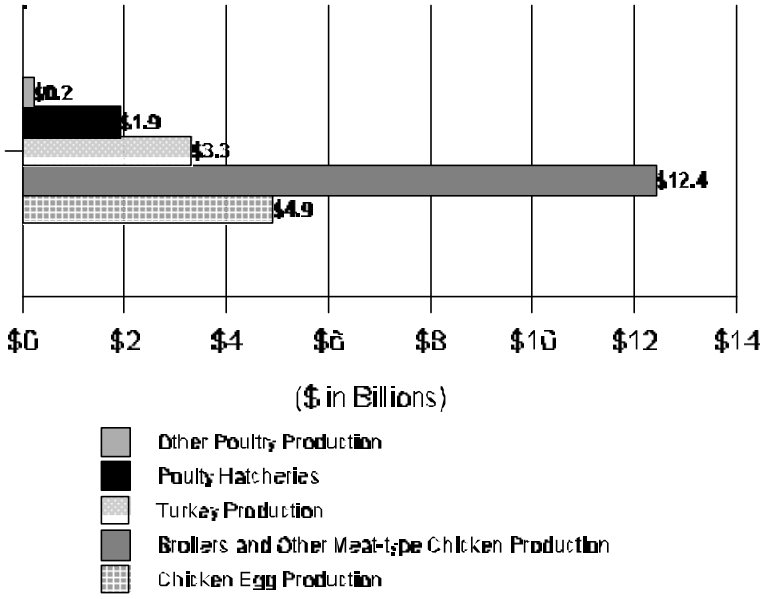
Exhibit 11 provides a breakdown of the 5 subclassifications by number of establishments. Each of these establishments averages approximately 150 acres in size.

Exhibit 11. Percent of Poultry and Egg Production Establishments by Type
(1997 Ag Census)



In 1997, the poultry and egg production industry combined for nearly $23 billion in sales, which accounted for 23 percent of total livestock sales in the U.S. Sales of broilers and other meat-type chicken accounted for 54 percent of those sales (approximately $12.4 billion). Exhibit 12 presents the total sales of each of the subclassifications of the poultry and egg production industry.

Exhibit 12. Total Sales of Poultry and Egg Production Establishments by Type (1997 Ag Census)



The poultry industry has increased its use of contractual agreements because of the high number of producers relative to the number of available buyers willing to handle raw farm products. The use of contracts has been noted to affect the organizational structure of the poultry industry raising questions about ownership responsibility as well as environmental concerns. This is particularly true when animals are produced under contracts where the contractor (processor or integrator) dictates the terms of the contract and controls the amount produced and the production practices used, but the contractee (grower) retains responsibility for increased animal waste management and disease control often without adequate compensation to meet these additional costs. In a 1993 study, USDA showed that almost 90 percent of the value of all poultry production is produced under contract, which has played a key role in the influence of integrators on the poultry sector.

II.B.4. Sheep and Goat Farming

Sheep and goat farming (NAICS code 1124) comprised 3 percent of all livestock establishments in the U.S. in 1997 and accounted for nearly 4 percent of the total acreage of livestock establishments. Of the 29,938 sheep and goat establishments, 21,084 (approximately 70 percent) are sheep farms; the remaining 8,854 are goat farms. The average sheep farm is approximately 830 acres in size. Goat farms average approximately 320 acres.

In 1997, sheep and goat farms combined for $625 million in total sales, which is less than 1 percent of total livestock producing establishment sales and the least amount of the six primary NAICS codes. Sheep accounted for $568 million in sales (approximately 91 percent) and goat sales accounted for the remaining $57 million.

II.B.5. Animal Aquaculture

Animal aquaculture (NAICS code 1125) is the smallest of the livestock producing establishments in terms of number of establishments, with only 3,079 active establishments in 1997. This accounted for fewer than 1 percent of all livestock producing establishments in the U.S. It also accounted for less than 1 percent ($800 million) of the 1997 total sales of livestock producing establishments. NAICS subdivides animal aquaculture establishments as follows:

- Finfish farming and fish hatcheries (NAICS code 112511), which is raising finfish (e.g., catfish, trout, goldfish, tropical fish, salmon, and minnows) and/or hatching fish of any kind.

- Shellfish farming (NAICS code 112512), which is raising crayfish, shrimp, oysters, clams, and/or mollusks.

- Other animal aquaculture (NAICS code 112519), which is raising animals other than finfish and shellfish, including alligators, frogs, and/or turtles.

While data for each of the specific NAICS subclassifications were not available through the 1997 Ag Census, USDA's NASS has identified at least 955 catfish producing operations. These operations are located primarily in four states--Alabama, Arkansas, Louisiana, and Mississippi. Similarly, the USDA has identified 451 trout operations located in 16 states, but primarily in North Carolina, Wisconsin, and Michigan. These trout operations had total sales in 1998 of $78.9 million. Both the number of operations and the value of total sales are down from the 1997 totals of 465 and $79.8 million, respectively.

II.B.6. Other Animal Production

Production of other animals (NAICS code 1129) occurred at 107,051 establishments in 1997, which is approximately 11 percent of all livestock producing establishments in the U.S. These establishments produce a variety of other animals including:

- Apiculture [bee farming (i.e., raising bees)] (NAICS code 11291)
- Horse and other equine production, including burros, donkeys, mules, and ponies (NAICS code 11292)
- Fur-bearing animal and rabbit production, including chinchillas, foxes, and mink (NAICS code 11293)
- All other animal production, including aviaries, bison/buffalo, cats/dogs, llamas, snakes, and worms (NAICS code 11299)

These four subclassifications accounted for just more than 2 percent of the total sales of livestock producing establishments in 1997. Exhibit 13 provides a breakdown of the 4 subclassifications by percent of establishments, as well as by percent of sales.

Exhibit 13. Percent of Establishments & Sales for the Other Animal Production Industry (1997 Ag Census)

Establishment Type	Percent of Establishments	Percent of Sales
Apiculture	4	5.9
Horse and Other Equine Production	86	42.9
Fur-bearing Animal and Rabbit Production	1	4.7
All Other Animal Production	9	46.5

II.C. Animal Feeding Operations

Many livestock establishments within NAICS code 112 are defined by EPA as either animal feeding operations (AFOs) or concentrated animal feeding operations (CAFOs). The primary factor classifying a livestock operation as an AFO or CAFO is the confinement of animals in a relatively small area devoid of sustaining vegetation. According to the USDA/EPA Unified National Strategy for AFOs, "AFOs congregate animals, feed, manure and urine, dead animals, and production operations on a small area of land." This factor separates AFOs (and CAFOs) from the pasture and range operations. The number of animals, among other factors, separates the AFOs from the CAFOs.

EPA is currently collecting and analyzing data on livestock production facilities to determine the number of facilities which meet the definition of AFO or CAFO. This will allow the Agency to better understand the universe of the regulated community, assist compliance, and as necessary, take enforcement action. EPA is currently developing AFO guidance documents and revised regulations that address permitting, performance standards, and other issues. The following sections provide information on the regulatory definitions of both AFOs and CAFOs.

Animal Feeding Operations

What is an AFO?

The term animal feeding operation or AFO is defined in EPA regulations [40 CFR 122.23(b)(1)] as:

- A lot or facility where animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period; AND

- Where crops, vegetation, forage growth, or post-harvest residues are not sustained over any portion of the lot or facility in the normal growing season.

According to EPA[1], the first part of this regulatory definition of an AFO states that animals must be kept on the lot or facility for a minimum of 45 days. If an animal is at a facility for any portion of a day, it is considered to be at the facility for a full day. However, this does not mean that the same animals must remain on the lot for 45 days; only that some animals are fed or maintained on the lot or facility 45 days out of any 12-month period. The 45 days do not have to be consecutive, and the 12-month period does not have to correspond to the calendar year. For example, June 1 to the following May 31 would constitute a 12-month period.

The second part of the regulatory definition of an AFO is meant to distinguish facilities that have feedlots (concentrated confinement areas) from those which have pasture and grazing land, which are generally not AFOs. Facilities that have feedlots with constructed floors, such as solid concrete or metal slots, satisfy this part of the definition. If a facility maintains animals in an area without vegetation, including dirt lots, the facility meets this part of the definition. Dirt lots with nominal vegetative growth along the edges while animals are present or during months when animals are kept elsewhere are also considered by EPA to meet the second part of the definition.

The NPDES permit regulations [40 CFR Part 122.23(b)(1)] give the permitting authority (EPA or NPDES-authorized States) considerable discretion in applying the AFO definition. EPA defines the AFO to include the confinement area and the storage and handling areas necessary to support the operation (e.g., waste storage areas). Grazing and winter feeding of animals in a confined area on pasture or range land are not normally considered to meet the AFO definition.

As indicated in the USDA/EPA Unified National Strategy for AFOs, discharges from areas where manure and wastewater are applied to the land can have a significant impact on water quality. These land application areas are outside the area of confined animals but can be implicated by their direct relationship to AFO waste. Discharges of CAFO wastes from land application areas can qualify as point source discharges in certain circumstances. Accordingly, NPDES permits for CAFOs should address land application of wastes from CAFOs.

[1] *Guidance Manual and Example NPDES Permit for Concentrated Animal Feeding Operations (Draft),* U.S. Environmental Protection Agency, August 6, 1999.

How Do You Determine the Size of an AFO?

Once the facility meets the AFO definition, its size, based upon the total numbers of animals confined, is a fundamental factor in determining whether it is a CAFO. The animal livestock industry is diverse and includes a number of different types of animals that are kept and raised in confined situations. In order to define these various livestock sectors in relative terms, the concept of an "animal unit"[2] was established in the EPA regulations [40 CFR Part 122 Appendix B]. An animal unit (AU) varies according to animal type; one animal is not necessarily equal to one AU. Each livestock type, except poultry, is assigned a multiplication factor to facilitate determining the total number of AUs at a given facility. Multiplication factors are defined in Exhibit 14.

Exhibit 14. Multiplication Factors to Calculate Animal Units

Animal Type	Multiplication Factor
Beef Cattle (slaughter and feeder)	1.0
Mature Dairy Cattle	1.4
Swine (weighing more than 55 lbs.)	0.4
Sheep	0.1
Horses	2.0
Poultry	There are currently no animal unit conversions for poultry operations. However the regulations [40 CFR 122, Appendix B] define the total number of animals (subject to waste handling technology restrictions) for specific poultry types that make these operations subject to the regulation.

These factors also are used when determining the total number of animal units at a facility with multiple animal types. Multiplication factors are applied to the total for each type of animal to determine the AU for that animal type. The AUs for each are then totaled for the facility total. A hypothetical AFO with multiple animal types and the calculation to determine the total number of animals confined at the facility is presented below (see box).

[2] EPA and USDA both use the concept of "animal unit," however it is important to recognize that with respect to swine and poultry, there are Agency differences in the application of this concept.

Example: Animal Unit Determination for an AFO with Multiple Animal Types		
Situation: An AFO is being evaluated to determine if it meets the animal unit criteria for being defined as a CAFO and subject to NPDES permitting. The facility confines 200 horses, 300 sheep, and 500 beef cattle.		
Animal Unit Calculation:	200 Horses x 2.0 =	400 AUs
	300 Sheep x 0.1=	30 AUs
	500 Beef Cattle x 1.0 =	500 AUs
	Total	930 AUs

Under the regulations, two or more AFOs under common ownership are considered one operation if they adjoin each other or use a common waste disposal system [40 CFR 122.23(b)(2)]. For example, facilities have a common waste disposal system if the wastes are commingled (e.g., stored in the same pond or lagoon or land applied on commonly owned fields) prior to use or disposal. The collective number of animal units of the adjoining facilities is used in determining the size of the AFO. Many poultry feeding operations adjoin each other and often meet the definition of one facility.

Concentrated Animal Feeding Operations

AFOs are CAFOs if they meet the regulatory definition [40 CFR 122, Appendix B] or have been designated on a case-by-case basis [40 CFR 122.23 (c)] by the NPDES-authorized permitting authority.

AFOs <u>Defined</u> as CAFOs

According to the NPDES regulations, a specific definition must be used when determining whether an AFO is a CAFO. The definition is broken down according to the number of animals confined at the facility (see box). AFOs with more than 1,000 AUs are CAFOs. AFOs with 301 to 1,000

AFOs are Defined as CAFOs if:

- More than 1,000 AUs are confined at the facility [40 CFR 122, Appendix B (a)]; ***or***
- From 301 to 1,000 AUs are confined at the facility and:
  - Pollutants are discharged into waters of the U.S. through a man-made ditch, flushing system, or other similar man-made device; or
  - Pollutants are discharged directly into waters of the U.S. that originate outside of and pass over, across, or through the facility or come into direct contact with the confined animals.

AUs are defined as CAFOs only if, in addition to the number of animals confined, they also meet one of the specific criteria addressing the method of discharge (see text box).

AFOs with fewer than 300 AUs are not defined as CAFOs under the current regulations but may be designated as a CAFO.

- ***AFOs With More Than 1,000 AUs are CAFOs***. Under existing regulations, virtually all AFOs with more than 1,000 AUs are CAFOs and should apply for an NPDES permit. For individual animal types, the regulations state the number of animals required for the facility to be defined as a CAFO. These numbers are presented in Exhibit 15. If the number of AUs for any one animal type at a facility exceeds the corresponding number, or if the cumulative number of animal types exceeds 1,000 AUs, the facility is defined as a CAFO.

Exhibit 15. Threshold Number of Animals (by Animal Type) to Meet the Definition of a CAFO with More Than 1,000 AUs

Animal Type	Number of Animals Units
Beef cattle	1,000 slaughter or feeder cattle
Dairy cattle	700 mature dairy cattle (whether milked or dry)
Swine	2,500 swine (over 25 kilos - approximately 55 lbs.)
Sheep	10,000 sheep or lambs
Horses	500 horses
Chickens	100,000 laying hens or broilers when the facility (if continuous flow watering system); 30,000 laying hens or broilers (if liquid manure system)
Turkeys	55,000 turkeys
Ducks	5,000 ducks

Source: 40 CFR Part 122, Appendix B (a)

- **AFOs With 301 to 1,000 AUs *May Be* CAFOs.** AFOs with 301 to 1,000 AUs are defined as CAFOs only if, in addition to the number of animals confined, they also meet one of the specific criteria governing "method of discharge." If the number of AUs for any one animal type exceeds the specified number [40 CFR Part 122, Appendix B(b)], or if the *cumulative* number of animal types exceeds 300 AUs, **and** only one of the "method of discharge" criteria are met, the facility is defined as a CAFO.

- **AFOs with up to 300 AUs.** An AFO with up to 300 AUs may be considered a CAFO only if designated as such by the permitting authority and if it meets the discharge criteria (see below).

AFOs Designated as CAFOs

According to the NPDES permit regulations [40 CFR 122.23 (c)], the NPDES-authorized permitting authority can, on a case-by-case basis, designate any AFO as a CAFO after determining that it is a significant contributor of pollution to waters of the United States. No AFO with fewer than 300 AUs shall be designated a CAFO unless it also meets the discharge criteria outlined in 40 CFR 122.23(c).

An AFO *cannot* be designated a CAFO on a case-by-case basis until the an inspector has conducted an on-site inspection of the facility and determined that the facility is a significant contributor of pollution. The designation is based on the factors listed in 40 CFR 122.23 (c) and shown below. This determination may be based on visual observations as well as water quality monitoring. Exhibit 16 shows example case-by-case designation factors and the inspection focus related to each factor.

Exhibit 16. Example Factors for Case-by-Case CAFO Designation	
Designation Factor	**Inspection Focus**
Size of the operation and amount of waste reaching waters of the United States	• Number of animals • Type of feedlot surface • Feedlot design capacity • Waste handling/storage system design capacity
Location of the operation relative to waters of the United States	• Location of water bodies • Location of flood plain • Proximity to surface waters • Depth to groundwater, direct hydrologic connection to surface water
Means of conveyance of animal waste and process waste waters into waters of the United States	• Identify existing or potential man-made (includes natural and artificial materials) structures that may convey waste • Direct contact between animals and surface water
Slope, vegetation, rainfall and other factors affecting the likelihood or frequency of discharge	• Slope of feedlot and surrounding land • Type of feedlot (concrete, soil, etc.) • Climate (e.g., arid or wet) • Type and condition of soils • Depth to groundwater • Drainage controls • Storage structures • Amount of rainfall • Volume and quantity of runoff • Buffers
Other Relevant Factors	• Waste handling and storage • Land application timing, methods, rates and areas

Following the on-site inspection, the NPDES permitting authority will prepare a brief report that: (1) identifies findings and any follow-up actions; (2) determines whether or not the facility should be designated as a CAFO; and (3) documents the reasons for that determination. Regardless of the outcome, a letter would be prepared and sent to the facility. The letter should inform the facility that it has been either: (1) designated a CAFO and required to apply for an NPDES permit; or (2) has not been designated as a CAFO at this time. In those cases where a facility has not been designated as a CAFO but the NPDES authority has identified areas of concern, these would be noted in the letter.

II.D. Geographic Distribution and Economic Trends

As described in the executive summary of the *Preliminary Data Summary: Feedlots Point Source Category Study* (December 1998), livestock production operations in the U.S. vary widely in both the mode and scale of production, with individual farms spanning small scale production facilities with few animals to large, intensive production facilities. The following are summaries of the principal producing States in 1992 by animal commodity for beef cattle, swine, dairy cattle, and poultry.

- Ranked by the number of cattle and calves sold, the top ten producing states controlled 65 percent of U.S. beef production in 1992. Texas was the largest beef producing state accounting for 16 percent of 1992 sales. Other major states included Kansas, Nebraska, Oklahoma, Colorado, Iowa, California, South Dakota, Missouri, Wisconsin, and Montana.

- The hog farming sector is concentrated among the top five producing states that together supply about 60 percent of U.S. pork production. Iowa accounted for 24 percent of 1992 hog sales. Other major hog producing states included North Carolina, Illinois, Minnesota, Indiana, and Nebraska.

- The top five dairy cattle states controlled more than 50 percent of all U.S. milk production in 1992. Wisconsin was the largest dairy producing state with 16 percent of volume milk sales. Other major milk producing states included California, New York, Pennsylvania, and Minnesota.

- Broiler and chicken meat production is controlled by 10 producing states, which supply about 80 percent of all broilers sold. Arkansas was the largest broiler producer in 1992, with 16 percent of sales. Other major states included Georgia, Alabama, North Carolina, Mississippi, Texas, Maryland, California, Delaware, and Virginia.

- The top ten producing states accounted for about 80 percent of turkey production. North Carolina was the largest turkey producing state in 1992, with about 20 percent of sales. Other top producing states included Minnesota, California, Arkansas, Virginia, Missouri, Indiana, Texas, Iowa, and Pennsylvania.

- Egg production is dominated by 10 producing states that supply almost two-thirds of the eggs sold. California was the largest egg producing state in 1992 with about 12 percent of all eggs sales. Other major producers included Indiana, Pennsylvania, Georgia, Ohio, Arkansas, Texas, North Carolina, and Alabama.

Recent trends in the U.S. livestock sector are marked by a decline in the number of farms attributable to ongoing consolidation in the livestock industry. Farms are closing – especially small farming operations – due to competitive pressures from highly specialized – often lower cost – large scale producers. This trend toward fewer and larger livestock operations represents a significant shift in the industry. Both 1992 and 1997 Agriculture Census data highlight the ongoing shift from many small, diversified farms toward fewer large-scale, year-round, intensive breeding and feeding operations.

Another industry trend has been a steady increase in animal production and sales in the U.S. This trend has occurred at the same time there has been a decrease in the number of animals on site. This trend signals continued gains in production efficiency on U.S. farms in the form of higher per-animal yields and quicker turnover of animals prior to marketing.

A detailed industry economic profile is presented in the *Feedlots Point Source Category Study* and covers major commodity sectors, industry trends in the U.S. livestock and poultry farm sectors, recent market trends, farm revenue, farm-gate prices, financial operating conditions, industry marketing chain, and industry employment generated.

Additional geographic and economic information can be found by accessing the 1997 Agriculture Census at http://www.nass.usda.gov/census/ and the National Agriculture Statistics Service at http://www.usda.gov/nass/.

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III. SUMMARY OF OPERATIONS, IMPACTS, AND POLLUTION PREVENTION OPPORTUNITIES FOR THE AGRICULTURAL LIVESTOCK PRODUCTION INDUSTRY

This section provides an overview of commonly employed operations and maintenance activities in the agricultural livestock production industry. This discussion is not exhaustive; the operations and maintenance activities discussed are intended to represent the material inputs, major pollution outputs, and associated environmental impacts from agricultural livestock production practices. General pollution prevention and waste minimization opportunities are also discussed in the context of each of the operations and maintenance activities.

The choice of practices or operations influences the material used and the resulting pollution outputs and environmental impacts. Keep in mind that environmental impacts are relative, as some kinds of pollution outputs have far greater impacts than others.

Impact of Agriculture on the Environment

The Clean Water Act Plan of 1998 called for the development of the EPA/USDA *Unified National Strategy for Animal Feeding Operations* (AFOs) to minimize the water quality and public health impacts of AFOs.

According to the *EPA/USDA Unified National Strategy for Animal Feeding Operations* (March 9, 1999), despite progress in improving water quality, 40 percent of the Nation's waterways assessed by States do not meet goals for fishing, swimming, or both. While pollution from factories and sewage treatment plants has been dramatically reduced, the runoff from city streets, agricultural activities, including AFOs, and other sources continues to degrade the environment and puts environmental resources (i.e., surface water, drinking water) at risk. According to EPA's 1996 305(b) water quality report, the top two pollutants from agriculture were identified as sediment and nutrients, respectively. Additional agricultural pollutants, such as animal wastes, salts, and pesticides, were identified by EPA[1]. The following presents a brief discussion of the environmental impacts or effects of agricultural pollutants.

(1) ***Nutrients***. Excess nutrients in water (i.e., phosphorus and nitrogen) can result in or contribute to low levels of dissolved oxygen (anoxia),

[1] *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters,* U.S. Environmental Protection Agency, January 1993.

eutrophication, and toxic algal blooms. These conditions may be harmful to human health; may adversely affect the suitability of the water for other uses; and, in combination with other circumstances, have been associated with outbreaks of microbes such as *Pfiesteria piscicida*.

- **S** Phosphorus. Phosphorus determines the amount of algae growth and aging that occurs in freshwater bodies. Runoff and erosion can carry some of the applied phosphorus to nearby water bodies.

- **S** Nitrogen. In addition to eutrophication, excessive nitrogen causes other water quality problems. Dissolved ammonia at concentrations above 0.2 mg/L may be toxic to fish. Biologically important inorganic forms of nitrogen are ammonium, nitrate, and nitrite. Ammonium becomes adsorbed to the soil and is lost primarily with eroding sediment. Even if nitrogen is not in a readily available form as it leaves the field, it can be converted to an available form either during transport or after delivery to waterbodies. Nitrogen in the form of nitrate, can contaminate drinking water supplies drawn from groundwater. Nitrates above 10 ppm in drinking water are potentially dangerous, especially to newborn infants.

(2) ***Sediment.*** Sediment affects the use of water in many ways. Suspended solids reduce the amount of sunlight available to aquatic plants, cover fish spawning areas and food supplies, clog the filtering capacity of filter feeders, and clog and harm the gills of fish. Turbidity interferes with the feeding habits of fish. These effects combine to reduce fish and plant populations and decrease the overall productivity of waters. In addition, recreation is limited because of the decreased fish population and the water's unappealing, turbid appearance. Turbidity also reduces visibility, making swimming less safe.

(3) ***Animal Wastes***. Animal waste includes the fecal and urinary wastes of livestock and poultry; process water (such as from a milking parlor); and the feed, bedding, litter, and soil with which fecal and urinary matter and process water become intermixed. Manure and wastewater from AFOs have the potential to contribute pollutants such as nutrients (e.g., nitrogen and phosphorus), organic matter, sediments, pathogens, heavy metals, hormones, antibiotics, and ammonia to the environment. Decomposing organic matter (i.e., animal waste) can reduce oxygen levels and cause fish kills. Solids deposited in waterbodies can

accelerate eutrophication through the release of nutrients over extended periods of time.

Contamination of groundwater can be a problem if runoff results from the misapplication or over application of manure to land or if storage structures are not built to minimize seepage. Because animal feed sometimes contains heavy metals (e.g., arsenic, copper, zinc), the possibility for harmful accumulations of metals on land where manure is improperly or over applied is possible.

> ***Pathogens in manure.*** Pathogens in manure can cause diseases in humans if people come in contact with the manure. Pathogens in manure also create a food safety concern if manure is applied directly to crops at inappropriate times or if manure contaminates a product (e.g., food, milk). In addition, pathogens are responsible for some shellfish bed closures. Runoff from fields receiving manure may contain extremely high numbers of bacteria (though all of these bacteria may not be harmful) if the manure has not been properly incorporated. Pathogens, such as *Cryptosporidium*, have been linked to impairments in drinking water supplies and threats to human health.

Air pollution is also a concern in relation to animal wastes. Farms on which animals are raised often concentrate odors associated with the microbial degradation of manure and other by-products of the production of meat, milk and eggs. Odors can be a nuisance to neighbors of animal operations, and there is increasing concern about the potential health effects from emissions of odorous compounds.

(4) ***Salts***. Salts are a product of the natural weathering process of soil and geologic material. In soils that have poor subsurface drainage, high salt concentrations are created within the root zone where most water extraction occurs. The accumulation of soluble and exchangeable salts leads to soil dispersion, structure breakdown, decreased infiltration, and possible toxicity; thus, salts often become a serious problem on irrigated land, both for continued agricultural production and for water quality considerations. High salt concentrations in streams can harm freshwater aquatic plants just as excess soil salinity damages agricultural crops.

(5) ***Pesticides.*** The primary pollutants from pesticides are the active and inert ingredients, diluents, and any persistent degradation products. Pesticides and their degradation products may enter groundwater and surface water in solution, in emulsion, or bound to soils. Pesticides may, in some instances, cause impairments to the uses of surface

waters and groundwater. Both the degradation and sorption characteristics of pesticides are highly variable. Some types of pesticides are resistant to degradation and may persist and/or accumulate in aquatic ecosystems. Pesticides may harm the environment by eliminating or reducing populations of desirable organisms, including endangered species.

Within a livestock production establishment, pesticides may be applied directly to livestock or to structures (e.g., barns, housing units) to control pests, including parasites, vectors, and predators.

Pesticides are both suspected and known for causing immediate and delayed-onset health hazards for humans. If exposed to pesticides, humans may experience adverse effects, such as nausea, respiratory distress, or more severe symptoms up to and including death. Animals and birds impacted by pesticides can experience similar illnesses or develop other types of physical distress.

Pollution Prevention/Waste Minimization Opportunities in the Agricultural Livestock Production Industry

The best way to reduce pollution is to prevent it in the first place. Industries have creatively implemented pollution prevention techniques that improve operations and increase profits while minimizing environmental impacts. This can be done in many ways such as reducing material inputs, reusing byproducts, improving management practices, and employing substitute toxic chemicals.

To encourage these approaches, this section provides general descriptions of some pollution prevention advances that have been implemented within the agricultural livestock production industry. While the list is not exhaustive, it does provide core information that can be used as the starting point for establishments interested in beginning their own pollution prevention projects. This section provides information from real activities that may be or are being implemented by this sector. When possible, information is provided that gives the context in which the technique can be effectively used. Please note that the activities described in this section do not necessarily apply to all facilities that fall within this sector. Facility-specific conditions must be carefully considered when pollution prevention options are evaluated, and the full impacts of the change must examine how each option affects air, land, and water pollutant releases.

The use of pollution prevention technologies and environmental controls can substantially reduce the volume and concentration of the contaminants

released/discharged into the surrounding environment. In some cases, these pollution prevention approaches may be economically beneficial to the agricultural production industries because they decrease the amount of chemicals needed, and therefore the cost of maintaining operations.

Waste minimization generally encompasses any source reduction or recycling that results in either the reduction of total volume or the toxicity of hazardous waste. Source reduction is a reduction of waste generation at the source, usually within a process. Source reduction can include process modifications, feedstock (raw material) substitution, housekeeping and management processes, and increases in efficiency of machinery and equipment. Source reduction includes any activity that reduces the amount of waste that exits a process. Recycling refers to the use or reuse of a waste as an effective substitute for a commercial product or as an ingredient or feedstock in an industrial process.

It should be noted that as individual practices, these pollution prevention and waste minimization practices can significantly reduce the environmental impacts of agricultural operations. However, to get the full effect of the practices and maximize pollution prevention potential, an agricultural operation must consider its individual practices in the context of a system. The practices combine to form an integrated system in which each practice interacts with the others and is affected by the others. That is, outputs from one practice may be inputs into one of the other practices, in effect creating a closed-loop system that both maximizes profits and minimizes environmental impacts. By considering their establishments as systems, operators will be better able to evaluate and implement pollution prevention or waste minimization opportunities.

Operations of Livestock Production

Livestock production generally includes the following activities:

- Feed storage, loading, and unloading
- Housing
- Feeding and watering
- Managing animal waste
- Applying pesticides and pest control
- Maintaining and repairing agricultural machinery and vehicles
- Fuel use and fueling activities

The additional activities of planning and management are required for all of the above processes to occur. Exhibit 17 presents the material inputs and pollution outputs from each of these processes.

Exhibit 17. Livestock Production Activities and Potential Pollution Outputs

Activity	Potential Pollution Outputs
Feed storage, loading, and unloading	S Dust emissions S Unusable or spilled feed S Leachate from silage S Nutrient-contaminated runoff
Housing	S Animal waste S Waste bedding S Air emissions (e.g., odors, methane, ammonia) S Washwater from flushing and washdown of housing areas
Feeding	S Animal waste S Air emissions (e.g., dust, methane) S Moldy feed discard S Spilled feed S Nutrient-contaminated runoff
Watering	S Animal waste S Water contaminated with animal waste S Destruction of stream bank, riparian zone (from animals in streams)

Typically, most of the above activities include the generation of *animal waste.* Animal waste must be managed appropriately because of its potential environmental impacts.

Managing animal waste, includes collecting and transporting; storing and treating; and utilizing animal waste	S Discharges and leaching of wastewater S Manure and urine S Bedding S Air emissions (e.g., ammonia, methane, other gases, odor, dust) S Hair and/or feathers S Carcasses S Pathogens S Heavy metals S Wasted products (e.g., milk, eggs)

Exhibit 17. Livestock Production Activities and Potential Pollution Outputs

Activity	Potential Pollution Outputs
Additional activities that occur at agricultural establishments and their potential pollution outputs include:	
Pest control	S Discharges and leaching of pesticides S Chemical air emissions
Maintaining and repairing agricultural machinery and vehicles	S Used oil S Spent fluids and organic solvents S Used tires S Spent batteries S Metal machining wastes S Scrap metal
Fuel use and fueling activities	S Fuel spills or leaks

III.A. Feed Storage, Loading, and Unloading

Feed storage, loading, unloading, and transport are major activities in livestock production. Livestock feed may include hay, grain (sometimes supplemented with protein, vitamins, mineral supplements and antibiotics), and silage -- with grain and hay being the most common feeds. Livestock operations may produce all, a portion, or none of the animal feed. Purchased feed is transported to the livestock operation by truck or, at very large animal operations, by rail. Stored feed must be loaded, transported to the animals' normal feed location, and unloaded.

S Hay that has been cut and partially dried is collected from fields and compacted into small rectangular bales or rolled into large round bales. Hay may be stored in covered and enclosed buildings, in fields, and in outside storage areas where it may or may not be covered. Small rectangular hay bales may be placed in a barn by conveyor.

Feed hay is often transported on tractor-drawn wagons to feed bunkers, feed rings, and mangers. Small rectangular hay bales may be mechanically or manually placed in bunkers and mangers. Front-end loaders are used to unload round bales and place them in the feed rings.

- Harvested grain is sometimes milled (ground) on site or more commonly sent offsite to a milling facility for grinding prior to being returned to the facility for use. Depending on the livestock species, protein, vitamins, mineral supplements, and antibiotics are often added at the time of milling or mixing. Grain is typically stored in aerated grain bins and handled with augers. High moisture corn is stored in silos. Grain, which is typically placed in feed bunkers, troughs, or feeder units, can be transported using a front-end loader, tractor front bucket, grain wagon, or manually for smaller volumes.

- Silage is usually produced onsite and may consist of chopped green corn or hay. Silage is allowed to ferment in vertical or horizontal silos or storage bunkers prior to use as feed. Silage is removed from silos and then distributed along the feed bunks.

Potential Pollution Outputs and Environmental Impacts

The primary pollution outputs include unusable feed; dust emissions from loading, unloading, and grinding activities; air emissions from transportation to and from sites; and leachate from silage. A minor pollution output is contamination of storm water from spilled feed. Dust emissions pollute the air that agricultural workers and animals breathe and can cause respiratory problems in instances of prolonged exposure. Research indicates that silage materials stored at 65 percent moisture content or higher can produce leachate.

Pollution Prevention/Waste Minimization Opportunities

One potential pollution prevention practice focuses on minimizing unusable feed and consequently maximizing the amount of feed that is consumed by the animal. One way to maximize animal consumption is by grinding the feed in either a grinder-mixer or a tub grinder. Grinding increases the ability of the animal to digest the feed. Where possible, grinders should be used with a dust collector to reduce dust emissions. Silage leachate can be reduced by allowing the material to wilt in the field for 24 hours, varying cutting and harvesting times, cutting or crimping the material, or adding moisture-absorbent material to the silage as it is stored[2].

[2] *Farm-A-Syst, Fact Sheet #9, Reducing the Risk of Groundwater Contamination by Improving Silage Storage*, University of Wisconsin, Extension/Cooperative Extension, College of Agricultural and Live Sciences.

III.B. Housing

Livestock housing may consist of feed lots, barns, stables or stalls, corrals, covered loafing areas, pens, poultry houses, and other similar structures that confine the animals in an area and manner best suited to the overall livestock production process. There are three general ways to house livestock:

(1) Enclosed housing (i.e., a roofed and walled structure)
(2) Partially enclosed (i.e., usually roofed with walls on some structure sides)
(3) Open or no structures

The type of housing used for a particular animal type/livestock production is related to animal size, feeding, animal health and biosecurity, climate, and the goal of achieving the optimum weight gain or commodity produced at the lowest cost.

- Dairy cattle. Most dairy operations provide separate housing for different animal groups based on age or milking status (lactating versus dry). Calves may be housed in barns, individual pens within a barn, open fields, and hutches. Heifers may be housed in freestall barns and bedded pack housing. Bedded pack housing is often used with an open feeding area. Dry cows (<3 months to calving) are usually housed on pasture or in freestall barns. Lactating cows are housed in freestall and other types of barns such as stanchion, corrals, structures, and open lots that provide shade[3].

- Beef cattle. Beef cattle are mainly housed in pastures and open feedlots. Calving facilities may consist of an open pasture, a shed with stalls, or an open, wind-protected pen. Bulls are either penned separately or in groups of up to 10. They may be contained in a barn or in an open pen with shade. Cattle feedlots are usually open areas that may have windbreaks and shade. Very few beef cattle are housed in freestall barns with slotted floors for manure collection.

- Sheep. Sheep are maintained primarily on open grazing land, but some are kept in open lots with shelters, facilities with slotted floors for manure collection, and in bedded pens.

[3] *Preliminary Data Summary: Feedlots Point Source Category Study*, U.S. Environmental Protection Agency, Office of Water, Washington, DC, December 1998.

- Horses. Most horses maintained in concentrated numbers are housed in stalls within an enclosed barn. Approximately 70 percent of the horse operations that use stalls have one animal per stall. Horses may also be housed in partially enclosed housing or on pasture.

- Poultry. Poultry including turkeys and ducks are maintained in an enclosed house. Chicken broilers, roasters, and pullets, which may be caged, are usually maintained in houses on a solid floor with bedding. Breeders are usually maintained in houses with a slatted floor generally covering one-third of each side of the house along the length of the side-wall of the house. Most layers are maintained in houses inside of cages with mesh floors, and a few in houses with a litter or slat/litter floor. Turkey poults are reared in enclosed brooder houses, then generally are moved to grower houses and sometimes to range. Turkeys are normally raised on a dirt or clay floor with a bedding cover. Duck housing is normally an enclosed house that has a wire-mesh floor, a solid floor, or a combination of the two.

- Goats. Goats are housed in loose housing common areas that may contain bedded and exercise areas, individual stalls, pens, and corrals. Pregnant does are usually housed in bedded pens.

- Swine. While some swine are raised outdoors with a shelter (e.g., hoop housing), most are housed in an enclosed barn or house. Breed sows may be kept in small group pens and then during farrowing, a sow is usually placed in an individual pen. Young pigs are placed together in larger nursery pens. Finishing operations keep several pigs in the same pen.

The floors of some livestock housing for cattle, swine, and sheep, may be of slotted construction. The floors for some poultry housing may be of wire-mesh or slat construction. The slotted, wire-mesh, and slatted housing floor systems allow the manure to drop into a long-term or temporary storage/collection/transfer area.

Bedding is mostly used in the housing of dairy cattle, poultry, and horses but may be used for the housing of any of the livestock types presented above. Manure and bedding needs to be removed at regular intervals. Methods of removal vary depending on the type of housing. Manure is primarily removed from housing by scraping, scooping, and flushing (see Section III.D. Managing Animal Wastes).

Potential Pollution Outputs and Environmental Impacts

The primary pollution outputs include animal wastes, bedding, wastewater from flushing and washdown of housing areas, and air emissions (e.g., methane, ammonia, and odors). The main impacts of these outputs are soil and water contamination stemming from waste spills, improper storage, and runoff.

From an environmental standpoint, each type of livestock housing (enclosed, partially enclosed or open) has advantages and disadvantages. The move from outdoor housing to confinement housing has removed the weather factor and runoff, which is a substantial problem for outdoor housing, and provided producers the opportunity to manage manure as a resource and not a waste. However, concentrated amounts of manure can be viewed as a disadvantage. While concentrating the animals (and therefore the animal manure) may lead to easier manure management, concentrated amounts of manure have a greater potential to significantly impact the environment in the event of a spill, release, or improper management.

Wastes, including manure and fouled bedding, that are not properly transported from housing could spill and potentially contaminate storm water runoff. Open housing such as feedlots, corrals, and pens, if not scraped as necessary, may also contaminate storm water runoff. Wastes carried in storm water runoff may be discharged to surface waters causing pollution, or may be deposited in low areas and potentially leach to the groundwater.

Animals contained in pasture areas (technically not housing but used for livestock containment) can wear away soil from feeding sites, destroy streambanks at natural watering sites, and, if allowed access, defecate and urinate in surface waters. This results in increased runoff, soil erosion as well as sediments, manure, and urine in the water.

With enclosed or partially enclosed housing areas, odors and other gases (e.g., methane, ammonia, and hydrogen sulfide gases) from animal waste can be concentrated, potentially harming the health of the animals and workers. When the gases are released outside, the odor can affect the surrounding areas and create nuisance problems for neighbors.

Pollution Prevention/Waste Minimization Opportunities

While the majority of the wastes discussed above for housing cannot be prevented, both the wastes and their impacts can be reduced by implementing best management practices.

- *Minimize water use during cleaning*. By cleaning livestock (except poultry) housing on a regular and frequent basis and using minimal amounts of water during cleaning, operations may reduce the volume of wastes to be handled and used. Keeping the waste dry also facilitates its management, reduces runoff potential, and minimizes odors from decomposition.

- *Minimize runoff by cleaning open areas*. Cleaning open areas reduces the potential for the runoff of wastes to surface waters.

- *Reduce odor by preventing ammonia generation*. Ammonia is created by the rapid conversion of urinary nitrogen (urea) to ammonia by microorganisms. By applying various chemicals (e.g., urease inhibitors) on a weekly basis, the conversion of nitrogen to ammonia can be reduced, thus minimizing ammonia emissions and odors, and conserving valuable fertilizer[4].

- *Use tools to minimize odor impacts on the surrounding community.* When considering the installation of a new livestock operation or the expansion of an existing operation, facilities should consider maximizing the distance to neighboring dwellings, the existence of "reverse" setback rules, the potential for new neighbors, and the potential impact neighbors may have on limiting the expansion of the animal housing. Additional methods for reducing odors in other aspects of livestock operations are discussed below.

III.C. Animal Nutrition and Health

There are many activities and considerations when managing animal nutrition and health, including feeding, watering, and biosecurity issues. Animal nutrition is an important consideration for livestock operators for various reasons, including the health of the animals, as well as the nutrient

[4] *Use of Urease Inhibitors to Control Nitrogen Loss From Livestock Waste,* U.S. Department of Agriculture, 1997.

composition of the manure. The nutrient composition of manure (nitrogen and phosphorus) is directly related to the composition of the animal feed, feed supplements, and ability of the animal to digest the feed.

Feeding

Corn, soybean, grasses, hay, silage, and other grains are some of the common food sources for livestock. Most livestock operations adjust the composition of the animals' feed to meet the animals' current protein needs. As an example, dry cows are typically fed a lower protein diet when compared to cattle being milked or nursing calves. Likewise, swine operations often use phase feeding and separation of sexes to best meet the animals' protein needs, lower feed costs, and reduce nutrient levels of the manure. Generally, swine operations feed varying protein diets in relationship to the growth phase and/or need of the animal. As an example, operations provide higher protein feed to farrowing sows, less protein to gilts, and even less to barrows (made possible through separate confinement of sexes). Some livestock operations place swine in confinements recently used for cattle. The swine will receive a portion of its nutrient requirement by feeding on the cattle manure. This provides an overall reduction in the nutrients excreted at the livestock operation.

Feed supplements may include amino acids and enzymes. The supplement of synthetic lysine in swine feed assists in lowering the nitrogen level in the manure. The addition of this amino acid allows feeding of a lower protein diet. Normally, the phosphate in the phytic acid passes through the digestive tract of swine and poultry and is excreted. The addition of phytase, an enzyme to swine and poultry feed, will allow the animal to digest phytic acid from cereal grains and soybean meal and convert it to phosphate for use by the animal. This reduces the need for supplemental phosphorus in the diet of swine and poultry. Currently, the use of phytase is not feasible due to economic and production concerns.

The ability of the animal to digest the feed can be increased by fine grinding and pelletizing feed. Fine grinding increases the surface area of the feed and thereby increases the portion digested.

Feeding can take place in the housing facility, at a separate feeding facility or feeder unit(s), and from pastureland. Other than grazing, where the animal (e.g., sheep, horses, cattle) goes to the feed, the feed is brought to the animals and placed in a feeding device. The feeding process begins with the feed being transported, by various means, from the storage areas to feeding area or unit. The method of feeding is usually related to the type of animal and the housing structure.

- Most dairy operations feed the animals between milking events and may feed the animals from feed bunks that may be covered or uncovered. Small dairy cattle operations may feed the animals during milking and place them on pasture for grazing between milkings.

- Beef (feeder) cattle operations generally feed the animals from feed bunks that may be covered or uncovered. These operations may also use feed rings for large bales of hay.

- Horses, if maintained inside, are fed from a manger and/or other feed device.

- Housed poultry and swine are generally fed continuously from feeding devices. The two major types of feeding devices for poultry and swine are self feeders, which provide the animal with a constant supply of food, and mechanical feeders, which distribute the feed to the animals at predetermined intervals.

Watering

Watering involves the operation and maintenance of animal drinking systems or access to naturally-occurring surface waters or man-made watering structures (e.g., ponds, reservoirs). It is essential that a constant or on-demand supply of water be provided for livestock.

For those housed or in other types of confined areas, there are many different types of man-made watering devices, each of which can be modified depending on the animal using the system. Some of the most commonly used systems include the following:

- *Animal-operated pumps or drinkers*. Large livestock kept in enclosed and partially enclosed housing can use animal-operated pumps or valves (nose pumps/valves). Livestock-operated on-demand watering devices allow the animal to use its nose to actuate a valve or push a pendulum unit that dispenses water. Small livestock kept in enclosed housing generally have on-demand drinkers that are actuated by the mouth or beak of the livestock.

- *Trough systems*. Large livestock kept in enclosed and partially enclosed housing can also use trough systems. In trough systems, animals drink directly from troughs or tanks. The discharge of water to the trough/tank may be float-controlled or continuous.

Many partially enclosed, open, and pasture/grazing livestock operations perform water hauling or provide access to watering sources to meet livestock watering needs.

- *Water hauling*. Water may also be provided to animals in open pastures and grazing operations through water hauling. By using a truck with a main storage tank and an easily-moved stock tank, the watering point can be relocated as necessary throughout the operation.

- *Access to privately-owned ponds or reservoirs using restricted access ramps*. For grazed cattle and pastured dairies, natural streams and other surface waters provide a source of drinking water. Many partially enclosed, open, and pasture/grazing livestock operations allow animals access to watering sources, such as privately-owned ponds or reservoirs, via restricted access ramps. Access ramps allow the animals to use the water source while minimizing erosion of the banks. While some reservoirs are supplied by natural precipitation, many use water pumping systems. Powered by gas, solar energy, and wind, these systems transport water from the water source to the reservoir or pond.

Biosecurity

Biosecurity consists of the procedures used to prevent the spread of animal diseases from one facility to another. Animal diseases can enter a facility with new animals, on equipment, and on people. Animals, equipment, and people that have recently been at another facility may pose the greatest biosecurity risk. Biosecurity procedures include such general categories as use of protective clothing, waiting periods for new animals and visitors, and cleaning.

Biosecurity is important to livestock owners because some diseases can weaken or kill large numbers of animals at an infected facility. In some cases, the only remedy available to an operation is to sacrifice an entire group of animals in order to prevent the spread of the disease to other parts of the facility or to other facilities. In other words, a failure to conduct biosecurity procedures can cause serious financial and productivity losses for a livestock operation.

The types of biosecurity procedures necessary will depend on the type of animal at a facility, the way the diseases of concern spread to and infect animals, and vulnerability of the animals to each specific disease. For example, if a group of swine has little immunity to a serious virus, and that virus can enter the facility on the skin or clothing of visitors, a facility may

need to require visitors to observe a waiting period, take a shower, and change into clean clothing provided by the facility before entering. A different group of swine may have better immunity to the virus, and such biosecurity measures would be unnecessary.

Some of the general types of biosecurity procedures include:

- Controls on the introduction of new animals to a group or facility (such as quarantine periods).
- Controls on equipment entering the farm (such as washing and disinfecting crates).
- Controls on personnel entering the farm (such as requiring service personnel to stay out of animal buildings, or providing protective clothing and footwear).
- Controls on wild or domestic animal access (such as closing holes in buildings to keep undesirable animals out).
- Sanitation in animal housing areas (such as cleaning pens).
- Identification and segregation of sick animals (including adequate removal and disposal of dead animals).

The key to developing adequate biosecurity procedures is to find accurate information about animal diseases and how to prevent them. Potential sources for specific biosecurity information and recommendations include extension services and other agricultural education organizations; veterinarians and veterinary organizations; producer and industry groups; and published information in books, magazines, and World Wide Web sources.

Potential Pollution Outputs and Environmental Impacts

Feeding. When feeding, the potential pollution outputs are soil erosion due to overgrazing, animal wastes (which are partially composed of unabsorbed feed components), spilled feed during feed unloading to feed equipment and by livestock as they feed, mechanical failures with feed equipment (e.g., inoperative cutoff switch), and dust emissions during feed transport. The pollution outputs and potential environmental impacts vary based on the type and location of feed equipment and number of animals.

- *Overgrazing* can contribute to soil losses due to severe erosion, and impoverishment can change the vegetation composition and associated organisms in rangelands.

- *Surface water and groundwater contamination from concentrated wastes*. Totally enclosed feed locations (e.g., barns, poultry houses), when compared to the same livestock types in a partially sheltered or open area, may generate a larger quantity of animal waste per acre of land due to a higher concentration of livestock in a smaller area. Totally enclosed structures are protected from rainfall and should not experience the runoff of livestock wastes and wasted feed that may occur in partially sheltered and open feed locations.

- *Surface water and groundwater contamination from runoff*. Partially sheltered feed locations (e.g., dairy operation free-stall barns and covered loafing areas) and open feed locations (e.g., feeder cattle maintained in a area that has no roofed or walled structures) have a greater pollution potential due to runoff. Areas with no vegetation may experience runoff of livestock waste and spilled feed during rainfall events.

- *Air emissions (e.g., dust).* Areas with no vegetation that are dry may produce dust pollution during the transportation of feed.

Watering. The primary pollution output from watering is excess water, which most likely becomes wastewater that is contaminated with livestock wastes (e.g., manure, urine) and feed. Surface waters and groundwater can become contaminated from wastewater runoff, and surface waters can be directly contaminated with wastes (e.g., manure, urine) from livestock that are allowed access to the water (e.g., during watering).

Properly operated man-made watering systems significantly reduce the environmental impact of livestock. However, continuous watering systems that overflow and cause runoff often cause significant environmental damage. Additionally, livestock with access to creeks, rivers and other natural water sources cause environmental damage by contaminating the water with animal waste, destroying riparian habitat, and eroding the stream banks.

Pollution Prevention/Waste Minimization Techniques

There are many pollution prevention opportunities to reduce or minimize the pollution outputs and impacts from livestock feeding and watering activities. Generation of these wastes can be prevented through management practices, preventive maintenance, appropriate feedlot location, and use of waste minimization technologies.

Feeding. Wastes generated during feeding (e.g., feed spills, unused feed) can be prevented by using troughs or mechanical feeding systems that reduce feed loss and prevent contact with watering areas, weather, and the ground.

- *Use portable and/or covered feeders*. Feeders can be constructed to be portable, eliminating the problem of manure buildup that occurs around stationary feeders. For outdoor or partially enclosed feeding operations, use of covered or protected feeders prevents the feed from being exposed to rain or wind. Examples of such feeders include mineral feeding boxes, and weathervane mineral feeders.

  - **S** A mineral feeding box is simply a trough that is raised off the ground, enclosed on three sides, and covered by a roof.

  - **S** A weathervane mineral feeder consists of a 55-gallon drum with a cut out opening of sufficient size for the animal to reach the feed. The drum pivots on a concrete base that is heavy enough to prevent overturning by cattle or wind. A weathervane is attached to the top of the drum so the feed opening is pushed away from the wind direction, and rain is prevented from reaching the opening.

- *Use specially designed feeders.* For hay feeding operations, using feeders that are specifically designed to accept bales minimizes hay loss and prevents potential nutrient runoff.

- *Use feeders that prevent spills and contact with the ground.* Feeding racks store hay between steel bars, thus minimizing the amount of hay that an animal can pull from the rack and spill on the ground. Totally enclosed racks where the hay is located inside a rectangular or circular enclosure may have diagonally shaped bars containing the hay inside. These bars require the

animal to turn its head in order to reach through and remove its head from the hay, thus significantly reducing the amount of hay the animal can pull from the feeder and spill.

Watering. Pollution prevention techniques to prevent environmental impacts from watering include the following:

- *Prevent access to surface waters*. Livestock operations can use physical barriers (e.g., fencing) to prevent animals access to surface waters (e.g., creeks, streams, rivers). This will minimize contamination of these waters caused by animal defecating directly in the water, and runoff carrying waste reaching the water.

- *Reduce excess water use and spills of water*. Preventing overflows of watering devices and excess water use during watering can prevent water becoming mixed with wastes and potential runoff.

- *Use self-watering devices*. The on-demand, self-watering systems that are used in many types of animal operations are an effective method of reducing waste as long as they are well maintained and checked frequently.

III.D. Managing Animal Wastes

Animal wastes are produced at all stages of the livestock production process, including housing, feeding, and watering. *For the purposes of this document, the term animal waste refers to animal manure, urine, and other materials that come in contact with and/or are managed with manure and urine in a typical livestock operation*. These materials may include, but are not limited to, bedding, wastewater from flushing and washdown of housing areas, lot runoff, disinfectants and cleaners, and spilled feed.

Animal manure has been recognized for centuries as an excellent source of plant nutrients and as a soil "builder" in terms of its positive benefits to soil quality. Animal manure is an excellent source of nutrients for plants because it contains most of the elements required for plant growth. Livestock operators today are managing and using manure as an important and valuable resource. If managed and used properly, manure can provide benefits for the livestock operation, such as reduced commercial fertilizer use and increased soil quality.

Overall, the amount of animal wastes to be managed can be extensive. The challenges of animal waste management have been compounded in recent years due to the growth of animal feeding operations. These types of operations have resulted in the concentration of manure production on an ever smaller land area. The consistency and volume of animal waste to be managed at a livestock operation depends on the types of animals at the facility. Generally, dairy cattle, beef cattle, swine, and sheep produce a comparatively wet waste and broiler poultry litter is dry (22-29 percent water). Laying and breeding operations are often considered to have wet manure because of how the waste is handled. Exhibit 18 provides a comparison of the manure production for various animals.

Animal Type	Weight of Manure (lbs/day/1000 lbs of animal live weight)	
Dairy Cow, Lactating	80.0	75-90
Beef, Cow	63.0	20-80
Swine, Grower (40 - 220 lb)	63.4	70-85
Poultry, Broiler	80.0	22-29
Sheep	40.0	70
Horse	50.0	70

Source: *Preliminary Data Summary: Feedlots Point Source Category Study*, Table 11.2, U.S. Environmental Protection Agency, Office of Water, Washington, DC, December 1998.
Composting Manure and Other Organic Residues, Table III, Cooperative Extension, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, March 1997.

Types of Animal Waste Management Systems. Animal waste management systems involve the collection, transport, storage, treatment, and utilization (rather than disposal) of waste, preferably in a manner that is economically and environmentally sound. The type of system that each operation uses

Additional management activities at livestock operations include controlling or collecting runoff from outdoor lots and waste storage; directing clean water away from lots and storage areas; and disposing of livestock mortalities.

depends on the type of animal(s), manure moisture content, size of the operation, acreage and site, available manure utilization methods, and operator's personal preference. Additional information on animal waste management systems, including collection, storage, treatment, transfer, and utilization, can be found in Chapter 9: Agricultural Waste Management Systems of the *Agricultural Waste Management Field Handbook* (USDA, 1992) which can be accessed at http://www.ftw.nrcs.usda.gov/awmfh.html.

Using Best Management Practices. Livestock operators can implement structural and nonstructural best management practices (BMPs) to reduce the volume of animal wastes that must be managed.

- *Structural BMPs* for an animal waste management system may include roof gutters on buildings to collect and divert clean water; vegetated filter strips and riparian buffers to trap sediment; and surface water diversions to move clean water around the areas containing waste.

- *Non-structural (management) BMPs* for an animal waste management system may include reduced frequency and volume of washdown; implementation of a comprehensive nutrient management plan; relocation of manure stacks; and other site-specific land uses that do not involve construction or land movement.

III.D.1. Collecting & Transporting Animal Wastes

The most significant quantities of animal waste are generated at feeding, watering, and housing locations. Waste collection methods vary based on the type of housing and feeding operations, as well as manpower, available equipment, operator training, pen size, and manure moisture content. Some types of manure collection systems used in livestock productions are:

- *Slotted floor systems*. The slotted floor system allows the manure to drop through the slots to a storage tank or area located beneath the floor.

- *Scraping*. Scraping is the primary method of manure collection for open housing and a common method for partially enclosed housing and enclosed housing. Common scraping equipment includes small tractor operated scrapers, tractor-pulled pan scrapers, and automated alley scraper blades on a cable. The manure may be scraped into storage facilities, to treatment, or to utilization equipment.

- *Flushing*. Flushing is often used in enclosed and partially enclosed housing. Manual or automated hydraulic flush equipment uses water to flush the manure to collection/storage pits or lagoons.

The following describes the animal waste collection and transport systems used for different types of animals.

- Dairy cattle. Dairy cattle manure is usually collected and transported from sheds and freestall barn alleys by a manual or automated hydraulic flush in warmer climates and alley scrapers in colder climates. Manure dropped in milking parlors is commonly collected by a manual hydraulic flush. Freestall barns and alleys may also have the manure collected by scraping. Manure in open areas such as corrals is primarily collected by scraping; manure in grazed areas is not collected.

- Beef cattle. Manure is usually collected from beef cattle feedlots by scraping. The feedlot area may be unpaved, partially paved around feed and watering areas, or totally paved. Though rare, if beef cattle are kept in enclosed and partially enclosed housing, manure collection is accomplished by a slotted floor system. The manure drops through the slots to a below-floor tank that provides either short-term or long-term storage. In grazed areas, the manure is not collected.

- Sheep. Sheep are primarily maintained on pasture and the manure is not collected. Manure, from sheep kept in enclosed housing, is usually collected by a slotted floor system.

- Horses. Manure from horses housed in enclosed barn stalls, is most often collected by shoveling. The manure and bedding from stalls is often removed daily and placed in stacks.

- Poultry. Poultry manure collection is generally related to the type of operation. Poultry manure is generally dry (22-29 percent water). Broiler, roaster, pullet, turkey, and some duck houses usually raise the birds on the house floor or in cages on beds of shavings, sawdust, rice hulls, or peanut hulls. The manure is allowed to accumulate on the floor where it is mixed with the bedding.

  Many of the poultry broiler houses are only cleaned out completely once a year. Often, they only remove the top two inches or so between flocks (approximately 5-6 flocks per year in broilers houses). The litter is removed with a cruster machine or a small tractor with a front

bucket. In layer and duck operations, the operator commonly collects the manure by allowing it to drop through the wire-mesh cage, house floor or slotted floor to a collection area where it is usually removed by a hydraulic flush or belt scraper to a lagoon. Manure is sometimes composted, but can also be stored in stacking sheds, roofed storage areas, outside and covered or uncovered, or occasionally in ponds until it is ready for transport to a disposal or land application area.

- Goats. Goat manure is collected by manual shoveling from small pens or stalls or scraped from larger containment enclosed, partially enclosed, and open areas.

- Swine. Manure from swine in enclosed housing is often collected by allowing it to drop through a slotted floor to a storage area, or it may be collected by a manual or automated flush system. Manure from swine maintained in partially enclosed or open housing is usually collected by scraping.

In housing where animals are confined, frequent manure collection and transport are critical to livestock health. Frequent removal of wastes reduces the naturally occurring volatilization of nitrogen as ammonia and the anaerobic digestion and the subsequent release of gases in the production buildings. This reduction of pit gases, which can be fatal, and odor improves the in-house environment and employee working conditions.

Collection and transport of wastes by flushing is facilitated by slightly sloped, paved floors, alleys, or gutters. Waste collected through slotted floors and wire-mesh cages is usually transported from the below-floor/below-cage collection area by a hydraulic (water) flush or may be scraped. The flushed manure and/or litter may be transported to a storage area or treatment lagoon. Two advantages of the flush system for collecting and transporting manure are that it is non-labor intensive and it provides a safe means to remove manure from confined spaces. The flush, which can be initiated manually or cycled by timer, dosing system, tip tank, or other means, transports the manure from the collection area. Pumping is used to transport liquid and slurry wastes from collection pits to storage or treatment lagoons. High solid wastes are often collected and transported from the housing or feeding areas using tractors with scraper blades and/or bucket loaders. Manure collected in gutters is often transported by automatic scrapers. Some disadvantages of the flush system include a huge increase in the amount of manure, manure cannot be transported very far because of the high cost versus low value, large use of water, problems with overloading when land-applied, and lagoons increasing the volatilization of nitrogen.

Potential Pollution Outputs and Environmental Impacts

For manure collection and transport, the pollution outputs can include manure, urine, litter, bedding, and water. Additional outputs include ammonia emissions from the waste, odors, hair and/or feathers, pathogens, and heavy metals.

Wastewater that may leak from storage areas or transport processes could result in surface water and groundwater contamination. While waste flushing systems aid in removing manure from underground storage basins, flush systems also generate additional manure wastewater that must be managed. Adding water also increases the risk of a manure spill or runoff reaching groundwater or surface water. Frequent collection and transport of manure and collection of surface runoff assists in reducing the nutrient losses and thereby provides greater nutrient availability during utilization. Between 40 to 60 percent of manure's nitrogen content may be lost through volatilization of ammonia NH_3 while the solid manure remains on an open lot[5]. Other nonvolatile nutrients (e.g., organic nitrogen, phosphorus) may be lost through leaching and surface runoff.

Pollution Prevention/Waste Minimization Opportunities

There are many techniques available to reduce pollution caused by animal waste collection and transport activities.

- *Reduce water used in flushing systems*. Alternative technologies, such as low-flow waste flushing systems or no-flow waste scraping systems, use less water than traditional systems, and decrease the amount of liquid that is sent to be treated in the lagoon.

- *Recycle water for flushing*. To minimize the amount of wastewater generated, some means of recycling clarified wastewater for flushing may be desirable. Separation of solids from flush water can be used to reduce the solids in the recycled flush water.

[5] *Generally Accepted Agricultural and Management Practices for Manure Management and Utilization*, Table 5, Nitrogen Losses During Handling and Storage. Adopted by Michigan Agriculture Commission, Lansing, Michigan, June 1997.

III.D.2. Storing & Treating Animal Wastes

Waste Storage

Storage is the temporary containment of manure and wastes. Following collection, animal waste not immediately used may be stored in dry or wet form by various means and structures. Broiler and beef wastes are stored in dry forms while dairy and swine wastes are stored in wet forms.

- Manure stacks, bunkers, and stacking sheds are commonly used for dry wastes.

- Pits, tanks, ponds, and lagoons for liquid or slurry wastes.

Dry manure or litter is often placed in a covered or roofed area so that it does not come into contact with storm water. Storage may be short-term, usually a few days to a few weeks, or long-term, which is usually less than one year. The purpose of short-term storage is typically the retention of manure at the point of collection until transport to long-term storage or treatment. The purpose of long-term storage is retention of the waste until utilization is possible and/or appropriate as determined by the field condition, crop, weather, and other factors. Storage containment must be designed to hold the total volume of manure generated during the maximum length of time between applications. Additionally, federally regulated CAFO liquid storage units that accept storm water runoff must be sized to contain normal precipitation and runoff (less evaporation) for the storage period plus a 25-year, 24-hour storm event flow and still provide adequate freeboard. Waste storage is not treatment and any treatment that occurs is incidental.

Waste Treatment

Following collection and/or storage, livestock production facilities may treat animal wastes. Treatment may include (1) solids separation by gravity, mechanical, or vegetative methods, and (2) stabilization of the waste by anaerobic lagoons, aerobic lagoons, or composting.

- *Solids Separation.* Solids separation is a physical treatment process whereby a portion of the larger solids and fibers are removed from the manure and can be reused. Solids separation is often used preceding a storage or a treatment lagoon to slow the rate of solids accumulation in the basin. Solids separation may be accomplished by settling basins, mechanical separation, and vegetative filter strips.

- **S** Settling basin. Solids separation, in a settling basin, is achieved by discharging the wastestream to a basin where the rate of flow is low enough to cause gravity settling of the solids.

- **S** Mechanical solids separator. A mechanical solids separator unit may be a static screen, vibrating screen, mechanical flat belt (press), or roller press. In solids separation by static or vibrating screen, the flow is generally passed across the screen where the solids are captured and the liquid drops through. The liquid portion from the settling basin and/or mechanical separator is normally sent to storage or treatment or used to irrigate cropland. The collected solids may be used for bedding, feed, soil amendment, or compost.

• *Lagoons (Anaerobic or Aerobic)*. Lagoons can be anaerobic or aerobic (non-mechanical and mechanical), although aerobic lagoons are used less frequently. In contrast to solids separation, lagoons are biological treatment processes used to satisfy the oxygen demand (e.g., BOD, COD) and volatilize nitrogen. Lagoons can convert ammonia nitrogen to nitrate, though this is extremely rare in animal treatment systems.

  Lagoons vary in shape and size, but when properly constructed should have sufficient volume to hold the waste during the treatment period and contain normal precipitation and runoff (less evaporation) for the storage period plus a 25-year, 24-hour storm event flow and still have adequate freeboard. Lagoons should be lined either with clay, naturally occurring high clay content soils, concrete, or a synthetic liner.

  - **S** *Anaerobic lagoons* are commonly used to treat animal waste -- particularly swine, but also cattle and layers. Because anaerobic lagoons do not require free oxygen for treatment, they are usually six to ten feet deep. Anaerobic systems are sometimes operated with two lagoons in series allowing the first lagoon to overflow via pipe or spillway to the second lagoon.

  - **S** *Non-mechanical aerobic lagoons* are shallow, usually two to five feet deep and have a large surface area. This allows more sunlight to reach the algae, which in turn produce oxygen needed for treatment to occur. Non-mechanical aerobic lagoons are rarely used in livestock applications because they require large amounts of land.

- **S** *Mechanical aerobic lagoons* have higher construction costs due to the aeration equipment. The aeration process is expensive to operate; however, digestion occurs at a faster rate and fewer odors are produced. Due to the additional construction and operating costs, mechanical aerobic lagoons are uncommon. Mechanically aerated lagoons are sometimes used to control odors in odor-sensitive areas. Aerobic lagoons will produce more sludge than anaerobic lagoons and thus require additional solids handling.

• *Composting.* Composting is an aerobic biological process that converts organic waste into a stable organic product that can be used onsite or transported offsite for use. Composting reduces the volume of waste and kills pathogens while preserving more of the nutrients for use by crops. The composted material improves soil fertility, tilth (tilled earth), and water holding capacity. Composting is optimized by proper ratios of carbon to nitrogen and carbon to phosphorus; moisture content; temperature; pH; and time.

  In the composting process, a bulking agent (e.g., wood chips, peanut husks, animal bedding, or other materials) is mixed with the manure to provide the proper carbon ratios. Because of its high nutrient to volume ratio, composted animal waste, or compost, is a beneficial agricultural product. Compost can be spread on paddocks, cropland, and nursery stock, or used for landscaping and home gardens. Note: Many poultry and some swine operations also use composting for carcasses.

  There are four general composting methods -- static pile, aerated static, windrow, and in-vessel.

  - **S** Static pile method is the simplest composting operation and requires the least labor, but take the longest time to complete the process. The static pile operation is not mixed or aerated.

  - **S** Aerated static pile method is not mixed but usually has piping to allow air to reach the interior of the pile.

  - **S** Windrow method involves a long narrow pile that is regularly mixed and aerated.

- In-vessel method is an enclosed operation that allows accurate control of moisture and other parameters, while containing the odors.

Potential Pollution Outputs and Environmental Impacts

During waste storage, livestock production operations may produce stack seepage and storm water runoff which should be directed to the liquid storage ponds and lagoons.

During waste treatment, the pollution outputs and impacts include releases of ammonia and other gases to the air, contaminated runoff to surface waters, leaching resulting in groundwater contamination, and odors. For lagoons, the major pollution output is wastewater that is leached to groundwater through improperly lined lagoons; discharges to surface waters due to overfilling and breakthroughs; or improper transfer of wastes between facilities resulting in surface water contamination.

Pollution Prevention/Waste Minimization Opportunities

There are pollution prevention techniques that can be used during animal waste storage and treatment activities. These include:

- *Proper location*. The location of manure storage systems should consider proximity to water bodies, floodplains, and other environmentally sensitive areas.

- *Cover wastes*. During storage, place dry manure or litter in a covered or roofed area so that it does not come into contact with storm water. When composting, impacts can be significantly reduced by maintaining the compost operation under a roof or in an enclosed area.

- *Prevent spills by regular inspections and maintenance*. Spills and overflows can be prevented by regular inspections and preventive maintenance of lagoons; never filling lagoons beyond treatment capacity; and removing sludge as needed.

- *Use vegetative filters.* Vegetative filters are often used to prevent runoff from lagoon or settling basin liquid overflow from reaching a waterbody. As the water flows across the vegetative strip, the solids drop out of the water, thus reducing

the amount of solids that can impact the environment. Vegetative filters are effective when located near the lagoon.

- *Build a reserve lagoon*. While the installation of a reserve lagoon may not be economically viable in all situations, the potential release of lagoon contents to the environment can be reduced by maintaining a spillway to a reserve lagoon. Spillways provide for limited release of overflow, which reduces the tendency for stress-related structural failure. A reserve lagoon is an integral component of a spillway system that prevents contamination of surface water and groundwater.

- *Prevent overtopping*. In preparation of rain events or to prevent exceeding lagoon capacity, livestock operations may hire a contractor to remove liquids from lagoons that are in danger of overtopping.

III.D.3. Utilizing Animal Wastes

Animal wastes (e.g., manure and urine) can be used as sources of plant nutrients. Land application is the most common, and usually most desirable, method of utilizing manure and wastewater because of the value of the nutrients and organic matter. Land application should be planned to ensure that the proper amount of nutrients are applied in a manner that does not adversely impact the environment or endanger public health.

Benefits of Land Application of Animal Wastes. The benefits of proper application include improvement of the physical, chemical, and biological properties of the soil, as well as significant economic returns from the use of manure as a plant nutrient.

Considerations for appropriate land application should include:

Nutrient Management Plans[6]. The primary purpose of nutrient management is to achieve the level of nutrients (e.g., nitrogen and phosphorus) required to grow the planned crop by balancing the nutrients that are already in the soil with those from other sources (e.g., manure, biosolids, commercial fertilizers) that will be applied. At a minimum, nutrient management can help prevent the application of nutrients at rates that will exceed the capacity of the soil and the planned crops to assimilate nutrients and prevent pollution.

- **S** Comprehensive Nutrient Management Plans (CNMPs). As discussed in the *USDA-EPA Unified National Strategy for Animal Feeding Operations*, all animal feeding operations should develop and implement technically sound, economically feasible, and site-specific CNMPs to minimize impacts to water quality and public health. In general, a CNMP identifies actions or priorities that will be followed to meet clearly defined nutrient management goals at an agricultural operation. CNMPs should address, as necessary, manure and wastewater handling and storage, land application of manure and other nutrient sources, site management, record keeping, and feed management. CNMPs should also address other utilization options for manure where the potential for environmentally sound land application of manure is limited at the point where it is generated.

- *Timing and Methods of Application:* The timing and methods of application should minimize the loss of nutrients to groundwater or surface water and the loss of nitrogen to the atmosphere. Manure and wastewater application equipment should be calibrated to ensure that the quantity of material being applied is what is planned. Care must be taken when land-applying manure and wastewater to prevent it from

[6] On May 24, 1999, USDA-NRCS released the Policy for Nutrient Management and the revision to the conservation practice standard for Nutrient Management (Code 590). NRCS' directive and supporting technical guide establishes policy for nutrient management, sets forth guidance to NRCS personnel who provide nutrient management technical assistance, and for the revision of the NRCS nutrient management conservation practice standard. These two documents will provide the framework for all nutrient management plans developed by NRCS for the agricultural community, which will be tailored by State Conservationists within a two-year period. Of particular importance is the new policy as it relates to producers that may not have sufficient land available to spread manure at rates that utilize nitrogen and phosphorus and will, as a result, need to pursue off-farm utilization options.

entering streams, other water bodies, or environmentally sensitive areas.

Manure can be land applied as solids, slurries, and liquids. The type of application equipment used depends on the manure moisture content. Box spreaders are typically used for dry manure, flail spreaders and injection for slurries, and irrigation and injection for liquids. Manure application may be by the livestock operation personnel or a custom applicator.

- *Surface application*. Box and flail spreaders apply the manure to the soil surface as the spreader is pulled or driven across the field. If surface applied, the manure may then be incorporated into the soil. Incorporation within 24 hours greatly reduces ammonia volatilization thus retaining nitrogen.

- *Injection*. Injected manure is incorporated into the soil as the equipment is driven or pulled across the field.

- *Irrigation.* Many livestock operations with storage ponds or treatment lagoons use irrigation systems, portable irrigation equipment, or hire custom irrigators. Those establishments with field crops or silviculture often use portable irrigation systems such as traveling guns or center pivots. Operations with several different fields or large acreage on which to apply the waste typically use travelers. Small acreage establishments often use small-nozzle, moderate-pressure, permanent irrigation systems, because they provide low labor costs and more uniform distribution of lagoon liquids.

Potential Pollution Outputs and Environmental Impacts

While properly applied animal wastes provide nutrients and have little negative environmental consequence, improper management and use of animal wastes, such as overapplication, excessive spraying, or application during rain events or on frozen ground, may result in serious impacts to the environment.

The potential pollution outputs of land application include nutrient runoff and leaching, which may cause surface water and groundwater contamination, respectively. Pollutants of concern include (1) nitrates and nitrites that originate from oxidation of nitrogen contributed by the manure, and (2) phosphorus. Groundwater contamination is caused by the nitrates leaching from the crop root zone into the groundwater aquifer. The amount of contaminated runoff depends on factors such as what type of manure is used, how it is handled, type of crop being

grown, stage of growth, weather conditions, method of application, and the amount of existing nutrients in the soil.

Overapplication or improper application of animal waste can also lead to aesthetic problems, including odors and vectors. It can also result in polluted runoff resulting in contamination of surface waters. The presence of ammonia, phosphates and organic matter in surface waters can result in increased biochemical oxygen demand and low levels of oxygen. This can cause the death of fish and other aquatic life forms. (Ohio State University, *Ohio Livestock Manure and Wastewater Guide*)

Vectors are defined as organisms that carry pathogens from one host to another, such as insects or rats/mice.

Pollution Prevention/Waste Minimization Opportunities
In addition to land application, other manure use practices include:

- Processing and recycling through ruminant feeding programs.
- Biogas production as an energy source using anaerobic digester technologies.
- Pyrolysis processes to produce electricity, chars (materials scorched, burned, or reduced to charcoal), and industrial petrochemicals.
- Microbial and algae production as an animal feed source.
- Aerobic degradation to produce composted products.

III.E. Other Management Issues

Odor Control

Odors are typically generated throughout the livestock production process. The odor from manure can vary depending on the type and consistency of the manure, how it is stored, and how and where it is applied.

Potential Pollution Outputs and Environmental Impacts
With enclosed or partially enclosed housing areas, odors and other gases (e.g., methane, ammonia, and hydrogen sulfide gases) from animal waste can be concentrated, potentially harming the health of the

animals and workers. When the gases are released outside, the odor can affect the surrounding areas and create nuisance problems for neighbors.

Pollution Prevention/Waste Minimization Techniques

There are several ways livestock facilities can reduce odors resulting from their operations and waste management practices. These include:

- *Reduce methane emissions*. One method of reducing methane emissions from livestock is to supplement the animal's diet. Scientists have found that supplementing a cow's diet with substances such as urea increases the animal's ability to digest food. With improved digestion, less fermentation takes place during digestion, and methane emissions per unit of forage have been reduced 25-75 percent. In addition, as digestion improves, productivity also improves, as dairy cows produce more milk and beef cattle fatten faster (*Information Unit on Climate Change, 1993*).

- *Follow BMPs for land application*. Odors from land application of manure can be minimized by following BMPs that are designed to maximize the nutrients available to the soil and crops. Many of these BMPs may be required by state or local ordinance. These practices include the following:

  - Spreading manure within agronomic rates.
  - When possible incorporating surface-applied manure within 24 hours.
  - Spreading early in the day as the air is warming and rising; this allows the applied waste to dry which reduces odor.
  - Avoiding spreading manure on windy days (i.e., blowing towards the neighbor).
  - Avoiding spreading manure during holidays and weekends.
  - Avoiding spreading waste near heavily traveled roads.

Managing Animal Carcasses

Dead animals should be disposed of in a way that does not adversely affect ground or surface water or create public health concerns. Composting, rendering, and other practices are common methods used to dispose of dead animals.

As with rendering plants, dead animals may be processed for use as pet food, composted, buried, or incinerated. USDA and FDA regulations prohibit the use of mortalities as feed for animals that are to be consumed by humans. *Note: State law or self-imposed industry standards may limit some of these options.* Because rendering must generally occur within 24 hours of an animal's death, it is helpful for the livestock production facility to establish rendering contacts in advance. Where this may not be possible, freezer storage could be used until such time as the rendering facility can collect the animals for processing. Some centrally located rendering facilities may provide pickup services to local livestock operations.

Animal carcass composting is another common method of handling poultry and small animal mortalities. Carcass composting typically takes more time than manure or yard waste composting, but has been shown to be an effective waste management approach. Many poultry and some swine operations use composting for carcasses. Livestock operations may use poultry compost sheds to dispose of their dead birds by mixing the dead birds with bedding and other materials.

As with manure composting, the compost process requires a carbon source to provide the proper carbon/nitrogen ratio for the necessary bacterial processes. Sawdust and straw are typically used as a carbon source due to their small particle size, ease of handling, absorbency, and high carbon content. Sawdust in excess of that required for the ideal carbon/nitrogen ratio is used in the initial stages of composting to provide adequate coverage of the carcasses. Sawdust also helps reduce odors from the composting process.

Potential Pollution Outputs and Environmental Impacts

Animal carcasses must be properly and quickly managed because they are a source of disease and can attract many vectors. Environmental impacts of carcasses depend on the management method used.

- Burial and/or pit disposal of carcasses in coarse textured soils and in areas of a high water table may contribute nutrients to groundwater.

- Animal carcasses that are disposed of above ground or insufficiently covered can cause aesthetic and potential human health impacts including odor generation and vector attraction, such as flies and mice.

- Specifically, poultry compost houses can be a potential source of pollution if not managed properly (e.g., kept at the right temperature, moisture content, etc.) because a leachate can form and leak from the compost house.

- The rendering process generates wastewater that must be managed according to the rendering facility's NPDES permit or pretreatment permit.

Pollution Prevention/Waste Utilization Techniques

There are several techniques that can be used to minimize wastes resulting from animal mortalities. As described above, rendering or composting are considered disposal methods that prevent pollution. If these are not available, burying carcasses can be another option. The impact of burying carcasses can be minimized by burying them deep below the surface of the ground, well away and downgrade from any source of drinking water, and covered with a generous supply of quicklime to reduce soil pH before fill dirt is added. If the carcasses must be disposed of onsite, it is preferable to have:

- A burial area at least 100 meters away from houses and watercourses
- The pit base at least 38 inches above the level of the watertable
- Heavy soil of low permeability and good stability
- Good access to the site for earthmoving machinery and stock transport unless the stock are to be walked in for slaughter

It is important to avoid sites sloping toward watercourses and areas that are likely to drain to surface water. Many states may have more strict statutes regulating the burial of dead animals. For example, Oregon requires that the animal carcasses be buried to such a depth that no part of them are nearer than four feet to the natural surface of the ground and they are covered with quicklime and at least four feet of soil.

The burial of dead animals is being phased out. In fact, some states prohibit the practice, except under the most extreme circumstances.

III.F. Pest Control

Within a livestock production establishment, pesticides may be used for a variety of purposes. They may be applied directly to livestock or to structures, such as barns and housing units, to control pests (e.g., parasites, vectors). Pesticides can also be used to control predators. Vectors are defined as organisms that carry pathogens from one host to another, such as insects or rats/mice.

Livestock. Commonly, pesticides are applied directly to livestock using high-pressure and low-pressure sprayers, mist application equipment (i.e., fumigation and foggers), and dipping vats. In addition, pesticides may be added to ear tags and to gates through which animals commonly pass (i.e., gate wipes/brushes). Spraying or fogging animals, especially high-pressure spraying, allows penetration into fur and wool to control lice, mange, wool maggots, and other parasites and vectors. Portable dipping vats are used for treating external parasites, especially of sheep and swine.

Structures. Pesticides may also be applied directly to or used in and around structures, such as barns or other types of housing units. Sprayers and foggers are the most commonly used methods to apply insecticides, rodenticides, and disinfectants, although other methods may be used, such as injected termite treatments, rat/mouse traps, or other types of insect traps. Such applications are used to control flies, beetles, and manure larvicides, among others.

Predators. Some livestock operations, especially sheep and goat operations, experience problems with predators. Historically, these problems have been addressed by operators through various methods to scare away potential predators. Such methods included scarecrows or bells. Recently, another method, livestock protection collars, have been developed to help combat predators. Livestock protection collars are placed around the necks of the livestock and contain a rubber bladder filled with a pesticide. When predators, primarily coyotes, attack livestock they go for the throat, puncture the bladder on the collar, and ingest the pesticide. The livestock are unhurt, but the coyotes ultimately die from the ingested pesticide.

Potential Pollution Outputs and Environmental Impacts

The potential environmental impacts from pesticide application are runoff or leaching to surface water or groundwater, spills to surface waters, potential human and animal exposure, overtolerance levels on animals and products, and soil contamination that could leave land unproductive. These environmental impacts may all occur if pesticides

are not applied in accordance with the label directions. The degree of environmental impact depends on the application method.

- The application of pesticides using spray or fogger systems is more likely to involve releases to air, which may result in human and excessive animal exposure.

- If not disposed of properly, liquids from dipping vats may contaminate both surface water and groundwater.

- If not protected with backflow prevention devices, pesticides applied through spray systems that are connected to water supplies can siphon back to the water source and potentially contaminate drinking water systems.

- In addition to runoff and leaching, spills of pesticides may also negatively impact the environment. The impacts are the same as for runoff and leaching, but may be more significant since the spilled materials will be concentrated in one specific area. Also, improperly cleaned and disposed pesticide containers may cause releases to the soil and/or surface waters.

Pesticides are both suspected and known for causing immediate and delayed-onset health hazards for humans. If exposed to pesticides, humans may experience adverse effects, such as nausea, respiratory distress, or more severe symptoms up to and including death. To help reduce this potential exposure, tolerance levels have been established for residues on agricultural products. Animals and birds impacted by pesticides can experience similar illnesses or develop other types of physical distress. Following label directions for application, protective gear, and disposal will help ensure such environmental impacts do not occur.

Pollution Prevention/Waste Minimization Opportunities

Environmental impacts from pesticides can be minimized by following the label directions and preventing or minimizing their use wherever possible. Pesticide use accounts for a substantial portion of farm production costs. By reducing their use, agricultural establishments can not only reduce production costs, but also reduce environmental impacts of their operations. Pesticide use and impact can be minimized by using general good housekeeping practices, integrated pest management, and good management practices. Examples of these are presented below.

- **Integrated Pest Management**. Integrated pest management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment. Examples of IPM in the livestock production industry could include maintaining structures (e.g., plug holes, place stripping around doors and windows), good housekeeping in barns and other structures, rodent and insect traps, and use of predators (e.g., certain insects, snakes). IPM can involve the use of pesticides. In such cases, the IPM plan should indicate when a pesticide is needed, and its selection is based on persistence, toxicity, and leaching and runoff potential such that the most environmentally friendly pesticide is used.

- **Good Management Practices**. In addition to use consistent with the label, there are other general management practices associated with pesticides that can help reduce their environmental impact. Such practices include:

  - Buy only the amount needed for a year or a growing season.
  - Minimize the amount of product kept in storage.
  - Calculate how much diluted pesticide will be needed for a job and mix only that amount.
  - Apply pesticides with properly-calibrated equipment.
  - Purchase pesticide products packaged in such a way as to minimize disposal problems.
  - Work with the state to locate a pesticide handler who can use the excess pesticide.
  - Return unused product to the dealer, formulator, or manufacturer.

- Implement setbacks from wellheads for application and storage.
- If possible, choose nonleachable pesticides labeled for the pest.

III.G. Maintaining and Repairing Agricultural Machinery and Vehicles

Day-to-day maintenance and repair activities keep agricultural machinery and vehicles safe and reliable. Maintenance activities include oil and filter changes, battery replacement, and repairs, including metal machining.

Potential Pollution Outputs and Environmental Impacts

The wastes from maintenance and repair activities can include used oil, spent fluids, spent batteries, metal machining wastes, spent organic solvents, and tires. These wastes have the potential to be released to the environment if not handled properly, stored in secure areas with secondary containment, protected from exposure to weather, and properly disposed of. If released to the environment, the impact of these releases can be contamination of surface waters, groundwater, and soils, as well as toxic releases to the atmosphere. Groundwater pollution can also result from discharges of wastes to Class V wells.

Pollution Prevention/Waste Minimization Opportunities

Preventive maintenance programs can minimize waste generation, increase equipment life, and minimize the probability of significant impacts and accidents. Where the wastes cannot be eliminated, safe handling and recycling can minimize environmental impacts. The following presents pollution prevention/waste minimization opportunities for each type of waste.

Used Oil. The impact of oil changes can be minimized by preventing releases of used oil to the environment, and recycling or reusing used oil whenever possible. Spills can be prevented by using containment around used oil containers, keeping floor drains closed when oil is being drained, and by training employees on spill prevention techniques. Oil that is contained rather than released can be recycled, thus saving money, and protecting the environment.

Recycling used oil requires equipment like a drip table with a used oil collection bucket to collect oil dripping from parts. Drip pans can be placed under machinery and vehicles awaiting repairs to capture any

leaking fluids. By using catch pans or buckets, rather than absorbent materials to contain leaks or spills of used oil, the used oil can be more easily recycled. To encourage recycling, the publication "How To Set Up A Local Program To Recycle Used Oil" is available at no cost from the RCRA/Superfund Hotline at 1-800-424-9346 or 1-703-412-9810.

Proper Disposal of Oil-Based Fluids. Spent petroleum-based fluids and solids should be sent to a recycling center whenever possible. Solvents that are hazardous waste must not be mixed with used oil or, under RCRA regulations, the entire mixture may be considered hazardous waste. Non-listed hazardous wastes can be mixed with waste oil, and as long as the resulting mixture is not hazardous, can be handled as waste oil. All used drip pans and containers should be properly labeled.

Spent Fluids. Farm machinery and vehicles require regular changing of fluids, including oil, coolant, and others. To minimize releases to the environment, these fluids should be drained and replaced in areas where there are no connections to storm drains or municipal sewers. Minor spills should be cleaned up prior to reaching drains. Used fluid should be collected and stored in separate containers. Fluids can often be recycled. For example, brake fluid, transmission fluid, and gear oil are recyclable. Some liquids are able to be legally mixed with used motor oil which, in turn, can be reclaimed.

During the process of engine maintenance, spills of fluids are likely to occur. The "dry shop" principle encourages spills to be cleaned immediately so that spilled fluid will not evaporate to air, be transported to soil, or be discharged to waterways or sewers. The following techniques help prevent and minimize the impact of spills:

- Collect leaking or dripping fluids in designated drip pans or containers. Keep all fluids separated so they may be properly recycled.
- Keep a designated drip pan under the vehicle while unclipping hoses, unscrewing filters, or removing other parts. The drip pan prevents splattering of fluids and keeps chemicals from penetrating the shop floor or outside area where the maintenance is occurring.
- Immediately transfer used fluids to proper containers. Never leave drip pans or other open containers unattended.

Radiator fluids are often acceptable to antifreeze recyclers. This includes fluids used to flush out radiators during cleaning. Reusing the flushing fluid minimizes waste discharges. If a licensed recycler does not accept the spent flushing fluids, consider changing to another brand of fluid that can be recycled.

Batteries. Farm operators have three options for managing used batteries: recycling through a supplier, recycling directly though a battery reclamation facility, or direct disposal. Most suppliers now accept spent batteries at the time of new battery purchase. While some waste batteries must be handled as hazardous waste, lead acid batteries are not considered hazardous waste as long as they are recycled. In general, recycling batteries may reduce the amount of hazardous waste stored at a farm, and thus reduce the farm's responsibilities under RCRA.

The following best management practices are recommended to prevent used batteries from impacting the environment prior to disposal:

- Place on pallets and label by battery type (e.g., lead-acid, nickel, and cadmium).
- Protect them from the weather with a tarp, roof, or other means.
- Store them on an open rack or in a watertight secondary containment unit to prevent leaks.
- Inspect them for cracks and leaks as they come to the farm. If a battery is dropped, treat it as if it is cracked. Acid residue from cracked or leaking batteries is likely to be hazardous waste under RCRA because it is likely to demonstrate the characteristic of corrosivity, and may contain lead and other metals.
- Neutralize acid spills and dispose of the resulting waste as hazardous if it still exhibits a characteristic of a hazardous waste.
- Avoid skin contact with leaking or damaged batteries.

Machine Shop Wastes. The major hazardous wastes from metal machining are waste cutting oils, spent machine coolant, and degreasing solvents. Scrap metal can also be a component of

hazardous waste produced at a machine shop. Material substitution and recycling are the two best means to reduce the volume of these wastes.

The preferred method of reducing the amount of waste cutting oils and degreasing solvents is to substitute with water-soluble cutting oils. If non-water-soluble oils must be used, recycling waste cutting oil reduces the potential environmental impact. Machine coolant can be recycled, either by an outside recycler, or through a number of in-house systems. Coolant recycling is most easily implemented when a standardized type of coolant is used throughout the shop. Reuse and recycling of solvents also is easily achieved, although it is generally done by a permitted recycler. Most shops collect scrap metals from machining operations and sell these to metal recyclers. Metal chips which have been removed from the coolant by filtration can be included in the scrap metal collection. Wastes should be carefully segregated to facilitate reuse and recycling.

III.H. Fuel Use and Fueling Activities

Fuel is used to operate agricultural machinery, equipment, and vehicles that are used throughout the livestock operation. Agricultural machinery and vehicles are typically fueled using an above ground fueling dispenser that is connected to an above ground or underground fuel tank.

Potential Pollution Outputs and Environmental Impacts

Agricultural machinery and vehicles that use fuel most likely emit pollutants to the atmosphere. The activity of fueling itself can emit air pollutants, and spills of fuel can cause water, soil and groundwater contamination. Underground fueling systems that are not monitored or maintained properly can leak into the surrounding soils and eventually contaminate groundwater.

Pollution Prevention/Waste Minimization Opportunities

Properly maintaining fuel tanks, lines, and fueling systems can substantially reduce the probability of accidental fuel spills or leaks. All leaking pipe joints, nozzle connections, and any damage to the fueling hose (e.g., kinks, crushing, breaks in the carcass, bulges, blistering, soft spots at the coupling, deep cracks or cuts, spots wet with fuel, or excessive wear) should be fixed immediately to reduce the amount of pollution to the environment. Spill and overflow protection devices can be installed to prevent fuel spills and secondary

containment can be used to contain spills or leaks. Additional pollution prevention techniques for fueling include the following:

- Inspect fueling equipment daily to ensure that all components are in satisfactory condition. While refueling, check for leaks.
- If refueling occurs at night, make sure it is carried out in a well-lighted area.
- Never refuel during maintenance as it might provide a source of ignition to fuel vapors.
- Do not leave a fuel nozzle unattended during fueling or wedge or tie the nozzle trigger in the open position.
- Discourage topping off of fuel tanks.

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IV. SUMMARY OF APPLICABLE FEDERAL STATUTES AND REGULATIONS

This section discusses the federal regulations that may apply to this sector. The purpose of this section is to highlight and briefly describe the applicable federal requirements, and to provide citations for more detailed information. The three following sections are included:

- Section IV.A contains a general overview of major statutes
- Section IV.B contains a list of regulations specific to this industry
- Section IV.C contains a list of pending and proposed regulatory requirements.

The descriptions within Section IV are intended solely for general information. Depending upon the nature or scope of the activities at a particular facility, these summaries may or may not necessarily describe all applicable environmental requirements. Moreover, they do not constitute formal interpretations or clarifications of the statutes and regulations. For further information, readers should consult the Code of Federal Regulations and other state or local regulatory agencies. EPA Hotline contacts are also provided for each major statute. For specific agricultural information, contact The National Agricultural Compliance Assistance Center at (888) 663-2155 or visit the website at http://www.epa.gov/agriculture.

IV.A. General Description of Major Statutes

Clean Water Act

The primary objective of the Federal Water Pollution Control Act Amendments of 1972, commonly referred to as the Clean Water Act (CWA), is to restore and maintain the chemical, physical, and biological integrity of the nation's surface waters. Pollutants regulated under the CWA are classified as either "toxic" pollutants; "conventional" pollutants, such as biochemical oxygen demand (BOD), total suspended solids (TSS), fecal coliform, oil and grease, and pH; or "non-conventional" pollutants, including any pollutant not identified as either conventional or priority.

The CWA regulates both direct and "indirect" dischargers (those who discharge to publicly owned treatment works). The National Pollutant Discharge Elimination System (NPDES) permitting program (CWA §402) controls direct discharges into navigable waters. Direct discharges or "point source" discharges are from sources such as pipes and sewers. NPDES permits, issued by either EPA or an authorized state (EPA has authorized 43 states and 1 territory to administer the NPDES program), contain industry-specific, technology-based water quality limits and

establish pollutant monitoring and reporting requirements. A facility that proposes to discharge into the nation's waters must obtain a permit prior to initiating a discharge. A permit applicant must provide quantitative analytical data identifying the types of pollutants present in the facility's effluent. The permit will then set forth the conditions and effluent limitations under which a facility may make a discharge.

Water quality-based discharge limits are based on federal or state water quality criteria or standards, that were designed to protect designated uses of surface waters, such as supporting aquatic life or recreation. These standards, unlike the technology-based standards, generally do not take into account technological feasibility or costs. Water quality criteria and standards vary from state to state, and site to site, depending on the use classification of the receiving body of water. Most states follow EPA guidelines which propose aquatic life and human health criteria for many of the 126 priority pollutants.

Storm Water Discharges

In 1987 the CWA was amended to require EPA to establish a program to address storm water discharges. In response, EPA promulgated NPDES permitting regulations for storm water discharges. These regulations require that facilities with the following types of storm water discharges, among others, apply for an NPDES permit: (1) a discharge associated with industrial activity; (2) a discharge from a large or medium municipal storm sewer system; or (3) a discharge which EPA or the state determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

The term "storm water discharge associated with industrial activity" means a storm water discharge from one of 11 categories of industrial activity defined at 40 CFR §122.26. Six of the categories are defined by SIC codes while the other five are identified through narrative descriptions of the regulated industrial activity. If the primary SIC code of the facility is one of those identified in the regulations, the facility is subject to the storm water permit application requirements. If any activity at a facility is covered by one of the five narrative categories, storm water discharges from those areas where the activities occur are subject to storm water discharge permit application requirements.

Those facilities/activities that are subject to storm water discharge permit application requirements are identified below. To determine whether a particular facility falls within one of these categories, the regulation should be consulted.

Category i: Facilities subject to storm water effluent guidelines, new source performance standards, or toxic pollutant effluent standards.

Category ii: Facilities classified as SIC 24-lumber and wood products (except wood kitchen cabinets); SIC 26-paper and allied products (except paperboard containers and products); SIC 28-chemicals and allied products (except drugs and paints); SIC 29-petroleum refining; SIC 311-leather tanning and finishing; SIC 32 (except 323)-stone, clay, glass, and concrete; SIC 33-primary metals; SIC 3441-fabricated structural metal; and SIC 373-ship and boat building and repairing.

Category iii: Facilities classified as SIC 10-metal mining; SIC 12-coal mining; SIC 13-oil and gas extraction; and SIC 14-nonmetallic mineral mining.

Category iv: Hazardous waste treatment, storage, or disposal facilities.

Category v: Landfills, land application sites, and open dumps that receive or have received industrial wastes.

Category vi: Facilities classified as SIC 5015-used motor vehicle parts; and SIC 5093-automotive scrap and waste material recycling facilities.

Category vii: Steam electric power generating facilities.

Category viii: Facilities classified as SIC 40-railroad transportation; SIC 41-local passenger transportation; SIC 42-trucking and warehousing (except public warehousing and storage); SIC 43-U.S. Postal Service; SIC 44-water transportation; SIC 45-transportation by air; and SIC 5171-petroleum bulk storage stations and terminals.

Category ix: Sewage treatment works.

Category x: Construction activities except operations that result in the disturbance of less than five acres of total land area.

Category xi: Facilities classified as SIC 20-food and kindred products; SIC 21-tobacco products; SIC 22-textile mill products; SIC 23-apparel related products; SIC 2434-wood kitchen cabinets manufacturing; SIC 25-furniture and fixtures; SIC 265-paperboard containers and boxes; SIC 267-converted paper and paperboard products; SIC 27-printing, publishing, and allied industries; SIC 283-drugs; SIC 285-paints, varnishes, lacquer, enamels, and allied products; SIC 30-rubber and plastics; SIC 31-leather and leather products (except leather and tanning and finishing); SIC 323-glass products; SIC 34-fabricated metal products (except fabricated structural metal); SIC 35-industrial and commercial machinery

and computer equipment; SIC 36-electronic and other electrical equipment and components; SIC 37-transportation equipment (except ship and boat building and repairing); SIC 38-measuring, analyzing, and controlling instruments; SIC 39-miscellaneous manufacturing industries; and SIC 4221-4225-public warehousing and storage.

Pretreatment Program

Another type of discharge that is regulated by the CWA is one that goes to a publicly owned treatment works (POTW). The national pretreatment program (CWA § 307(b)) controls the indirect discharge of pollutants to POTWs by "industrial users." Facilities regulated under §307(b) must meet certain pretreatment standards. The goal of the pretreatment program is to protect municipal wastewater treatment plants from damage that may occur when hazardous, toxic, or other wastes are discharged into a sewer system and to protect the quality of sludge generated by these plants.

EPA has developed technology-based standards for industrial users of POTWs. Different standards apply to existing and new sources within each category. "Categorical" pretreatment standards applicable to an industry on a nationwide basis are developed by EPA. In addition, another kind of pretreatment standard, "local limits," are developed by the POTW in order to assist the POTW in achieving the effluent limitations in its NPDES permit.

Regardless of whether a state is authorized to implement either the NPDES or the pretreatment program, if it develops its own program, it may enforce requirements more stringent than federal standards.

Wetlands

Wetlands, commonly called swamps, marshes, fens, bogs, vernal pools, playas, and prairie potholes, are a subset of "waters of the United States," as defined in Section 404 of the CWA. The placement of dredge and fill material into wetlands and other water bodies (i.e., waters of the United States) is regulated by the U.S. Army Corps of Engineers (Corps) under 33 CFR Part 328. The Corps regulates wetlands by administering the CWA Section 404 permit program for activities that impact wetlands. EPA's authority under Section 404 includes veto power of Corps permits, authority to interpret statutory exemptions and jurisdiction, enforcement actions, and delegating the Section 404 program to the states.

EPA's Office of Water, at (202) 260-5700, will direct callers with questions about the CWA to the appropriate EPA office. EPA also maintains a bibliographic database of Office of Water publications which can be accessed

through the Ground Water and Drinking Water resource center, at (202) 260-7786.

Oil Pollution Prevention Regulation

Section 311(b) of the CWA prohibits the discharge of oil, in such quantities as may be harmful, into the navigable waters of the United States and adjoining shorelines. The EPA Discharge of Oil regulation, 40 CFR Part 110, provides information regarding these discharges. The Oil Pollution Prevention regulation, 40 CFR Part 112, under the authority of Section 311(j) of the CWA, requires regulated facilities to prepare and implement Spill Prevention Control and Countermeasure (SPCC) plans. The intent of a SPCC plan is to prevent the discharge of oil from onshore and offshore non-transportation-related facilities. In 1990 Congress passed the Oil Pollution Act which amended Section 311(j) of the CWA to require facilities that because of their location could reasonably be expected to cause "substantial harm" to the environment by a discharge of oil to develop and implement Facility Response Plans (FRP). The intent of a FRP is to provide for planned responses to discharges of oil.

A facility is SPCC-regulated if the facility, due to its location, could reasonably be expected to discharge oil into or upon the navigable waters of the United Stated or adjoining shorelines, and the facility meets one of the following criteria regarding oil storage: (1) the capacity of any aboveground storage tank exceeds 660 gallons, or (2) the total aboveground storage capacity exceeds 1,320 gallons, or (3) the underground storage capacity exceeds 42,000 gallons. 40 CFR § 112.7 contains the format and content requirements for a SPCC plan. In New Jersey, SPCC plans can be combined with DPCC plans, required by the state, provided there is an appropriate cross-reference index to the requirements of both regulations at the front of the plan.

According to the FRP regulation, a facility can cause "substantial harm" if it meets one of the following criteria: (1) the facility has a total oil storage capacity greater than or equal to 42,000 gallons and transfers oil over water to or from vessels; or (2) the facility has a total oil storage capacity greater than or equal to 1 million gallons and meets any one of the following conditions: (i) does not have adequate secondary containment, (ii) a discharge could cause "injury" to fish and wildlife and sensitive environments, (iii) shut down a public drinking water intake, or (iv) has had a reportable oil spill greater than or equal to 10,000 gallons in the past 5 years. Appendix F of 40 CFR Part 112 contains the format and content requirements for a FRP. FRPs that meet EPA's requirements can be combined with U.S. Coast Guard FRPs or other contingency plans, provided there is an appropriate cross-reference index to the requirements of all applicable regulations at the front of the plan.

For additional information regarding SPCC plans, contact EPA's RCRA, Superfund, and EPCRA Hotline, at (800) 424-9346. Additional documents and resources can be obtained from the hotline's homepage at www.epa.gov/epaoswer/hotline. The hotline operates weekdays from 9:00 a.m. to 6:00 p.m., EST, excluding federal holidays.

Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) encourages states/tribes to preserve, protect, develop, and where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife using those habitats. It includes areas bordering the Atlantic, Pacific, and Arctic Oceans, Gulf of Mexico, Long Island Sound, and Great Lakes. A unique feature of this law is that participation by states/tribes is voluntary.

In the Coastal Zone Management Act Reauthorization Amendments (CZARA) of 1990, Congress identified nonpoint source pollution as a major factor in the continuing degradation of coastal waters. Congress also recognized that effective solutions to nonpoint source pollution could be implemented at the state/tribe and local levels. In CZARA, Congress added Section 6217 (16 U.S.C. § 1455b), which calls upon states/tribes with federally-approved coastal zone management programs to develop and implement coastal nonpoint pollution control programs. The Section 6217 program is administered at the federal level jointly by EPA and the National Oceanic and Atmospheric Agency (NOAA).

Section 6217(g) called for EPA, in consultation with other agencies, to develop guidance on "management measures" for sources of nonpoint source pollution in coastal waters. Under Section 6217, EPA is responsible for developing technical guidance to assist states/tribes in designing coastal nonpoint pollution control programs. On January 19, 1993, EPA issued its *Guidance Specifying Management Measures For Sources of Nonpoint Pollution in Coastal Waters*, which addresses five major source categories of nonpoint pollution: (1) urban runoff, (2) agriculture runoff, (3) forestry runoff, (4) marinas and recreational boating, and (5) hydromodification.

Additional information on coastal zone management may be obtained from EPA's Office of Wetlands, Oceans, and Watersheds at http://www.epa.gov/owow or from the Watershed Information Network at http://www.epa.gov/win. The NOAA website at http://www.nos.noaa.gov/ocrm/czm/ also contains additional information on coastal zone management.

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) mandates that EPA establish regulations to protect human health from contaminants in drinking water. The law authorizes EPA to develop national drinking water standards and to create a joint federal-state system to ensure compliance with these standards. The SDWA also directs EPA to protect underground sources of drinking water through the control of underground injection of fluid wastes.

EPA has developed primary and secondary drinking water standards under its SDWA authority. EPA and authorized states enforce the primary drinking water standards, which are, contaminant-specific concentration limits that apply to certain public drinking water supplies. Primary drinking water standards consist of maximum contaminant level goals (MCLGs), which are non-enforceable health-based goals, and maximum contaminant levels (MCLs), which are enforceable limits set generally as close to MCLGs as possible, considering cost and feasibility of attainment.

The SDWA Underground Injection Control (UIC) program (40 CFR Parts 144-148) is a permit program which protects underground sources of drinking water by regulating five classes of injection wells. UIC permits include design, operating, inspection, and monitoring requirements. Wells used to inject hazardous wastes must also comply with RCRA corrective action standards in order to be granted a RCRA permit, and must meet applicable RCRA land disposal restrictions standards. The UIC permit program is often state/tribe-enforced, since EPA has authorized many states/tribes to administer the program. Currently, EPA shares the UIC permit program responsibility in seven states and completely runs the program in 10 states and on all tribal lands.

The SDWA also provides for a federally-implemented Sole Source Aquifer program, which prohibits federal funds from being expended on projects that may contaminate the sole or principal source of drinking water for a given area, and for a state-implemented Wellhead Protection program, designed to protect drinking water wells and drinking water recharge areas.

The SDWA Amendments of 1996 require states to develop and implement source water assessment programs (SWAPs) to analyze existing and potential threats to the quality of the public drinking water throughout the state. Every state is required to submit a program to EPA and to complete all assessments within 3 ½ years of EPA approval of the program. SWAPs include: (1) delineating the source water protection area, (2) conducting a contaminant source inventory, (3) determining the susceptibility of the public water supply to

contamination from the inventories sources, and (4) releasing the results of the assessments to the public.

EPA's Safe Drinking Water Hotline, at (800) 426-4791, answers questions and distributes guidance pertaining to SDWA standards. The Hotline operates from 9:00 a.m. through 5:30 p.m., EST, excluding federal holidays. Visit the website at www.epa.gov/ogwdw for additional material.

Resource Conservation and Recovery Act

The Solid Waste Disposal Act (SWDA), as amended by the Resource Conservation and Recovery Act (RCRA) of 1976, addresses solid and hazardous waste management activities. The Act is commonly referred to as RCRA. The Hazardous and Solid Waste Amendments (HSWA) of 1984 strengthened RCRA's waste management provisions and added Subtitle I, which governs underground storage tanks (USTs).

Regulations promulgated pursuant to Subtitle C of RCRA (40 CFR Parts 260-299) establish a "cradle-to-grave" system governing hazardous waste from the point of generation to disposal. RCRA hazardous wastes include the specific materials listed in the regulations (discarded commercial chemical products, designated with the code "P" or "U"; hazardous wastes from specific industries/sources, designated with the code "K"; or hazardous wastes from non-specific sources, designated with the code "F") or materials which exhibit a hazardous waste characteristic (ignitability, corrosivity, reactivity, or toxicity and designated with the code "D").

Entities that generate hazardous waste are subject to waste accumulation, manifesting, and recordkeeping standards. A hazardous waste facility may accumulate hazardous waste for up to 90 days (or 180 days depending on the amount generated per month) without a permit or interim status. Generators may also treat hazardous waste in accumulation tanks or containers (in accordance with the requirements of 40 CFR 262.34) without a permit or interim status.

Facilities that treat, store, or dispose of hazardous waste are generally required to obtain a RCRA permit. Subtitle C permits for treatment, storage, or disposal facilities contain general facility standards such as contingency plans, emergency procedures, recordkeeping and reporting requirements, financial assurance mechanisms, and unit-specific standards. RCRA also contains provisions (40 CFR Subparts I and S) for conducting corrective actions which govern the cleanup of releases of hazardous waste or constituents from solid waste management units at RCRA treatment, storage, or disposal facilities.

Although RCRA is a federal statute, many states implement the RCRA program. Currently, EPA has delegated its authority to implement various provisions of RCRA to 47 of the 50 states and two U.S. territories. Delegation has not been given to Alaska, Hawaii, or Iowa.

Most RCRA requirements are not industry specific but apply to any company that generates, transports, treats, stores, or disposes of hazardous waste. Here are some important RCRA regulatory requirements:

- **Criteria for Classification of Solid Waste Disposal Facilities and Practices** (40 CFR Part 257) establishes the criteria for determining which solid waste disposal facilities and practices pose a reasonable probability of adverse effects on health or the environment. The criteria were adopted to ensure non-municipal, non-hazardous waste disposal units that receive conditionally exempt small quantity generator waste do not present risks to human health and environment.

- **Criteria for Municipal Solid Waste Landfills** (40 CFR Part 258) establishes minimum national criteria for all municipal solid waste landfill units, including those that are used to dispose of sewage sludge.

- **Identification of Solid and Hazardous Wastes** (40 CFR Part 261) establishes the standard to determine whether the material in question is considered a solid waste and, if so, whether it is a hazardous waste or is exempted from regulation.

- **Standards for Generators of Hazardous Waste** (40 CFR Part 262) establishes the responsibilities of hazardous waste generators including obtaining an EPA ID number, preparing a manifest, ensuring proper packaging and labeling, meeting standards for waste accumulation units, and recordkeeping and reporting requirements. Generators can accumulate hazardous waste on-site for up to 90 days (or 180 days depending on the amount of waste generated) without obtaining a permit.

- **Land Disposal Restrictions** (LDRs) (40 CFR Part 268) are regulations prohibiting the disposal of hazardous waste on land without prior treatment. Under the LDRs program, materials must meet treatment standards prior to placement in a RCRA land disposal unit (landfill, land treatment unit, waste pile, or surface impoundment). Generators of waste subject to the LDRs must provide notification of such to the designated TSD facility to ensure proper treatment prior to disposal.

- **Used Oil Management Standards** (40 CFR Part 279) impose management requirements affecting the storage, transportation, burning, processing, and re-refining of the used oil. For parties that merely generate used oil, regulations establish storage standards. For a party considered a used oil processor, re-refiner, burner, or marketer (one who generates and sells off-specification used oil directly to a used oil burner), additional tracking and paperwork requirements must be satisfied.

- RCRA contains unit-specific standards for all units used to store, treat, or dispose of hazardous waste, including **Tanks and Containers**. Tanks and containers used to store hazardous waste with a high volatile organic concentration must meet emission standards under RCRA. Regulations (40 CFR Part 264-265, Subpart CC) require generators to test the waste to determine the concentration of the waste, to satisfy tank and container emissions standards, and to inspect and monitor regulated units. These regulations apply to all facilities who store such waste, including large quantity generators accumulating waste prior to shipment offsite.

- **Underground Storage Tanks** (USTs) containing petroleum and hazardous substances are regulated under Subtitle I of RCRA. Subtitle I regulations (40 CFR Part 280) contain tank design and release detection requirements, as well as financial responsibility and corrective action standards for USTs. The UST program also includes upgrade requirements for existing tanks that were to be met by December 22, 1998.

- **Boilers and Industrial Furnaces** (BIFs) that use or burn fuel containing hazardous waste must comply with design and operating standards. BIF regulations (40 CFR Part 266, Subpart H) address unit design, provide performance standards, require emissions monitoring, and, in some cases, restrict the type of waste that may be burned.

  EPA's RCRA, Superfund, and EPCRA Hotline, at (800) 424-9346, responds to questions and distributes guidance regarding all RCRA regulations. Additional documents and resources can be obtained from the hotline's homepage at www.epa.gov/epaoswer/hotline. The RCRA Hotline operates weekdays from 9:00 a.m. to 6:00 p.m., EST, excluding federal holidays.

Comprehensive Environmental Response, Compensation, And Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), a 1980 law commonly known as Superfund, authorizes EPA to respond to releases, or threatened releases, of hazardous substances that may endanger public health, welfare, or the environment. CERCLA also enables EPA to force parties responsible for environmental contamination to clean it up or to reimburse the Superfund for response or remediation costs incurred by EPA. The Superfund Amendments and Reauthorization Act (SARA) of 1986 revised various sections of CERCLA, extended the taxing authority for the Superfund, and created a free-standing law, SARA Title III, also known as the Emergency Planning and Community Right-to-Know Act (EPCRA).

The CERCLA hazardous substance release reporting regulations (40 CFR Part 302) direct the person in charge of a facility to report to the National Response Center (NRC) any environmental release of a hazardous substance which equals or exceeds a reportable quantity. Reportable quantities are listed in 40 CFR §302.4. A release report may trigger a response by EPA, or by one or more federal or state emergency response authorities.

EPA implements hazardous substance responses according to procedures outlined in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Part 300). The NCP includes provisions for cleanups. The National Priorities List (NPL) currently includes approximately 1,300 sites. Both EPA and states can act at other sites; however, EPA provides responsible parties the opportunity to conduct cleanups and encourages community involvement throughout the Superfund response process.

EPA's RCRA, Superfund and EPCRA Hotline, at (800) 424-9346, answers questions and references guidance pertaining to the Superfund program. Documents and resources can be obtained from the hotline's homepage at www.epa.gov/epaoswer/hotline. The Superfund Hotline operates weekdays from 9:00 a.m. to 6:00 p.m., EST, excluding federal holidays.

Emergency Planning And Community Right-To-Know Act

The Superfund Amendments and Reauthorization Act (SARA) of 1986 created the Emergency Planning and Community Right-to-Know Act (EPCRA, also known as SARA Title III), a statute designed to improve community access to information about chemical hazards and to facilitate the development of chemical emergency response plans by state and local governments. Under EPCRA, states establish State Emergency Response Commissions (SERCs), responsible for coordinating

certain emergency response activities and for appointing Local Emergency Planning Committees (LEPCs).

EPCRA and the EPCRA regulations (40 CFR Parts 350-372) establish four types of reporting obligations for facilities which store or manage specified chemicals:

- **EPCRA § 302** requires facilities to notify the SERC and LEPC of the presence of any extremely hazardous substance at the facility in an amount in excess of the established threshold planning quantity. The list of extremely hazardous substances and their threshold planning quantities is found at 40 CFR Part 355, Appendices A and B.

- **EPCRA § 303** requires that each LEPC develop an emergency plan. The plan must contain (but is not limited to) the identification of facilities within the planning district, likely routes for transporting extremely hazardous substances, a description of the methods and procedures to be followed by facility owners and operators, and the designation of community and facility emergency response coordinators.

- **EPCRA § 304** requires the facility to notify the SERC and the LEPC in the event of a release exceeding the reportable quantity of a CERCLA hazardous substance (defined at 40 CFR 302) or an EPCRA extremely hazardous substance.

- **EPCRA § 311 and § 312** requires a facility at which a hazardous chemical, as defined by the Occupational Safety and Health Act, is present in an amount exceeding a specified threshold to submit to the SERC, LEPC and local fire department material safety data sheets (MSDSs) or lists of MSDSs and hazardous chemical inventory forms (also known as Tier I and II forms). This information helps the local government respond in the event of a spill or release of the chemical.

- **EPCRA § 313** requires certain covered facilities, including SIC codes 20 through 39 and others, which have ten or more employees, and which manufacture, process, or use specified chemicals in amounts greater than threshold quantities, to submit an annual toxic chemical release report. This report, commonly known as the Form R, covers releases and transfers of toxic chemicals to various facilities and environmental media. EPA maintains the data reported in a publically accessible database known as the Toxics Release Inventory (TRI).

All information submitted pursuant to EPCRA regulations is publicly accessible, unless protected by a trade secret claim.

EPA's RCRA, Superfund and EPCRA Hotline, at (800) 535-0202, answers questions and distributes guidance regarding the emergency planning and community right-to-know regulations. Documents and resources can be obtained from the hotline's homepage at http://www.epa.gov/epaoswer/hotline. The EPCRA Hotline operates weekdays from 9:00 a.m. to 6:00 p.m., EST, excluding federal holidays.

Clean Air Act

The Clean Air Act (CAA) and its amendments are designed to "protect and enhance the nation's air resources so as to promote the public health and welfare and the productive capacity of the population." The CAA consists of six sections, known as Titles, which direct EPA to establish national standards for ambient air quality and for EPA and the states to implement, maintain, and enforce these standards through a variety of mechanisms. Under the CAA, many facilities are required to obtain operating permits that consolidate their air emission requirements. State and local governments oversee, manage, and enforce many of the requirements of the CAA. CAA regulations appear at 40 CFR Parts 50-99.

Pursuant to Title I of the CAA, EPA has established national ambient air quality standards (NAAQSs) to limit levels of "criteria pollutants," including carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone and sulfur dioxide. Geographic areas that meet NAAQSs for a given pollutant are designated as attainment areas; those that do not meet NAAQSs are designated as non-attainment areas. Under §110 and other provisions of the CAA, each state must develop a State Implementation Plan (SIP) to identify sources of air pollution and to determine what reductions are required to meet federal air quality standards. Revised NAAQSs for particulates and ozone were proposed in 1996 and will become effective in 2001.

Title I also authorizes EPA to establish New Source Performance Standards (NSPS), which are nationally uniform emission standards for new and modified stationary sources falling within particular industrial categories. The NSPSs are based on the pollution control technology available to that category of industrial source (*see* 40 CFR Part 60).

Under Title I, EPA establishes and enforces National Emission Standards for Hazardous Air Pollutants (NESHAPs), nationally uniform standards oriented toward controlling specific hazardous air pollutants (HAPs). Section 112(c) of the CAA further directs EPA to develop a list of sources that emit any of 188 HAPs, and to develop regulations for these categories of sources. To date EPA has listed 185 source categories and developed a schedule for the establishment of emission standards. The emission standards are being developed for both new and existing

sources based on "maximum achievable control technology" (MACT). The MACT is defined as the control technology achieving the maximum degree of reduction in the emission of the HAPs, taking into account cost and other factors.

Title II of the CAA pertains to mobile sources, such as cars, trucks, buses, and planes. Reformulated gasoline, automobile pollution control devices, and vapor recovery nozzles on gas pumps are a few of the mechanisms EPA uses to regulate mobile air emission sources.

Title IV-A establishes a sulfur dioxide and nitrogen oxides emissions program designed to reduce the formation of acid rain. Reduction of sulfur dioxide releases will be obtained by granting to certain sources limited emissions allowances that are set below previous levels of sulfur dioxide releases.

Title V of the CAA establishes an operating permit program for all "major sources" (and certain other sources) regulated under the CAA. One purpose of the operating permit is to include in a single document all air emissions requirements that apply to a given facility. States have developed the permit programs in accordance with guidance and regulations from EPA. Once a state program is approved by EPA, permits are issued and monitored by that state.

Title VI is intended to protect stratospheric ozone by phasing out the manufacture of ozone-depleting chemicals and restricting their use and distribution. Production of Class I substances, including 15 kinds of chlorofluorocarbons (CFCs), were phased out (except for essential uses) in 1996. Methyl bromide, a common pesticide, has been identified as a significant stratospheric ozone depleting chemical. The production and importation of methyl bromide, therefore, is currently being phased out in the United States and internationally. As specified in the Federal Register of June 1, 1999 (Volume 64, Number 104) and in 40 CFR Part 82, methyl bromide production and importation will be reduced from 1991 levels by 25 percent in 1999, by 50 percent in 2001, by 70 percent in 2003, and completely phased out by 2005. Some uses of methyl bromide such as the production, importation, and consumption of methyl bromide to fumigate commodities entering or leaving the United States or any state (or political subdivision thereof) for purposes of compliance with Animal and Plant Health Inspection Service requirements or with any international, federal, state, or local sanitation or food protection standard, will be exempt from this rule. After 2005, exceptions may also be made for critical agricultural uses. The United States EPA and the United Nations Environment Programme have identified alternatives to using methyl bromide in agriculture. Information on the methyl bromide phase-out, including alternative, can be found at the EPA Methyl Bromide Phase-Out Website: (http://www.epa.gov/docs/ozone/mbr/mbrqa.html).

EPA's Clean Air Technology Center, at (919) 541-0800 and at the Center's homepage at http://www.epa.gov/ttn/catc, provides general assistance and information on CAA standards. The Stratospheric Ozone Information Hotline, at (800) 296-1996 and at http://www.epa.gov/ozone, provides general information about regulations promulgated under Title VI of the CAA; EPA's EPCRA Hotline, at (800) 535-0202 and at http://www.epa.gov/epaoswer/hotline, answers questions about accidental release prevention under CAA §112(r); and information on air toxics can be accessed through the Unified Air Toxics website at http://www.epa.gov/ttn/uatw. In addition, the Clean Air Technology Center's website includes recent CAA rules, EPA guidance documents, and updates of EPA activities.

Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) was first passed in 1947, and amended numerous times, most recently by the Food Quality Protection Act (FQPA) of 1996. FIFRA provides EPA with the authority to oversee, among other things, the registration, distribution, sale and use of pesticides. The Act applies to all types of pesticides, including insecticides, herbicides, fungicides, rodenticides and antimicrobials. FIFRA covers both intrastate and interstate commerce.

Establishment Registration

Section 7 of FIFRA requires that establishments producing pesticides, or active ingredients used in producing a pesticide subject to FIFRA, register with EPA. Registered establishments must report the types and amounts of pesticides and active ingredients they produce. The Act also provides EPA inspection authority and enforcement authority for facilities/persons that are not in compliance with FIFRA.

Product Registration

Under §3 of FIFRA, all pesticides (with few exceptions) sold or distributed in the United States must be registered by EPA. Pesticide registration is very specific and generally allows use of the product only as specified on the label. Each registration specifies the use site, i.e., where the product may be used, and the amount that may be applied. The person who seeks to register the pesticide must file an application for registration. The application process often requires either the citation or submission of extensive environmental, health or safety data.

To register a pesticide, the EPA Administrator must make a number of findings, one of which is that the pesticide, when used in accordance with widespread and

commonly recognized practice, will not generally cause unreasonable adverse effects on the environment.

FIFRA defines "unreasonable adverse effects on the environment" as "(1) any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of the pesticide, or (2) a human dietary risk from residues that result from a use of a pesticide in or on any food inconsistent with the standard under §408 of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 346a)."

Under FIFRA § 6(a)(2), after a pesticide is registered, the registrant must also notify EPA of any additional facts and information concerning unreasonable adverse environmental effects of the pesticide. Also, if EPA determines that additional data are needed to support a registered pesticide, registrants may be requested to provide additional data. If EPA determines that the registrant(s) did not comply with their request for more information, the registration can be suspended under FIFRA § 3(c)(2)(B) and § 4.

Use Restrictions

As a part of the pesticide registration, EPA must classify the product for general use, restricted use, or general for some uses and restricted for others (Miller, 1993). For pesticides that may cause unreasonable adverse effects on the environment, including injury to the applicator, EPA may require that the pesticide be applied either by or under the direct supervision of a certified applicator.

Reregistration

Due to concerns that much of the safety data underlying pesticide registrations becomes outdated and inadequate, in addition to providing that registrations be reviewed every 15 years, FIFRA requires EPA to reregister all pesticides that were registered prior to 1984 (§ 4). After reviewing existing data, EPA may approve the reregistration, request additional data to support the registration, cancel, or suspend the pesticide.

Tolerances and Exemptions

A tolerance is the maximum amount of pesticide residue that can be on a raw product and still be considered safe. Before EPA can register a pesticide that is used on raw agricultural products, it must grant a tolerance or exemption from a tolerance (40 CFR.163.10 through 163.12). Under the Federal Food, Drug, and Cosmetic Act (FFDCA), a raw agricultural product is deemed unsafe if it contains a pesticide residue, unless the residue is within the limits of a tolerance established by EPA or is exempt from the requirement.

Cancellation and Suspension

EPA can cancel a registration if it is determined that the pesticide or its labeling does not comply with the requirements of FIFRA or causes unreasonable adverse effects on the environment (Haugrud, 1993).

In cases where EPA believes that an "imminent hazard" would exist if a pesticide were to continue to be used through the cancellation proceedings, EPA may suspend the pesticide registration through an order and thereby halt the sale, distribution, and usage of the pesticide. An "imminent hazard" is defined as an unreasonable adverse effect on the environment or an unreasonable hazard to the survival of a threatened or endangered species that would be the likely result of allowing continued use of a pesticide during a cancellation process.

When EPA believes an emergency exists that does not permit a hearing to be held prior to suspending, EPA can issue an emergency order that makes the suspension immediately effective.

Imports and Exports

Under FIFRA §17(a), pesticides not registered in the United States and intended solely for export are not required to be registered provided that the exporter obtains and submits to EPA, prior to export, a statement from the foreign purchaser acknowledging that the purchaser is aware that the product is not registered in the United States and cannot be sold for use there. EPA sends these statements to the government of the importing country. FIFRA sets forth additional requirements that must be met by pesticides intended solely for export. The enforcement policy for exports is codified at 40 CFR 168.65, 168.75, and 168.85.

Under FIFRA §17(c), imported pesticides and devices must comply with United States pesticide law. Except where exempted by regulation or statute, imported pesticides must be registered. FIFRA §17(c) requires that EPA be notified of the arrival of imported pesticides and devices. This is accomplished through the Notice of Arrival (NOA) (EPA Form 3540-1), which is filled out by the importer prior to importation and submitted to the EPA regional office applicable to the intended port of entry. United States Customs regulations prohibit the importation of pesticides without a completed NOA. The EPA-reviewed and signed form is returned to the importer for presentation to United States Customs when the shipment arrives in the United States. NOA forms can be obtained from contacts in the EPA Regional Offices or www.epa.gov/oppfead1/international/noalist.htm.

Additional information on FIFRA and the regulation of pesticides can be obtained from a variety of sources, including EPA's Office of Pesticide Programs homepage at www.epa.gov/pesticides,

EPA's Office of Compliance, Agriculture and Ecosystem Division at http://es.epa.gov/oeca/agecodiv, or The National Agriculture Compliance Assistance Center toll-free at 888-663-2155 or http://www.epa.gov/oeca/ag. Other sources include the National Pesticide Telecommunications Network toll-free at 800-858-7378 and the National Antimicrobial Information Network toll-free at 800-447-6349.

Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) granted EPA authority to create a regulatory framework to collect data on chemicals in order to evaluate, assess, mitigate, and control risks which may be posed by their manufacture, processing, and use. TSCA provides a variety of control methods to prevent chemicals from posing unreasonable risk. It is important to note that pesticides as defined in FIFRA are not included in the definition of a "chemical substance" when manufactured, processed, or distributed in commerce for use as a pesticide.

TSCA standards may apply at any point during a chemical's life cycle. Under TSCA §5, EPA has established an inventory of chemical substances. If a chemical substance is not already on the inventory, and has not been excluded by TSCA, a premanufacture notice (PMN) must be submitted to EPA prior to manufacture or import. The PMN must identify the chemical and provide available information on health and environmental effects. If available data are not sufficient to evaluate the chemical's effects, EPA can impose restrictions pending the development of information on its health and environmental effects. EPA can also restrict significant new uses of chemicals based upon factors such as the projected volume and use of the chemical.

Under TSCA § 6, EPA can ban the manufacture or distribution in commerce, limit the use, require labeling, or place other restrictions on chemicals that pose unreasonable risks. Among the chemicals EPA regulates under § 6 authority are asbestos, chlorofluorocarbons (CFCs), lead, and polychlorinated biphenyls (PCBs).

Under TSCA § 8(e), EPA requires the producers and importers (and others) of chemicals to report information on a chemicals' production, use, exposure, and risks. Companies producing and importing chemicals can be required to report unpublished health and safety studies on listed chemicals and to collect and record any allegations of adverse reactions or any information indicating that a substance may pose a substantial risk to humans or the environment.

EPA's TSCA Assistance Information Service, at (202) 554-1404, answers questions and distributes guidance pertaining to Toxic Substances Control Act standards. The Service operates from 8:30 a.m. through 4:30 p.m., EST, excluding federal holidays.

IV.B. Industry-Specific Requirements for Agricultural Livestock Production Industry

The agricultural livestock production industry discussed in this notebook is regulated by several different federal, state, and local agencies. EPA has traditionally relied on delegation to states to meet environmental standards, in many cases without regard to the methods used to achieve certain performance standards. This has resulted in states with more stringent air, water, and hazardous waste requirements than the federal minimum requirements. This document does not attempt to discuss state standards, but rather highlights relevant federal laws and proposals that affect the agricultural livestock production industry.

Clean Water Act

Under the CWA, there are five program areas that potentially affect agricultural establishments and businesses. These include: point source discharges, storm water discharges, nonpoint source pollution, wetland regulation, and sludge management. Key provisions addressing each of these areas are summarized below:

- **Point Source Discharges**: The CWA establishes a permitting program known as the NPDES program for "point sources" of pollution. The term "point source" includes facilities from which pollutants are or may be discharged to waters of the United States and is further defined at 40 CFR Part 122. If granted, the permit will place limits and conditions on the proposed discharges based on the performance of available control technologies and on any applicable (more stringent) water quality considerations. Usually the permit also will require specific compliance measures, establish schedules, and specify monitoring and reporting requirements.

  - **Concentrated Animal Feeding Operations (CAFOs):** The CWA defines CAFOs as point sources. Therefore, CAFOs are subject to the NPDES permitting program. See 40 CFR Part 122.23 and 40 CFR 122 Appendix B. A CAFO is prohibited from discharging pollutants to waters of the U.S. unless it has obtained an NPDES permit for the discharge.

    < Definition of an AFO – An AFO is defined in EPA regulations as a lot or facility where (1) animals have been,

are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and (2) crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.

< Definition of a CAFO – CAFOs are a subset of all AFOs. Whether an AFO is a CAFO under the regulations depends on the number of animals confined at the facility. A CAFO is defined as follows:

(1) More than 1,000 AUs are confined at the facility [40 CFR 122, Appendix B (a)]; **OR**

(2) ***From 301 to 1,000 AUs*** are confined at the facility and:

– Pollutants are discharged into waters of the U.S. through a man-made ditch, flushing system, or other similar man-made device; or

– Pollutants are discharged directly into waters of the U.S. that originate outside of and pass over, across, or through the facility or come into direct contact with the confined animals. [40 CFR 122, Appendix B (b)] OR

(3) The facility has been **designated as a CAFO** by the permitting authority on a ***case-by-case basis*** [40 CFR 122.23(c)], based on the permitting authority's determination that the operation is a "significant contributor of pollution." In making this determination, the permitting authority considers the following factors:

- Size of the operation;
- Amount of waste reaching waters of the United States;
- Location of the operation relative to waters of the U.S.;
- The means of conveyance of animal wastes and process wastewater into waters of the United States;

- The slope, vegetation, rainfall, and other factors affecting the likelihood or frequency of discharge of animal wastes and process wastewater into waters of the U.S.; and
- Other relevant factors (e.g.,waste handling and storage, land application timing, methods, rates and areas, etc.).

A permit application shall not be required from a concentrated animal feeding designated under the case-by-case authority until after the Director has conducted an on-site inspection and determined that the operation should and could be regulated under the NPDES permit program.

No animal feeding operation with less than the number of animals set forth in 40 CFR 122, Appendix B shall be designated as a concentrated animal feeding operation unless either (1) pollutants are discharged into waters of the U.S. through a manmade ditch, flushing system, or other similar means, or (2) pollutants are discharged directly into waters of the U.S. which originate outside of the facility and pass over, across, or through the facility, or otherwise come into direct contact with the animals confined in the operation.

The NPDES permit regulations [40 CFR 122, Appendix B] contain an exemption for any AFO from being defined as a CAFO if it discharges only in the event of a 25 year, 24-hour, or larger, storm event. To be eligible for an exemption, the facility must demonstrate to the permitting authority that it has not had a discharge. It must also demonstrate that the entire facility is designed, constructed, and operated to contain a storm event of this magnitude in addition to process wastewater. An operation that qualifies for this exemption from being defined as a CAFO may still be designated as a CAFO by the permitting authority on a case-by-case basis.

> A 25-year, 24-hour rainfall event means the maximum precipitation event with a probable occurrence of once in 25 years, as defined by the National Weather Service in Technical Paper Number 40, "Rainfall Frequency Atlas of the United States," May 1961, and subsequent amendments, or equivalent regional or state rainfall probability information developed therefrom [40 CFR Part 412.11(e)].

- **Storm Water Discharges:** Under 40 CFR §122.2, the definition of "point source" excludes agricultural storm water runoff. Thus, such runoff is not subject to the storm water permit application regulations at 40 CFR §122.26. Non-agricultural storm water discharges, however, are regulated if the discharge results from construction over 5 acres or certain other types of industrial activity such as landfills, automobile junk yards, vehicle maintenance facilities, etc.

  – **Concentrated Aquatic Animal Production Facilities**. Under 40 CFR Part 122.24, a *concentrated aquatic animal production facility* is defined and designated as a point source subject to the NPDES permit program.

    < Definition of concentrated aquatic animal production facility (40 CFR Part 122 Appendix C) -- A *concentrated aquatic animal production facility* is a hatchery, fish farm, or other facility that meets one of the following criteria:

    (1) A facility that contains, grows, or holds cold water fish species or other cold water aquatic animals in ponds, raceways, or similar structures which discharge at least 30 days per year. The term does not include (a) facilities which produce less than 9,090 harvest weight kilograms (approximately 20,000 pounds) of aquatic animals per year, and (b) facilities which feed less than 2,272 kilograms (approximately 5,000 pounds) of food during the calendar month of maximum feeding. Cold water aquatic animals include, but are not limited to, the *salmonidae* family (e.g., trout and salmon).

    (2) A facility that contains, grows, or holds warm water fish species or other warm water aquatic animals in ponds, raceways, or similar structures which discharge at least 30

days per year. The term does not include (a) facilities which produce less than 45,454 harvest weight kilograms (approximately 100,000 pounds) of aquatic animals per year or (b) closed ponds which discharge only during periods of excess runoff. Warm water aquatic animals include, but are not limited to, the *Ameiuridae*, *Centrarchidae,* and *Cyprinidae* families of fish (e.g., respectively catfish, sunfish, and minnows).

Designated facility -- A facility that does not otherwise meet the criteria in 40 CFR Part 122 Appendix C (described above) may be *designated* as a concentrated aquatic animal production facility if EPA or an authorized state determines the production facility is a significant contributor of pollution to waters of the U.S. No permit is required for such a designated facility until the EPA or state officials have conducted an onsite inspection and determined that the facility should be regulated under the NPDES permit program.

– **Aquaculture Projects**. Under 40 CFR Part 122.25(b), *aquaculture* means a defined, managed water area that uses discharges of pollutants to maintain or produce harvestable freshwater, estuarine, or marine plants or animals. Discharges into approved aquaculture projects are not required to meet effluent limitations that might otherwise apply. The entire aquaculture project (discharges into and out of the project) is addressed in an NPDES permit.

Wastewater Effluent Guidelines for Dairy Product Processing Establishments. Under 40 CFR Part 405, discharges from twelve categories of dairy products processing are subject to the NPDES permit program. Effluent limitations are established for BOD, TSS, and pH. The effluent guidelines establish technology-based pretreatment standards and effluent limitations for each category.

– **Wastewater Effluent Guidelines for Feedlots (CAFOs)**. Under 40 CFR Part 412, feedlot (beef cattle, dairy cattle, swine, sheep, etc.) point sources are subject to the NPDES permit program. The effluent guidelines establish technology-based pretreatment standards and effluent limitations for this category. In general, the current guidelines for feedlots prohibit any discharge of

process wastewater to navigable waters, except in the case of a 25-year, 24-hour rainfall event. CAFOs over 1,000 animal units with NPDES permits may discharge pollutants when chronic or catastrophic rainfall events cause an overflow from a facility designed, constructed, and operated to contain all process wastewater plus the runoff from a 25-year, 24-hour storm for the location of the point source.

- **Nonpoint Source Pollution**. Under the CWA §319 Nonpoint Source (NPS) Management Program and 40 CFR §130.6, states (tribes, and territories) establish programs to manage NPS pollution, including runoff and leaching of fertilizers and pesticides, and irrigation return flows. These NPS management programs must identify: (a) best management practices (BMPs) to be used in reducing NPS pollution loadings; (b) programs to be used to assure implementation of BMPs; (c) a schedule for program implementation with specific milestones; and (d) sources of federal or other funding that will be used each year for the support of the state's NPS pollution management program. Congress provides grant funds to the states annually for the administration of these management programs.

- **Discharges to Publicly Owned Treatment Works (POTWs)**. Under 40 CFR Part 403, facilities, including agricultural establishments, may discharge certain substances to a POTW if the facility has received prior written permission from the POTW and has completed any required pretreatment. Facilities must check with their POTWs for information about permitted discharges and for conditions and limitations.

- **Discharges of Designated Hazardous Substances**. Under 40 CFR Parts 116-117, facilities, including agricultural establishments, must immediately notify the National Response Center (1-800-424-8802) and their state agency of any unauthorized discharge of a designated hazardous substance into (1) navigable waters, (2) the shorelines of navigable waters, or (3) contiguous zones, if the quantity discharged in any 24-hour period equals or exceeds the reportable quantity. A *designated hazardous substance* is any chemical listed in Section 311 of the Clean Water Act. The *reportable quantity* is the amount of the hazardous substance that EPA has determined might cause harm. The list of hazardous substances along with each chemical's reportable quantity is found in 40 CFR Parts 116 and 117. Ammonia and several pesticides are on the list.

- **Discharges of Oil**. Under 40 CFR Part 110, facilities must immediately notify EPA's National Response Center (1-800-424-8802) of any unauthorized discharge of a *harmful quantity of oil* (including petroleum,

fuel oil, sludge, oil refuse, or oil mixed with other wastes) into (1) navigable waters, (2) the shorelines of navigable waters, or (3) contiguous zones and beyond. A discharge of oil is considered harmful if it violates applicable water quality standards, causes a sludge or emulsion to be deposited under the surface of the water or on adjoining shorelines, or causes a film or sheen on, or discoloration of, the water or adjoining shorelines. In practice, any quantity of oil or a petroleum product is a harmful quantity, since even small amounts will cause a film or sheen on surface water.

– **Oil Spill Prevention Control and Countermeasure (SPCC) Program**. Under 40 CFR Part 112, facilities, including agricultural establishments, must comply with EPA's SPCC program when they store oil at their facility. SPCC requirements apply to non-transportation related onshore and offshore facilities of specified size engaged in storing, processing, refining, transferring or consuming oil products, which due to their location, could potentially discharge oil into waters of the U.S. or adjoining shorelines.

  Facilities must comply with the SPCC program: (1) if they have a single aboveground container with an oil storage capacity of more than 660 gallons, multiple aboveground containers with a combined oil storage capacity of more than 1,320 gallons, or a total underground oil storage capacity of more than 42,000 gallons *and* (2) if there is a reasonable expectation that a discharge (spill, leak, or overfill) from the tank will release harmful quantities of oil into navigable waters or adjoining shorelines. The requirements are triggered by tank capacity, regardless of whether tanks are completely filled.

  Facilities subject to the SPCC requirements must prepare an SPCC plan. This plan must include: (1) *prevention* measures that keep oil releases from occurring, (2) *control* measures installed to prevent oil releases from reaching navigable waters, and (3) *countermeasures* to contain, clean up, and mitigate the effects of any oil release that reaches navigable waters. Each plan must be unique to the facility and must be signed by a registered professional engineer.

• **Wetlands on Agricultural Lands**. Swamps, marshes, fens, bogs, vernal pools, playas, and prairie potholes are common names for wetlands. Wetlands provide a habitat for threatened and endangered species as well as a diversity of other plant, wildlife, and fish species. In addition to

providing habitat, wetlands serve other functions, including stabilizing shorelines; storing flood waters; filtering sediments, nutrients, and toxic chemicals from water; and providing an area for the recharge and discharge of groundwater. It is important to note that not all wetlands will be obvious to the untrained observer. For example, an area can appear dry during much of the year and still be classified as a wetland. Your local Natural Resources Conservation Service (NRCS) office can help to identify and delineate wetlands on your property.

NRCS, formerly the Soil Conservation Service, is the lead agency for identifying wetlands on *agricultural lands*. According to NRCS, agricultural lands means those lands intensively used and managed for the production of food or fiber to the extent that the natural vegetation has been removed and therefore does not provide reliable indicators of wetland vegetation. Areas that meet this definition may include intensively used and managed cropland, hayland, pastureland, orchards, vineyards, and areas that support wetland crops (e.g., cranberries, taro, watercress, rice). Lands not included in the definition of *agricultural lands* include rangelands, forest lands, woodlots, and tree farms.

– ***Exemption to Section 404 Permit Requirements.*** The placement of dredge and fill material into wetlands and other water bodies (i.e., waters of the United States) is regulated by the U.S. Army Corps of Engineers (Corps) under 33 CFR Part 328. The Corps regulates wetlands by administering the CWA Section 404 permit program for activities that impact wetlands. The 404 permit program requires a permit for point source discharges of dredged and fill material into waters of the United States. However, many normal established farming activities (e.g., plowing, cultivating, minor drainage, and harvesting), silviculture, and ranching activities that involve discharges of dredged or fill materials into U.S. waters are **exempt from Section 404 permits** and do **NOT** require a permit (33 CFR §323.4). In order to be exempt, the activity must be part of an ongoing operation and cannot be associated with bringing a wetland into agricultural production or converting an agricultural wetland to a non-wetland area.

  If not covered by the above exemption, a permit is required before discharging dredged or fill material into U.S. waters, including most wetlands (33 CFR Part 323). The Army Corps of Engineers (Corps) reviews Section 404 permit applications to determine if a project is the least environmentally damaging and practicable alternative.

- **POTW Sludge Management - Land Application of Biosolids**. Land application is the application of biosolids to land to either condition the soil or fertilize crops or other vegetation grown in the soil. Biosolids are a primarily organic solid product produced by wastewater treatment processes that can be beneficially recycled.

  EPA regulates the land application of biosolids under 40 CFR Part 503. As described in *A Plain English Guide to the EPA Part 503 Biosolids Rule* (EPA/832/R-93-003, September 1994), the Part 503 rule includes general provisions, and requirements for land application, surface disposal, pathogen and vector attraction reduction, and incineration. For each regulated use or disposal practice, a Part 503 standard includes general requirements, pollutant limits, management practices, operational standards, and requirements for the frequency of monitoring, recordkeeping, and reporting. For the most part, the requirements of the Part 503 rule are ***self-implementing*** and must be followed even without the issuance of a permit covering biosolids use or disposal requirements.

- **Total Maximum Daily Load (TMDL) Program**. There are still waters in the nation that do not meet the CWA national goal of "fishable, swimmable" despite the fact that nationally required levels of pollution control technology have been implemented by many pollution sources. The TMDL program, established under Section 303(d) of the Clean Water Act, focuses on identifying and allocating pollutant loads to these waterbodies. The goal of a TMDL is the attainment of water quality standards.

  A TMDL identifies the amount a pollutant needs to be reduced to meet water quality standards, allocates pollutant load reductions among pollutant sources in a watershed, and provides the basis for taking actions needed to restore a waterbody. It can identify the need for point source and nonpoint source controls.

  Under this provision, States are required to (1) identify and list waterbodies where State water quality standards are not being met following the application of technology-based point source pollution controls; and (2) establish TMDLs for these waters. EPA must review and approve (or disapprove) State lists and TMDLs. If State actions are not adequate, EPA must prepare lists and TMDLs. TMDLs are to be implemented using existing federal, state, and local authorities and voluntary programs.

  TMDLs should address all significant pollutants which cause or threaten to cause waterbody use impairment, including:

- Point sources (e.g., sewage treatment plant discharges)
- Nonpoint sources (e.g., runoff from fields, streets, range, or forest land)
- Naturally occurring sources (e.g., runoff from undisturbed lands)

A TMDL is the sum of the individual wasteload allocations for point sources, load allocations for nonpoint sources and natural background pollutants, and an appropriate margin of safety. TMDLs may address individual pollutants or groups of pollutants, as long as they clearly identify the links between: (1) the waterbody use impairment or threat of concern, (2) the causes of the impairment or threat, and (3) the load reductions or actions needed to remedy or prevent the impairment.

TMDLs may be based on readily available information and studies. In some cases, complex studies or models are needed to understand how pollutants are causing waterbody impairment. In many cases, simple analytical efforts provide an adequate basis for pollutant assessment and implementation planning.

Where inadequate information is available to draw precise links between these factors, TMDLs may be developed through a phased approach. The phased approach enables states to use available information to establish interim targets, begin to implement needed controls and restoration actions, monitor waterbody response to these actions, and plan for TMDL review and revision in the future. Phased approach TMDLs are particularly appropriate to address nonpoint source issues.

Numerous TMDLs are under development in many states and TMDLs are likely to impact agricultural activities by prompting states and stakeholders to mitigate water pollution caused by agricultural sources (assuming agriculture-related industries are identified as significant contributors to water quality impairment).

Coastal Zone Act Reauthorization Amendments of 1990

The Coastal Nonpoint Pollution Control Program, which is implemented under the authority of Section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA) of 1990, is administered at the federal level jointly by EPA and the National Oceanic and Atmospheric Agency (NOAA). The Section 6217 program requires the 29 states and territories with NOAA-approved coastal zone management programs to develop and implement coastal nonpoint pollution control programs. These submitted programs must include: (1) management measures that are in conformity with applicable federal guidance and (2) state-developed

management measures as necessary to achieve and maintain applicable water quality standards.

On January 19, 1993, EPA issued its *Guidance Specifying Management Measures For Sources of Nonpoint Pollution in Coastal Waters*. The federal guidance specifies management measures for the following agricultural sources: (1) erosion from cropland, (2) confined animal facilities, (3) the application of nutrients to croplands, (4) the application of pesticides to cropland, (5) grazing management, and (6) irrigation of cropland.

Once approved, the programs are implemented through state nonpoint source programs (under CWA §319) and state coastal zone management programs (authorized under §306 of the Coastal Zone Management Act). Agricultural establishments located in coastal states should determine whether their land is included in the state's coastal management area. If so, they must comply with their state's applicable coastal nonpoint programs. Currently, all state coastal nonpoint management programs have been conditionally approved and have begun to be implemented.

Coastal Zone Management Act

The 1996 amendments to the Coastal Zone Management Act that may affect agriculture-related industries include those that relate to aquaculture in the coastal zone. Eligible states may now receive grants for developing a coordinated process among state agencies to regulate and issue permits for aquaculture facilities in the coastal zone. States may also receive grants for adopting procedures and policies to evaluate facilities in the coastal zone that will enable the states to formulate, administer, and implement strategic plans for marine aquaculture. Each state that receives such grants will make its own determination as part of its coastal management plan on how to specifically use the funds. Therefore, persons engaged in aquaculture productivity in the coastal zone may be eligible for technical or financial assistance under their state's plan.

Safe Drinking Water Act

The SDWA, which has been amended twice since 1974, protects the water supply through water quality regulations and source protection, such as underground injection control (UIC) regulations. SDWA requirements apply to all public water systems (PWSs). Currently, 54 of 56 states and territories have been delegated primacy to run the drinking water program.

- **Public Water Systems**. Under 40 CFR Parts 141-143, facilities that operate a PWS or receive water from a PWS and provide treatment to it

are subject to SDWA regulations. Prior to 1996, SDWA defined a PWS as "a system for the provision to the public of piped water *for human consumption* if such system has at least 15 service connections or regularly serves at least 25 individuals." The 1996 Amendments expanded the means of delivering water to include not only pipes, but also other constructed conveyances such as ditches and waterways.

While there are three categories of PWSs, an agricultural establishment will most likely operate a non-transient, non-community system. This type of system serves at least 25 people for over 6 months of the year, but the people generally do not live at the facility. All PWSs must comply with the national primary drinking water regulations (40 CFR 141). Under 40 CFR Part 141 Subpart G, EPA has established drinking water standards for numerous pesticides.

Establishments that operate a non-transient, non-community system, in general, will need to: (1) monitor for the contaminants the state has established for that type of system, (2) keep records of the monitoring results, (3) report results from all tests and analyses to the state/tribe on a set schedule, (4) take immediate action to correct any violations in the allowable contaminant levels, (5) make a public announcement of any violations to warn people about potential adverse effects and to describe the steps taken to remedy the problem, and (6) keep records of actions taken to correct violations.

- **Comprehensive State Ground Water Protection Program**. Under the SDWA §1429, states/tribes are allowed to establish a Comprehensive State Ground Water Protection Program to protect underground sources of drinking water. Under this program, a state/tribe can require facilities, including agricultural establishments, to use designated best management practices (BMPs) to help prevent contamination of groundwater by nitrates, phosphates, pesticides, microorganisms, or petroleum products. These requirements generally apply only to facilities that are subject to the public water system supervision program. Persons applying pesticides or fertilizers must know the location of all the public water supply source areas in the vicinity that are protected by state/tribal (and sometimes local) requirements.

- **Source Water and Protection Program**. Under the SDWA, states are required to develop comprehensive Source Water Assessment Programs (SWAP). The statutorily defined goals for SWAPs are to provide for the protection and benefit of public water systems and for the support of monitoring flexibility. These programs plan to identify the areas that supply

public tap water, inventory contaminants and assess water system susceptibility to contamination, and inform the public of the result.

- **Wellhead Protection Program**. Under the SDWA §1428, if a facility, has an onsite water source (e.g., well) that qualifies as a PWS, it must take the steps required by the state/tribe to protect the wellhead from contaminants. A wellhead protection area is the surface and subsurface area surrounding a water well or wellfield supplying a PWS through which contaminants are reasonably likely to move toward and reach such water well or wellfield.

  Since drinking water standards (40 CFR Part 141 Subpart G) exist for numerous pesticides, which may be used in various agriculture-related activities, some state/tribe and local wellhead and source water protection programs restrict the use of agricultural chemicals in designated wellhead protection areas. In addition, persons applying pesticides or fertilizers must know the location of all the public water supply source areas in the vicinity that are protected by state/tribal (and sometimes local) requirements, and the requirements for mixing, loading, and applying agricultural chemicals within any designated wellhead or source water protection areas.

- **Sole Source Aquifer Protection Program**. Under the SDWA §1424 and 40 CFR Part 149 Subpart B, EPA can establish requirements for protecting sole source aquifers. EPA designates an aquifer as a ***sole source aquifer*** if it supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer and no alternative drinking water sources are feasible. The Sole Source Aquifer program prohibits federal financial assistance (any grant, contract, loan guarantee, or otherwise) for any project, including agricultural projects, that may result in contamination to the aquifer and create a hazard to public heath. Currently, only a few aquifers have been designated as protected sole source aquifers.

- **Underground Injection Control (UIC) Program**. The UIC program (40 CFR Parts 144 and 146-148) is a permit program that protects underground sources of drinking water by regulating five classes of injection wells (I - V). *Underground injection* means depositing fluids beneath the surface of the ground by injecting them into a hole (any hole that is deeper than it is wide). *Fluids* means any material or substance which flows or moves whether in a semisolid, liquid, sludge, gas, or any other form or state.

  If a facility disposes of (or formerly disposed of) waste fluids onsite in an injection well, it triggers the UIC requirements. In general, a facility may

not inject contaminants into any well if the contaminant could cause a violation of any primary drinking water regulation or endanger an underground source of water if the activity would adversely affect the public health. Most deep well underground injections are prohibited without a UIC permit. No Class I, II, or III injection well may be constructed or opened before a permit has been issued. UIC permits include design, operating, inspection, and monitoring requirements. In many states/tribes, EPA has authorized the state/tribal agency to administer the program.

Class V Wells. Owners/operators of Class V wells (shallow wells that inject fluids above an underground source of water) must not construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation (40 CFR Part 142) or may otherwise adversely affect the health of persons. Examples of Class V wells potentially applicable to agricultural establishments include, but are not limited to:

(1) Drainage wells, such as agricultural drainage wells, primarily used for storm runoff.

(2) Cesspools with open bottoms (and sometimes perforated sides) and septic system wells used to inject waste or effluent from multiple dwellings or businesses (the UIC requirements do not apply to single family residential septic system or cesspool wells or to non-residential septic system or cesspool wells that are used solely for the disposal of sanitary wastes and have the capacity to serve fewer than 20 persons per day).

(3) Dry wells used for waste injection.

(4) Recharge wells used to replenish aquifers.

(5) Injection wells associated with the recovery of geothermal energy for heating, aquaculture, and production of electric power.

(6) Floor drains in maintenance shops/work areas.

Agricultural drainage wells typically drain water from low-lying farm land, but some serve to recharge aquifers from which irrigation water is withdrawn. These wells are usually constructed in areas with poor soil drainage, but where underlying geologic formations allow rapid infiltration of water. Sometimes abandoned water supply wells are adapted for use in agricultural drainage. Agricultural drainage wells typically receive field drainage from saturated topsoil and subsoil, and from precipitation, snowmelt, floodwaters, irrigation return flow, and animal feedlots. The types of pollutants injected into these wells include (1) pesticide runoff, (2) nitrate, nitrite, and salts, such as those of calcium, magnesium, sodium, potassium, chloride, sulfate, and carbonate from fertilizer runoff, (3) salts and metals (i.e., iron, lead, cadmium, and mercury) from biosolid sludges and compost, (4) microbes (i.e., bacteria and viruses) from animal waste runoff, and (5) petroleum contaminants, such as fuel and oil, from runoff from roads or equipment maintenance areas.

If a facility has a Class V well, it must furnish inventory information about the well to the appropriate state/tribal agency. If at any time EPA or the state/tribal agency learns that a Class V well may cause a violation of primary drinking water regulations (40 CFR Part 142) or may be otherwise adversely affecting the health of persons, it may require the injector to obtain an individual UIC permit, or order the injector to take such actions (including, where required, closure of the injection well) as may be necessary to prevent the violation.

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) was enacted to address problems related to hazardous and solid waste management. RCRA gives EPA the authority to establish a list of solid and hazardous wastes and to establish standards and regulations for the treatment, storage, and disposal of these wastes. Regulations in Subtitle C of RCRA address the identification, generation, transportation, treatment, storage, and disposal of hazardous wastes. These regulations are found in 40 CFR Part 124 and 40 CFR Parts 260-279. Under RCRA, persons who generate waste must determine whether the waste is defined as solid waste or hazardous waste. Solid wastes are considered hazardous wastes if they are listed by EPA as hazardous or if they exhibit characteristics of a hazardous waste: toxicity, ignitability, corrosivity, or reactivity.

Most agriculture-related activities do not generate significant amounts of hazardous waste. Generally, the activities potentially subject to RCRA involve the use of pesticides and fertilizers, and the use and maintenance of different types of machinery.

Hazardous Waste Generator Categories. Facilities that generate hazardous waste can be classified into one of three hazardous waste generator categories as defined in 40 CFR Part 262:

- ***Conditionally exempt small quantity generator (CESQG)***. A facility is classified as a CESQG if it generates no more than 220 lbs (100 kg) of hazardous waste in a calendar month. There is no time limit for accumulating #2,200 lbs of hazardous waste onsite. However, CESQGs cannot store more than 2,200 lbs (1,000 kg) of hazardous waste onsite at any time. In addition, CESQGs cannot accumulate onsite more than 2.2 lbs (1 kg) of acutely hazardous waste or more than 220 lbs spill residue from acutely hazardous waste for any period of time.

- ***Small quantity generator (SQG)***. A facility is classified as a SQG if it generates >220 lbs (100 kg) and <2,200 lbs (1,000 kg) of hazardous waste in a calendar month. SQGs can accumulate onsite no more than 13,200 lbs (6,000 kg) of hazardous waste. SQGs can store hazardous waste onsite for up to 180 days (or up to 270 days if the waste treatment/disposal facility is more than 200 miles away).

- ***Large quantity generator (LQG)***. A facility is classified as a LQG if it generates > 2,200 lbs (1,000 kg) of hazardous waste in a calendar month. While there is no limit on the amount of hazardous waste that LQGs can accumulate onsite, they can only store it onsite for up to 90 days.

If a facility is a CESQG and generates #2.2 lbs (1 kg) of acutely hazardous waste; or #220 lbs (100 kg) of acutely hazardous waste spill residues in a calendar month, and never stores more than that amount for any period of time, it may manage the acutely hazardous waste according to CESQG requirements. If it generates more than 2.2 lbs (1 kg) of acutely hazardous waste or >220 lbs (100 kg) of acutely hazardous waste spill residues in a calendar month, the facility must manage it according to LQG requirements.
The hazardous wastes that must be measured are those: (1) accumulated at the facility for any period of time before disposal or recycling, (2) packaged and transported away from the facility, (3) placed directly into a treatment or disposal unit at the facility, or (4) generated as still bottoms or sludges *and* removed from product storage tanks.

Requirements for CESQGs. Based on the quantity of hazardous waste generated per month, most agricultural establishments will qualify as CESQGs. As CESQGs, facilities must comply with three basic waste management requirements:

(1) Identify all hazardous waste generated.

(2) Do not generate per month more than 220 lbs (100 kg) of hazardous waste; more than 2.2 lbs (1 kg) of acutely hazardous waste; or more than 220 lbs (100 kg) of acutely hazardous waste spill residues; and never store onsite more than 2,200 lbs (1,000 kg) of hazardous waste; 2.2 lbs of acutely hazardous waste; or more than 220 lbs of acutely hazardous waste spill residues for any period of time.

(3) Ensure proper treatment and disposal of the waste. This means ensuring that the disposal facility is one of the following:
- A state or federally regulated hazardous waste management treatment, storage, or disposal facility.
- A facility permitted, licensed, or registered by a state to manage municipal or industrial solid waste.
- A facility that uses, reuses, or legitimately recycles the waste (or treats the waste before use, reuse, or recycling).
- A universal waste handler or destination facility subject to the requirements for universal wastes.

CESQGs are allowed to transport their own wastes to the treatment or storage facility, unlike SQGs and LQGs who are required to use a licensed, certified transporter. While there are no specific RCRA requirements for CESQGs who transport their own wastes, the U.S. Department of Transportation (DOT) requires all transporters of hazardous waste to comply with all applicable DOT regulations. Specifically, DOT regulations require all transporters, including CESQGs, transporting hazardous waste that qualifies as a DOT hazardous material to comply with EPA hazardous waste transporter requirements found in 40 CFR Part 263. CESQGs are not required by federal hazardous waste laws to train their employees on waste handling or emergency preparedness.

Requirements for SQGs and LQGs. Facilities determined to be SQGs or LQGs must meet many requirements under the RCRA regulations. These requirements, found in 40 CFR 260-279, include identifying hazardous waste; obtaining an EPA identification numbers; meeting requirements for waste accumulation and storage limits; container management; conducting personnel training; preparing a manifest; ensuring proper hazardous waste packaging, labeling, and placarding; reporting and recordkeeping; and contingency planning, emergency procedures, and accident prevention.

Notes: Facilities that fall into different generator categories during different months may choose to simplify compliance by satisfying the more stringent requirements all the time.

Specific Provisions. RCRA regulations include several specific provisions addressing agriculture-related materials and activities. Key provisions are briefly summarized below:

- ***Exemption for Certain Solid Wastes Used as Fertilizers***. Under 40 CFR §261.4(b), solid wastes generated by (1) growing and harvesting of agricultural crops, or (2) raising animals (including animal manure), and that are returned to the soils as fertilizers are excluded from regulation as hazardous waste.

- ***Exemption for Certain Hazardous Waste Pesticides***. Under 40 CFR §262.70, farmers who generate any amount of hazardous waste pesticides from their own use are excluded from the generator, treatment/storage/disposal facility, land disposal, and permit requirements under RCRA Subtitle C, provided that the farmer: (1) disposes of the waste pesticide in a manner consistent with the label on the pesticide container; (2) triple rinses each empty container in accordance with requirements at 40 CFR §261.7(b)(3); and (3) disposes of the rinsate on his own farm in accordance with the instructions on the label. If the label does not include disposal instruction, or no instructions are available from the pesticide manufacturer, the waste pesticide and rinsate must be disposed of in accordance with Subtitle C hazardous waste requirements. (Also see 40 CFR Part 165 - FIFRA)

- ***Exemption for Commercial Fertilizers***. Under 40 CFR §266.20, commercial fertilizers produced for general public (including agricultural) use that contain recyclable materials are not presently subject to regulation provided they meet the applicable land disposal restriction (LDR) standards for each recyclable material they contain. For example, zinc-containing fertilizers containing K061 (emission control dust from the primary production of steel in electric furnaces) are not subject to regulation.

- ***Fertilizers Made from Hazardous Wastes***. Under 40 CFR Parts 266 and 268, EPA regulates fertilizers containing hazardous wastes as ingredients. Hazardous wastes may be used as ingredients in fertilizers under certain conditions, since such wastes can be a beneficial component of legitimate fertilizers. EPA has established standards that specify limits on the levels of heavy metals and other contents used as fertilizer ingredients. These standards are based on treatment, by the best technology currently available, to reduce the toxicity and mobility of all the contents of the hazardous waste components. These standards are based on waste management considerations and do not include consideration of the potential agronomic or dietary risk.

- ***Food Chain Crops Grown on Hazardous Waste Land Treatment Units***. Under 40 CFR Part 264.276, food chain crops (including feed for animals consumed by humans) may be grown in or on hazardous waste land treatment units under certain conditions and only with a permit. The permit for a facility will list the specific food-chain crops that may be grown. To obtain a permit, the owner/operator of the facility wishing to grow the food-chain crops must demonstrate -- prior to the planting of such crops -- that there is no substantial risk to human health caused by the growth of such crops in or on the treatment zone.

- ***Solid Waste Disposal Criteria.*** Under RCRA Subtitle D, 40 CFR 257.3 establishes solid waste disposal criteria addressing floodplains, endangered species, groundwater protection, application to land used for food chain crops, disease vectors, air pollution, and safety. These criteria are largely guidelines used by states in developing solid waste regulations, which control the disposal of waste on a farmer's property.
- ***Land Application of Fertilizers Derived from Drinking Water Sludge***. Under 40 CFR Part 257, EPA regulates the land application of solid wastes, including drinking water sludge applied as fertilizer. These requirements include: (1) cadmium limits on land used for the production of food-chain crops (tobacco, human food, and animal feed) or alternative less stringent cadmium limits on land used solely for production of animal feed; (2) polychlorinated biphenyls (PCBs) limits on land used for producing animal feed, including pasture crops for animals raised for milk; and (3) minimization of disease vectors, such as rodents, flies, and mosquitoes, at the site of application through incorporation of the fertilizer into soil so as to impede the vectors' access to the sludge.

- ***Pesticides That Are Universal Wastes***. Under 40 CFR Part 273, EPA has established a separate set of requirements for three types of wastes called *universal wastes.* Universal wastes include certain batteries, certain pesticides, and mercury thermostats. Pesticides designated as universal wastes include (1) recalled pesticides that are stocks of a suspended or canceled pesticide and part of a voluntary or mandatory recall under FIFRA §19(b); (2) recalled pesticides that are stocks of a suspended or canceled pesticide, or a pesticide that is not in compliance with FIFRA, that are part of a voluntary recall [see FIFRA §19(b)(2)] by the registrant; and (3) stocks of other unused pesticide products that are collected and managed as part of a waste pesticide collection program.

  The Universal Waste rule is *optional* for states/tribe to adopt. In those states/tribes that have not adopted the Universal Waste rule, these wastes

must be disposed of in accordance with the hazardous (or acutely hazardous) waste requirements (see 40 CFR Part 262).

- ***Exemption for Small Quantities of Used Oil***. Under 40 CFR §279.20, agricultural establishments that generate an average of 25 gallons or less of used oil per month per calendar year from vehicles or machinery used on the establishment are not subject to the requirements of 40 CFR Part 279.

- ***Exemption for "Farm Tanks" and Tanks of 110 Gallons or Less***. Under the underground storage tank (UST) regulations (RCRA Subtitle I, 40 CFR §280.12), "farm tanks" of 1,100 gallons or less capacity used for storing motor fuel for non-commercial purposes are not regulated as underground storage tanks. *"Farm tanks"* include tanks located on a tract of land devoted to the production of crops or raising animals (including fish) and associated residences and improvements. Also under 40 CFR §280.10, the UST program does not apply to UST systems of 110 gallons or less capacity, or that contain a *de minimis* concentration of a regulated substance.

  Even with the above exemptions, keep in mind that many agricultural establishments may be subject to the UST program (40 CFR Part 280). The UST regulations apply to facilities that store either petroleum products or hazardous substances (except hazardous wastes) identified under CERCLA. UST regulations address design standards, leak detection, operating practices, response to releases, financial responsibility for releases, and closure standards.

Comprehensive Environmental Response, Compensation, and Liability Act

Under CERCLA, there are a limited number of statutory and regulatory requirements that potentially affect agricultural businesses. The key provisions are summarized below:

- **Emergency Release Notification Requirements**. Under CERCLA §103(a), facilities are required to notify the National Response Center about any release of a CERCLA hazardous substance in quantities equal to or greater than its reportable quantity (RQ). Releases include discharges into the air, soil, surface water, or groundwater. Any release at or above the RQ must be reported regardless of whether there is a potential for offsite exposure.

  – ***Hazardous Substances***. The term "hazardous substance" is defined in CERCLA §101(14) and these substances (more than

700) are listed at 40 CFR Part 302, Table 302.4. Several agricultural chemicals are on the CERCLA hazardous substance list, including many pesticides, anhydrous ammonia, and ethylene glycol.

– ***Reportable Quantities***. For each hazardous substance, EPA has designated a RQ of 1, 10, 100, 1,000, or 5,000 pounds. RQs are listed in 40 CFR Part 355, Appendices A and B and 40 CFR Part 302, Table 302.4.

– ***When No Notification is Required***. There are several types of releases that are excluded from the requirements of CERCLA release notification. Two of these releases, excluded under CERCLA §§101(22) and 103(e), include the normal application of fertilizer and the application of pesticide products registered under FIFRA. *Keep in mind that spills, leaks, or other accidental or unintended releases of fertilizers and pesticides are subject to the reporting requirements.*

- **Facility Notification and Recordkeeping Requirements - Exemption for Agricultural Producers**. Under CERCLA §§103(c) and (d), certain facilities must notify EPA of their existence and the owners/operators must keep records. However, CERCLA §103(e) exempts agricultural producers who store and handle FIFRA-registered pesticides from the facility notification and recordkeeping requirements. CERCLA does not define the term *agricultural producer*.

- **Liability for Damages**. Under CERCLA §107(a), an owner/operator of a facility that has CERCLA hazardous substances onsite may be liable for cleanup costs, response costs, and natural resource damages associated with a release or threatened release of hazardous substances. Agricultural establishments are potentially liable under this section, and that liability extends to past practices.

Emergency Planning and Community Right-to-Know Act

A summary of the potential applicability of specific sections of EPCRA on the agricultural sector follows below.

- **Emergency Planning and Notification**. Under EPCRA §302, owners or operators of any facility, including agricultural establishments, that have *extremely hazardous substances* (40 CFR Part 355 Appendices A and B) present in excess of the *threshold planning quantity* must notify in

writing their state emergency response commission (SERC) and their local emergency planning committee (LEPC) that they are subject to EPCRA planning requirements. Under EPCRA §303, they must also notify the LEPC of the name of a person at their facility whom the LEPC may contact in regard to planning issues related to these extremely hazardous substances. They must also inform the LEPC promptly of any relevant changes, and when requested, must provide information to the LEPC necessary for emergency planning.

Ammonia, several agricultural pesticides, and certain fuels are included on the list of extremely hazardous substances found in 40 CFR Part 355 Appendices A and B. If a listed substance is a solid, two different planning quantities are listed (e.g., 500 lbs/10,000 lbs). The smaller amount (e.g., 500 lbs.) applies if the substance is in powder form, such as a soluble or wettable powder, or if it is in solution or molten form. The larger quantity (10,000 lbs.) applies for most other forms of the substance. If the extremely hazardous substance is part of a mixture or solution, then the amount is calculated by multiplying its percent by weight times the total weight of the mixture or solution. If the percent by weight is less than one percent, the calculation is not required (40 CFR Part 355.30).

- Ammonia -- The quantity of anhydrous ammonia that triggers the planning requirement is 500 pounds.

- Pesticides -- Examples of pesticides on the list with the quantity in pounds that triggers the planning requirement include: ethion (1,000), nicotine (100), dichlorvos (1,000), parathion (100), chlordane (1,000), methyl bromide (1,000), ethylene oxide (1,000), fenitrothion (500), phorate (10), zinc phosphide (500), aluminum phosphide (500), terbufos (100), phosphamidon (100), demeton (500), ethoprop (1,000), and disulfoton (500).

- Solid Pesticides -- Examples of pesticides with dual quantities that trigger the planning requirements include: coumaphos (100/10,000), strychnine (100/10,000), dimethoate (500/10,000), warfarin (500/10,000), azinphos-methyl (10/10,000), methyl parathion (100/10,000), phosmet (10/10,000), methidathion (500/10,000), carbofuran (10/10,000), paraquat (10/10,000), methiocarb (500/10,000), methamidophos (100/10,000), methomyl (500/10,000), fenamiphos (10/10,000), and oxamyl (100/10,000).

- **§304 Emergency Release Notification**. Under 40 CFR 355, facilities must *immediately* notify the SERC and LEPC of releases of EPCRA

extremely hazardous substances and CERCLA hazardous substances when the release equals or exceeds the reportable quantity within a 24-hour period and has the *potential* for offsite exposure. There are two notifications required: the initial notification and the written followup notification.

Exemption for Substances Used in Agricultural Operations. Only facilities that produce, use or store *hazardous chemicals* are subject to EPCRA release reporting. EPCRA §311(e) excludes from the definition of *hazardous chemicals* those substances used in routine agricultural operations. The exemption covers fertilizers and pesticides used in routine agricultural operations and fuels for operating farm equipment (including to transport crops to market). If all the hazardous chemicals present at the facility do not fall within this exemption, the facility must report all releases of any EPCRA extremely hazardous substance or CERCLA hazardous substance. Additionally, spills, leaks, or other accidental or unintended releases of fertilizers and pesticides are subject to the EPCRA release reporting requirements.

- **§311 and §312 Hazardous Chemical Inventory and Reporting**. Under EPCRA §311 and §312, facilities must inventory the hazardous chemicals present onsite in amounts equal to or in excess of the threshold planning quantities, and meet two reporting requirements:

  – A one-time notification of the presence of hazardous chemicals onsite in excess of threshold levels (EPCRA §311) to the SERC, LEPC, and the local fire department; and

  – An annual notification (Tier I or Tier II report) to the SERC, LEPC, and the local fire department detailing the locations and hazards associated with the hazardous chemicals found on facility grounds (EPCRA §312).

  Exemption for Substances Used in Agricultural Operations. As mentioned above, the term "hazardous chemical," as defined in EPCRA §311(e), *excludes* substances used in routine agricultural operations.

Clean Air Act

Agriculture-related industries generally do not include those industry sectors considered to be major sources of air pollution. Nevertheless, some agriculture-related activities are potentially subject to regulation under the CAA. The

provisions identified below summarize the CAA requirements applicable to certain agriculture-related activities:

- **Risk Management Program**. Under §112(r) of the Clean Air Act, EPA has promulgated the Risk Management Program Rule. The rule's main goals are to prevent accidental releases of regulated substances and to reduce the severity of those releases that do occur by requiring facilities to develop risk management programs. A facility's risk management program must incorporate three elements: a hazard assessment, a prevention program, and an emergency response program. These programs are to be summarized in a risk management plan (RMP) that will be made available to state and local government agencies and the public.

  Under 40 CFR Part 68, facilities that have more than the threshold quantity of any of the listed regulated substances in a single process are required to comply with the regulation. *Process* means any regulated activity involving a regulated substance, including manufacturing, storing, distributing, or handling a regulated substance or using it in any other way. Any group of interconnected vessels (including piping), or separate vessels located close enough together to be involved in a single accident, are considered a single process. Transportation is not included.

  Listed regulated substances are acutely toxic substances, flammable gases, volatile liquids, and highly explosive substances listed by EPA in the Risk Management Program rule. The *threshold quantity* is the amount of a regulated substance that triggers the development of a RMP. The list of regulated substances and their corresponding threshold quantities are found at 40 CFR Part 68. Examples of threshold quantities of listed regulated substances include: formaldehyde -- 15,000 pounds; ethylene oxide -- 10,000 pounds; methyl isocyanate -- 10,000 pounds; anydrous ammonia -- 10,000 pounds; and mixtures containing ammonia in a concentration of 20 percent or greater -- 20,000 pounds.

  Exception: Ammonia that farmers are holding for use as fertilizer is not a regulated substance under the risk management program. Farmers are not responsible for preparing a risk management plan if ammonia held for use as a fertilizer is the only listed regulated substance that they have in more than threshold quantities. However, ammonia that is on a farm for any other use, such as for distribution or as a coolant/refrigerant, is not exempt.

  Three program levels. The risk management planning regulation (40 CFR Part 68) defines the activities facilities must undertake to address the

risks posed by regulated substances in covered processes. To ensure that individual processes are subject to appropriate requirements that match their size and the risks they may pose, EPA has classified them into 3 categories ("programs"):

- **Program 1** requirements apply to processes for which a worst-case release, as evaluated in the hazard assessment, would not affect the public. These are processes that have **not** had an accidental release that caused serious offsite consequences.

- **Program 2** requirements apply to less complex operations that do **not** involve chemical processing.

- **Program 3** requirements apply to higher risk, complex chemical processing operations and to processes already subject to the **OSHA Process Safety Management Standard (29 CFR 1910.119)**.

Risk Management Planning. Facilities with more than a threshold quantity of any of the 140 regulated substances in a single process are required to develop a risk management program and to summarize their program in a risk management plan (RMP). A facility subject to the requirements was required to have submitted a registration and RMP by June 21, 1999, or whenever it first exceeds the threshold for a listed regulated substance after that date.

All facilities with processes in Program 1 must carry out the following elements of risk management planning:

- An offsite consequence analysis that evaluates specific potential release scenarios, including worst-case and alternative scenarios.

- A five-year history of certain accidental releases of regulated substances from covered processes.

- A risk management plan, revised at least once every five years, that describes and documents these activities for all covered processes.

Facilities with processes in Programs 2 and 3 must also address each of the following elements:

- An integrated prevention program to manage risk. The prevention program will include identification of hazards, written operating procedures, training, maintenance, and accident investigation.

- An emergency response program.

- An overall management system to put these program elements into effect.

- **National Ambient Air Quality Standards (NAAQS)/SIPS**. Under the CAA §10, each state must develop a State Implementation Plan (SIP) to identify sources of air pollution and to determine what reductions are required to meet federal air quality standards. If the applicable SIP imposes requirements on an agricultural establishment, that facility must comply with the SIP. The most likely pollutant of concern with respect to agriculture-related businesses is particulate matter.

Federal Insecticide, Fungicide, and Rodenticide Act

For agricultural producers, FIFRA is the environmental statute that most significantly impacts day-to-day operations of pesticide use. It also imposes administrative requirements on pesticide users, including agricultural producers. A summary of major provisions applicable to agricultural producers is provided below.

- **Use Restrictions**. The pesticide product label is information printed on or attached to the pesticide container. Users are legally required to follow the label. Labeling is the pesticide product label and other accompanying materials which contain directions that pesticide users are legally required to follow. Under FIFRA §12, each pesticide must be used only in a way that is consistent with its labeling.

  - As a part of the pesticide registration, EPA must classify the product for general use, restricted use, or general for some uses and restricted for others (Miller, 1993). For pesticides that may cause unreasonable adverse effects on the environment, including injury to the applicator, EPA may require that the pesticide be applied either by or under the direct supervision of a certified applicator.

  - It is against the law (Endangered Species Act) to harm an endangered species. Harm includes not only acts that directly injure or kill the protected species, but also significant habitat

modification or degradation that disrupts breeding, feeding, or sheltering. Pesticide users must comply with any pesticide labeling restrictions or requirements that concern the protection of endangered species or their habitats.

- **Tolerances and Exemptions**. A tolerance is the maximum amount of pesticide residue that can be on a raw product and still be considered safe. Before EPA can register a pesticide that is used on raw agricultural products, it must grant a tolerance or exemption from a tolerance (40 CFR.163.10 through 163.12). Under the Federal Food, Drug, and Cosmetic Act (FFDCA), a raw agricultural product is deemed unsafe if it contains a pesticide residue, unless the residue is within the limits of a tolerance established by EPA or is exempt from the requirement.

  To avoid being responsible for products being over tolerance, users must be particularly careful to comply with the label instructions concerning application rate and minimum days between pesticide application and harvest (i.e., preharvest interval), slaughter, freshening, or grazing.

- **Worker Protection Standard (WPS) Requirements for Users**. The WPS for Agricultural Pesticides (40 CFR Parts 156 and 170) covers pesticides that are used in the commercial production of agricultural plants on farms, forests, nurseries, and greenhouses. The WPS requires pesticide users to take steps to reduce the risk of pesticide-related illness and injury if they or their employees may be exposed to pesticides used in the commercial production of agricultural plants.

- **Cancellation and Suspension**. EPA can cancel a registration if it is determined that the pesticide or its labeling does not comply with the requirements of FIFRA or causes unreasonable adverse effects on the environment (Haugrud, 1993).

  In cases where EPA believes that an "imminent hazard" would exist if a pesticide were to continue to be used through the cancellation proceedings, EPA may suspend the pesticide registration through an order and thereby halt the sale, distribution, and usage of the pesticide. An "imminent hazard" is defined as an unreasonable adverse effect on the environment or an unreasonable hazard to the survival of a threatened or endangered species that would be the likely result of allowing continued use of a pesticide during a cancellation process.

When EPA believes and emergency exists that does not permit a hearing to be held prior to suspending, EPA can issue an emergency order that makes the suspension immediately effective.

Toxic Substances Control Act

TSCA has a limited impact on the agricultural sector. TSCA §3, Definitions, specifies that the term chemical substance means any organic or inorganic substance of a particular molecular identity. The definition also states, as declared at subsection (2)(B)(ii), that such term does not include any pesticide (as defined in FIFRA) when manufactured, processed, or distributed in commerce for use as a pesticide. Since the majority of potentially hazardous substances used by agricultural producers are pesticides, they are regulated under FIFRA. Regulation of hazardous substances under other authorities is part of TSCA's overall scheme which allows EPA to decline to regulate a chemical under TSCA if other federal regulatory authorities (e.g., FIFRA) are sufficiently addressing the risks posed from those substances.

- **Asbestos and Asbestos-Containing Material**. Under TSCA §6 and 40 CFR Part 61, Subpart M, EPA regulates the renovation/demolition activities, notification, work practices and removal, and disposal of asbestos-containing material (ACM). ACM should be carefully monitored; however, the mere presence of asbestos in a building is not considered hazardous. ACM that becomes damaged, however, may pose a health risk since it may release asbestos fibers over time. If a material is suspected of containing asbestos and it is more than slightly damaged, or if changes need to be made to a building that might disturb it, repair or removal of the ACM by a professional is needed.

- **Asbestos Brake Pads**. Facilities that repair their own brakes should be aware of asbestos requirements. Asbestos brake pads must be removed using appropriate control measures so that no visible emissions of asbestos will be discharged to the outside air. These measures can include one of the following: (1) wetting that is generally done through the use of a brake washing solvent bath, such as those provided by a service; (2) vacuuming that is usually performed with a commercial brake vacuum specifically designed for use during brake pad changing or pad re-lining operations; or (3) combination of wetting and vacuuming.

  Asbestos brake pads and wastes must be managed by: (1) labeling equipment, (2) properly disposing of spent solvent, (3) properly disposing of used vacuum filters, and (4) sealing used brake pads. The containers or

wrapped packages must be labeled using warning labels as specified by OSHA [29 CFR 1910.001 (j) (2) or 1926.58 (k)(2)(iii)].
Asbestos waste must be disposed of as soon as practical at an EPA-approved disposal site. The asbestos containers must be labeled with the name and location of the waste generator. Vehicles used to transport the asbestos must be clearly labeled during loading and unloading. The waste shipment records must be maintained (40 CFR 61.150) so that the asbestos shipment can be tracked and substantiated.

- **Polychlorinated Biphenyls (PCBs)**. PCBs were widely used in electrical equipment manufactured from 1932 to 1978. Types of equipment potentially containing PCBs include transformers and their bushings, capacitors, reclosers, regulators, electric light ballasts, and oil switches. Any equipment containing PCBs in their dielectric fluid at concentrations of greater than 50 ppm are subject to the PCB requirements.

  Under TSCA §6 and 40 CFR Part 761, facilities must ensure through activities related to the management of PCBs (e.g., inspections for leaks, proper storage) that human food or animal feed are not exposed to PCBs. While the regulations do not establish a specific distance limit, any item containing PCBs is considered to pose an unacceptable exposure risk to food or feed if PCBs released in any form have the potential to reach/ contaminate food or feed.

- **Lead**. Approximately 1.7 million children have blood-lead levels high enough to raise health concerns. Studies suggest that lead exposure from deteriorated residential lead-based paint, contaminated soil, and lead in dust are among the major existing sources of lead exposure among children in the U.S.

  Section 1018 of the Residential Lead-Based Paint Hazard Reduction Act of 1992 directs EPA and the Department of Housing and Urban Development (HUD) to jointly issue regulations requiring disclosure of known lead-based paint and/or lead-based paint hazards by persons selling or leasing housing constructed before the phaseout of residential lead-based paint use in 1978. Under that authority, EPA and HUD jointly issued on March 6, 1996, regulations titled *Lead; Requirements for Disclosure of Known Lead-Based Paint and/or Lead-Based Paint Hazards in Housing* (40 CFR Part 35 and 40 CFR Part 745). In these regulations, EPA and HUD established requirements for sellers/lessors of residential housing built before 1978.

Pre-Renovation Lead Information Rule. If conducted improperly, renovations in housing with lead-based paint can create serious health hazards to workers and occupants by releasing large amounts of lead dust and debris. Under TSCA §406 and through a rule published on June 1, 1998 entitled *Lead; Requirements for Hazard Education Before Renovation of Target Housing* (40 CFR Part 745), EPA required the distribution of lead hazard information (i.e., EPA-developed pamphlet) prior to professional renovations on residential housing built before 1978.

IV.C. Proposed and Pending Regulations

Clean Water Act

Feedlots Effluent Limitation Guidelines. EPA is in the process of reviewing and revising the effluent limitation guidelines for feedlots. EPA is under a court-ordered schedule to revise the guidelines for poultry and swine by December 2001 and for beef and dairy cattle by December 2002.

NPDES Implementing Regulations. EPA intends to revise the existing NPDES permitting regulations to clarify expectations and requirements for CAFOs as well as to reflect the changes in the industry. NRCS and other USDA agencies will participate on the regulatory workgroup to advise EPA on the technical and implementation aspects related to any proposed revisions. Revision of the permitting regulations is expected to be closely coordinated with the revision of the Feedlots Effluent Limitation Guidelines (40 CFR Part 412) because of the commonality of issues and the administrative efficiencies for EPA, States and all interested groups. Permits in effect on the date of new regulations will remain in effect until subsequently changed to incorporate the new requirements.

Coastal Zone Act Reauthorization Amendments of 1990

Implementation of Management Measures. Under Section 6217, states/tribes must fully implement the management measures in their Coastal Nonpoint Pollution Control Programs by January 2004. States/tribes are required to perform effectiveness monitoring between 2004 and 2006 and implement other measures between 2006 and 2009.

Safe Drinking Water Act

Management of Class V Wells. EPA plans to propose additional requirements addressing the environmental risks posed by the highest risk Class V wells. This rulemaking potentially affects agricultural operations that use industrial and commercial disposal wells and large capacity cesspools.

Federal Insecticide, Fungicide, and Rodenticide Act

Pesticide Management and Disposal: Proposed Rule - issued on May 5, 1993 (FR26857). The regulations for this rule will be found in the Code of Federal Regulations (CFR) at 40 CFR Part 165 - Regulations for the Acceptance of Certain Pesticides and Recommended Procedures for the Disposal and Storage of Pesticides and Pesticides Containers. This final rule will:

- Describe procedures for voluntary and mandatory recall actions.
- Establish criteria for acceptable storage and disposal plans which registrants may submit to EPA to become eligible for reimbursement of storage costs.
- Establish procedures for the indemnification of owners of suspended and canceled pesticides.
- Amend the Agency's responsibility for accepting for disposal suspended and canceled pesticides.

V. COMPLIANCE AND ENFORCEMENT HISTORY

V.A. Background

Until recently, EPA has focused much of its attention on measuring compliance with specific environmental statutes. This approach allows the Agency to track compliance with the Clean Air Act, the Resource Conservation and Recovery Act, the Clean Water Act, and other environmental statutes. Within the last several years, the Agency has begun to supplement single-media compliance indicators with facility-specific, multimedia indicators of compliance. In doing so, EPA is in a better position to track compliance with all statutes at the facility level and within specific industrial sectors.

A major step in building the capacity to compile multimedia data for industrial sectors was the creation of EPA's Integrated Data for Enforcement Analysis (IDEA) system. IDEA has the capacity to "read into" the Agency's single-media databases, extract compliance records, and match the records to individual facilities. The IDEA system can match air, water, waste, toxics/pesticides, EPCRA, Toxics Release Inventory (TRI), and enforcement docket records for a given facility and generate a list of historical permit, inspection, and enforcement activity. IDEA also has the capability to analyze data by geographic area and corporate holder. As the capacity to generate multimedia compliance data improves, EPA will make available more in-depth compliance and enforcement information. Additionally, EPA is developing sector-specific measures of success for compliance assistance efforts.

V.B. Compliance and Enforcement Profile Description

This section uses inspection, violation, and enforcement data from the IDEA system to provide information about the historical compliance and enforcement activity of this sector. While other sector notebooks have used Standard Industrial Classification (SIC) data from the Toxics Release Inventory System (TRIS) to define their data sampling universes, none of the SIC codes associated with the livestock production sector identifies facilities that report to the TRI program. As such, sector-defining data have been provided from EPA data systems

Note: Many of the previously published sector notebooks contained a chapter titled *"Chemical Release and Transfer Profile."* The information and data for that chapter were taken primarily from EPA's Toxic Release Inventory (TRI). Because the industries discussed in this notebook do not, in general, directly report to TRI, that chapter has not been included in this sector notebook.

linked to EPA's Facility Indexing System (FINDS), which tracks facilities in all media databases. This section does not attempt to define the actual number of facilities that fall within each sector. Instead, the section portrays the records of a subset of facilities within the sector that are well defined within EPA databases.

As a check on the relative size of the full sector universe, most notebooks contain an estimated number of facilities within the sector according to the Bureau of Census. With sectors dominated by small businesses, such as metal finishers and printers, the reporting universe within the EPA databases may be small in comparison to Census data. However, the group selected for inclusion in this data analysis section should be consistent with this sector's general make-up.

Before presenting the data, the next section defines general terms and the column heads used in the data tables. The data represent a retrospective summary of inspections and enforcement actions and solely reflect EPA, state, and local compliance assurance activities that have been entered into EPA databases. To identify trends, EPA ran two data queries, one for five calendar years (March 7, 1992 to March 6, 1997) and the other for a twelve-month period (March 7, 1996 to March 6, 1997). The five-year analysis gives an average level of activity for that period for comparison to the more recent activity.

Because most inspections focus on single-media requirements, the data queries presented in this section are taken from single media databases. These databases do not provide data on whether inspections are state/local or EPA-led. However, the table breaking down the universe of violations does give the reader a crude measurement of the EPA's and state's efforts within each media program. The presented data illustrate the variations across EPA regions for certain sectors[1]. This variation may be attributable to state/local data entry variation, specific geographic concentrations, proximity to population centers, sensitive ecosystems, highly toxic chemicals used in production, or historical noncompliance. Hence, the exhibited data do not rank regional performance or necessarily reflect which regions may have the most compliance problems.

[1]EPA Regions are as follows: I (CT, MA, ME, RI, NH, VT); II (NJ, NY, PR, VI); III (DC, DE, MD, PA, VA, WV); IV (AL, FL, GA, KY, MS, NC, SC, TN); V (IL, IN, MI, MN, OH, WI); VI (AR, LA, NM, OK, TX); VII (IA, KS, MO, NE); VIII (CO, MT, ND, SD, UT, WY); IX (AZ, CA, HI, NV, Pacific Trust Territories); X (AK, ID, OR, WA).

Compliance and Enforcement Data Definitions

General Definitions

Facility Indexing System (FINDS) - assigns a common facility number to EPA single-media permit records, establishing a linkage capability to the permit data. The FINDS identification number allows EPA to compile and review all permit, compliance, enforcement, and pollutant release data for any given regulated facility.

Integrated Data for Enforcement Analysis (IDEA) **-** is a data integration system that can retrieve information from the major EPA program office databases. IDEA uses the FINDS identification number to link separate data records from EPA's databases. This allows retrieval of records from across media or statutes for any given facility, this creating a "master list" of records for that facility. Some of the data systems accessible through IDEA are AFS (Air Facility Indexing and Retrieval System, Office of Air and Radiation), PCS (Permit Compliance System, Office of Water), RCRIS (Resource Conservation and Recovery Information System, Office of Solid Waste), NCBD (National Compliance Data Base, Office of Prevention, Pesticides, and Toxic Substances), CERCLIS (Comprehensive Environmental and Liability Information System, Superfund), and TRIS. IDEA also contains information from outside sources, such as Dun and Bradstreet (DUN) and the Occupational Safety and Health Administration (OSHA). Most data queries displayed in this section were conducted using IDEA.

Data Table Column Heading Definitions

Facilities in Search - based on the universe of TRI reporters within the listed SIC code range. For industries not covered under TRI reporting requirements, or industries in which only a very small fraction of facilities report to TRI, the notebook uses the FINDS universe for executing data queries. The SIC code range selected for each search is defined by each notebook's selected SIC code coverage described in Section II.

Facilities Inspected - indicates the level of EPA and state agency inspections for the facilities in this data search. These values show what percentage of the facility universe is inspected in a one-year or five-year period.

Number of Inspections - measures the total number of inspections conducted in this sector. An inspection event is counted each time it is entered into a single media database.

Average Time Between Inspections - provides an average length of time, expressed in months, between compliance inspections at a facility within the defined universe.

Facilities With One or More Enforcement Actions - expresses the number of facilities that were the subject of at least one enforcement action within the defined time period. This category is broken down further into federal and state actions. Data are obtained for administrative, civil/judicial, and criminal state actions. A facility with multiple enforcement actions is only counted once in this column, e.g., a facility with 3 enforcement actions counts as 1 facility.

Total Enforcement Actions - describes the total number of enforcement actions identified for an industrial sector across all environmental statutes. A facility with multiple enforcement actions is counted multiple times (i.e., a facility with 3 enforcement actions counts as 3).

State Lead Actions - shows what percentage of the total enforcement actions are taken by state and local environmental agencies. Varying levels of use by states of EPA data systems may limit the volume of actions accorded state enforcement activity. Some states extensively report enforcement activities into EPA data systems, while other states may use their own data systems.

Federal Lead Actions - shows what percentage of the total enforcement actions are taken by the U.S. EPA. This value includes referrals from state agencies. Many of these actions result from coordinated or joint federal/state efforts.

Enforcement to Inspection Rate - is a ratio of enforcement actions to inspections, and is presented for comparative purposes only. The ratio is a rough indicator of the relationship between inspections and enforcement. It relates the number of enforcement actions and the number of inspections that occurred within the one-year or five-year period. This ratio includes inspections and enforcement actions reported under the Clean Water Act (CWA), the Clean Air Act (CAA) and the Resource Conservation and Recovery Act (RCRA). Inspections and actions from the TSCA/FIFRA/EPCRA database are not factored into this ratio because most of the actions taken under these programs are not the result of facility inspections. Also, this ratio does not account for enforcement actions arising from non-inspection compliance monitoring activities (e.g., self-reported water discharges) that can result in enforcement action within the CAA, CWA and RCRA.

Facilities with One or More Violations Identified - expresses the percentage of inspected facilities having a violation identified in one of the following data

categories: In Violation or Significant Violation Status (CAA); Reportable Noncompliance, Current Year Noncompliance, Significant Noncompliance (CWA); Noncompliance and Significant Noncompliance (FIFRA, TSCA, and EPCRA); Unresolved Violation and Unresolved High Priority Violation (RCRA). The values presented for this column reflect the extent of noncompliance within the measured time frame, but do not distinguish between the severity of the noncompliance. Violation status may be a precursor to an enforcement action, but does not necessarily indicate that an enforcement action will occur.

Media Breakdown of Enforcement Actions and Inspections - four columns identify the proportion of total inspections and enforcement actions within EPA Air, Water, Waste, and TSCA/FIFRA/EPCRA databases. Each column is a percentage of either the "Total Inspections," or the "Total Actions" column.

V.C. Livestock Production Industry Compliance History

Exhibit 19 provides an overview of the reported compliance and enforcement data for the livestock sector over a 5-year period (March 1992 to March 1997). These data are also broken out by EPA regions thereby permitting geographical comparisons. A few points evident from the data are listed below.

Note: It should be noted that the data presented in this section represent federal enforcement activity only. Enforcement activity conducted at the state level is not included in this analysis.

- Of the 1,001 facilities identified through IDEA with livestock SIC codes, approximately 20 percent (205) were inspected in the last 5 years.
- Region 4 had more inspections (163) than other regions and the most enforcement actions (9), accounting for 29 percent of the total enforcement actions.
- Region 10 had only 3 percent of the total inspections, but had 16 percent of the total enforcement actions yielding the highest enforcement/inspection ratio of 0.29.
- The total inspections (600) conducted nationwide have resulted in 31 enforcement actions, which results in an enforcement-to-inspection rate of 0.05. This means that for every 100 inspections conducted, there are approximately 5 resulting enforcement actions.

- Enforcement actions were primarily state-led (84%). Regions 7 and 9 had no enforcement actions.

- Several regions (1, 4, 6, 7, 8, 10) had an average time between inspections of greater than 100 months.

Exhibit 19. Five-Year Enforcement and Compliance Summary for the Livestock Industry

A	B	C	D	E	F	G	H	I	J
Region	Facilities in Search	Facilities Inspected	Number of Inspections	Average Months Between Inspections	Facilities with 1 or More Enforcement Actions	Total Enforcement Actions	Percent State Lead Actions	Percent Federal Lead Actions	Enforcement to Inspection Rate
I	16	3	5	192	2	1	100%	0%	0.20
II	20	12	33	36	3	6	100%	0%	0.18
III	49	24	161	18	3	5	100%	0%	0.03
IV	304	67	163	112	7	9	56%	44%	0.06
V	69	18	42	99	2	3	100%	0%	0.07
VI	96	6	14	411	1	1	100%	0%	0.07
VII	217	11	20	651	0	0	--	--	--
VIII	122	23	67	109	1	1	100%	0%	0.01
IX	40	35	78	31	0	0	--	--	--
X	68	6	17	240	1	5	80%	20%	0.29
TOTAL	1,001	205	600	100	20	31	84%	16%	0.05

Comparison of Enforcement Activity Between Selected Industries

Exhibits 20 and 21 allow the compliance history of the livestock production sector to be compared to other industries covered by the sector notebooks. Comparisons between these exhibits permit the identification of trends in compliance and enforcement records of the various industries by comparing data covering a 5-year period (March 1992 to March 1997) to that of a 1-year period (March 1996 to March 1997). Some points evident from the data are listed below.

- The one-year enforcement-to-inspection ratio (0.01) is one-fifth of the five-year ratio (0.05).

- In the 5-year comparison, the average months between inspections (100) was more than any other sector.

- In Exhibit 20, the livestock production industry data approximate the averages of the industries shown for percent state-lead versus federal-led actions.

- In Exhibit 21, when compared to all sectors over the period March 1996 - March 1997, the livestock sector had the third fewest number of inspections conducted (146) and fewest enforcement actions (2).

Exhibits 22 and 23 provide a more in-depth comparison between the livestock production sector and other sectors by breaking out compliance and enforcement data by environmental statute. As in the previous exhibits (Exhibits 20 and 21), the data cover a 5-year period (Exhibit 22) and a 1-year period (Exhibit 23) to facilitate the identification of recent trends. Points evident from the data are listed below.

- As shown in Exhibit 22, over the past 5 years, more than half (57%) of all inspections conducted at livestock facilities and nearly two-thirds (65%) of all enforcement actions have been under the Clean Water Act. It should be noted that 3 percent of all enforcement actions were taken under the FIFRA/TSCA/EPCRA/Other category although no inspections were conducted within that category. This number is possible because in many EPA regions, media inspectors are being trained to examine the facility from a multimedia viewpoint.

- As shown in Exhibits 22 and 23, Clean Water Act inspections account for more than half (57% and 51%, respectively) of all inspections, with the Clean Air Act representing nearly all of the remaining inspections (38% and 48%, respectively). However, from March 1996 - March

1997, every single enforcement action taken was under the Clean Water Act.

Exhibit 20. Five-Year Enforcement and Compliance Summary for Selected Industries

A	B	C	D	E	F	G	H	I	J
Industry Sector	**Facilities in Search**	**Facilities Inspected**	**Number of Inspections**	**Average Months Between Inspections**	**Facilities with 1 or More Enforcement Actions**	**Total Enforcement Actions**	**Percent State Lead Actions**	**Percent Federal Lead Actions**	**Enforcement to Inspection Rate**
Livestock	**1,001**	**205**	**600**	**100**	**20**	**31**	**84%**	**16%**	**0.05**
Crop Production	6,688	3,046	10,453	38	141	262	73%	27%	0.03
Metal Mining	1,232	378	1,600	46	63	111	53%	47%	0.07
Coal Mining	3,256	741	3,748	52	88	132	89%	11%	0.04
Oil and Gas Extraction	4,676	1,902	6,071	46	149	309	79%	21%	0.05
Non-Metallic Mineral Mining	5,256	2,803	12,826	25	385	622	77%	23%	0.05
Textiles	355	267	1,465	15	53	83	90%	10%	0.06
Lumber and Wood	712	473	2,767	15	134	265	70%	30%	0.10
Furniture	499	386	2,379	13	65	91	81%	19%	0.04
Pulp and Paper	484	430	4,630	6	150	478	80%	20%	0.10
Printing	5,862	2,092	7,691	46	238	428	88%	12%	0.06
Inorganic Chemicals	441	286	3,087	9	89	235	74%	26%	0.08
Resins and Manmade Fibers	329	263	2,430	8	93	219	76%	24%	0.09
Pharmaceuticals	164	129	1,201	8	35	122	80%	20%	0.10
Organic Chemicals	425	355	4,294	6	153	468	65%	35%	0.11
Agricultural Chemicals	263	164	1,293	12	47	102	74%	26%	0.08
Petroleum Refining	156	148	3,081	3	124	763	68%	32%	0.25
Rubber and Plastic	1,818	981	4,383	25	178	276	82%	18%	0.06
Stone, Clay, Glass and Concrete	615	388	3,474	11	97	277	75%	25%	0.08
Iron and Steel	349	275	4,476	5	121	305	71%	29%	0.07
Metal Castings	669	424	2,535	16	113	191	71%	29%	0.08
Nonferrous Metals	203	161	1,640	7	68	174	78%	22%	0.11
Fabricated Metal Products	2,906	1,858	7,914	22	365	600	75%	25%	0.08
Electronics	1,250	863	4,500	17	150	251	80%	20%	0.06
Automobile Assembly	1,260	927	5,912	13	253	413	82%	18%	0.07
Aerospace	237	184	1,206	12	67	127	75%	25%	0.10
Shipbuilding and Repair	44	37	243	9	20	32	84%	16%	0.13
Ground Transportation	7,786	3,263	12,904	36	375	774	84%	16%	0.06
Water Transportation	514	192	816	38	36	70	61%	39%	0.09
Air Transportation	444	231	973	27	48	97	88%	12%	0.10
Fossil Fuel Electric Power	3,270	2,166	14,210	14	403	789	76%	24%	0.06
Dry Cleaning	6,063	2,360	3,813	95	55	66	95%	5%	0.02

Exhibit 21. One-Year Enforcement and Compliance Summary for Selected Industries

A	B	C	D	E		F		G	H
Industry Sector	Facilities in Search	Facilities Inspected	Number of Inspections	Facilities with 1 or More Violations		Facilities with 1 or more Enforcement Actions		Total Enforcement Actions	Enforcement to Inspection Rate
				Number	Percent*	Number	Percent*		
Livestock	**1001**	**107**	**146**	**22**	**21%**	**2**	**2%**	**2**	**0.01**
Crop Production	6688	1012	1459	866	86%	23	2%	29	0.02
Metal Mining	1,232	142	211	102	72%	9	6%	10	0.05
Coal Mining	3,256	362	765	90	25%	20	6%	22	0.03
Oil and Gas Extraction	4,676	874	1,173	127	15%	26	3%	34	0.03
Non-Metallic Mineral Mining	5,256	1,481	2,451	384	26%	73	5%	91	0.04
Textiles	355	172	295	96	56%	10	6%	12	0.04
Lumber and Wood	712	279	507	192	69%	44	16%	52	0.10
Furniture	499	254	459	136	54%	9	4%	11	0.02
Pulp and Paper	484	317	788	248	78%	43	14%	74	0.09
Printing	5,862	892	1,363	577	65%	28	3%	53	0.04
Inorganic Chemicals	441	200	548	155	78%	19	10%	31	0.06
Resins and Manmade Fibers	329	173	419	152	88%	26	15%	36	0.09
Pharmaceuticals	164	80	209	84	105%	8	10%	14	0.07
Organic Chemicals	425	259	837	243	94%	42	16%	56	0.07
Agricultural Chemicals	263	105	206	102	97%	5	5%	11	0.05
Petroleum Refining	156	132	565	129	98%	58	44%	132	0.23
Rubber and Plastic	1,818	466	791	389	83%	33	7%	41	0.05
Stone, Clay, Glass and Concrete	615	255	678	151	59%	19	7%	27	0.04
Iron and Steel	349	197	866	174	88%	22	11%	34	0.04
Metal Castings	669	234	433	240	103%	24	10%	26	0.06
Nonferrous Metals	203	108	310	98	91%	17	16%	28	0.09
Fabricated Metal	2,906	849	1,377	796	94%	63	7%	83	0.06
Electronics	1,250	420	780	402	96%	27	6%	43	0.06
Automobile Assembly	1,260	507	1,058	431	85%	35	7%	47	0.04
Aerospace	237	119	216	105	88%	8	7%	11	0.05
Shipbuilding and Repair	44	22	51	19	86%	3	14%	4	0.08
Ground Transportation	7,786	1,585	2,499	681	43%	85	5%	103	0.04
Water Transportation	514	84	141	53	63%	10	12%	11	0.08
Air Transportation	444	96	151	69	72%	8	8%	12	0.08
Fossil Fuel Electric Power	3,270	1,318	2,430	804	61%	100	8%	135	0.06
Dry Cleaning	6,063	1,234	1,436	314	25%	12	1%	16	0.01

**Percentages in Columns E and F are based on the number of facilities inspected (Column C). Percentages can exceed 100% because violations and actions can occur without a facility inspection.*

Exhibit 22. Five-Year Inspection and Enforcement Summary by Statute for Selected Industries

Industry Sector	Facilities Inspected	Total Inspections	Total Enforcement Actions	Clean Air Act		Clean Water Act		RCRA		FIFRA/TSCA/ EPCRA/Other	
				% of Total Inspections	% of Total Actions	% of Total Inspections	% of Total Actions	% of Total Inspections	% of Total Actions	% of Total Inspections	% of Total Actions
Livestock	**205**	**600**	**31**	**38%**	**26%**	**57%**	**65%**	**3%**	**6%**	**0%**	**3%**
Crop Production	3,046	10,453	262	72%	35%	11%	23%	13%	25%	3%	17%
Metal Mining	378	1,600	111	39%	19%	52%	52%	8%	12%	1%	17%
Coal Mining	741	3,748	132	57%	64%	38%	28%	4%	8%	1%	1%
Oil and Gas Extraction	1,902	6,071	309	75%	65%	16%	14%	8%	18%	0%	3%
Non-Metallic Mineral Mining	2,803	12,826	622	83%	81%	14%	13%	3%	4%	0%	3%
Textiles	267	1,465	83	58%	54%	22%	25%	18%	14%	2%	6%
Lumber and Wood	473	2,767	265	49%	47%	6%	6%	44%	31%	1%	16%
Furniture	386	2,379	91	62%	42%	3%	0%	34%	43%	1%	14%
Pulp and Paper	430	4,630	478	51%	59%	32%	28%	15%	10%	2%	4%
Printing	2,092	7,691	428	60%	64%	5%	3%	35%	29%	1%	4%
Inorganic Chemicals	286	3,087	235	38%	44%	27%	21%	34%	30%	1%	5%
Resins and Manmade Fibers	263	2,430	219	35%	43%	23%	28%	38%	23%	4%	6%
Pharmaceuticals	129	1,201	122	35%	49%	15%	25%	45%	20%	5%	5%
Organic Chemicals	355	4,294	468	37%	42%	16%	25%	44%	28%	4%	6%
Agricultural Chemicals	164	1,293	102	43%	39%	24%	20%	28%	30%	5%	11%
Petroleum Refining	148	3,081	763	42%	59%	20%	13%	36%	21%	2%	7%
Rubber and Plastic	981	4,383	276	51%	44%	12%	11%	35%	34%	2%	11%
Stone, Clay, Glass and Concrete	388	3,474	277	56%	57%	13%	9%	31%	30%	1%	4%
Iron and Steel	275	4,476	305	45%	35%	26%	26%	28%	31%	1%	8%
Metal Castings	424	2,535	191	55%	44%	11%	10%	32%	31%	2%	14%
Nonferrous Metals	161	1,640	174	48%	43%	18%	17%	33%	31%	1%	10%
Fabricated Metal	1,858	7,914	600	40%	33%	12%	11%	45%	43%	2%	13%
Electronics	863	4,500	251	38%	32%	13%	11%	47%	50%	2%	7%
Automobile Assembly	927	5,912	413	47%	39%	8%	9%	43%	43%	2%	9%
Aerospace	184	1,206	127	34%	38%	10%	11%	54%	42%	2%	9%
Shipbuilding and Repair	37	243	32	39%	25%	14%	25%	42%	47%	5%	3%
Ground Transportation	3,263	12,904	774	59%	41%	12%	11%	29%	45%	1%	3%
Water Transportation	192	816	70	39%	29%	23%	34%	37%	33%	1%	4%
Air Transportation	231	973	97	25%	32%	27%	20%	48%	48%	0%	0%
Fossil Fuel Electric Power	2,166	14,210	789	57%	59%	32%	26%	11%	10%	1%	5%
Dry Cleaning	2,360	3,813	66	56%	23%	3%	6%	41%	71%	0%	0%

Exhibit 23. One-Year Inspection and Enforcement Summary by Statute for Selected Industries

Industry Sector	Facilities Inspected	Total Inspections	Total Enforcement Actions	Clean Air Act		Clean Water Act		RCRA		FIFRA/TSCA/ EPCRA/Other	
				% of Total Inspections	% of Total Actions	% of Total Inspections	% of Total Actions	% of Total Inspections	% of Total Actions	% of Total Inspections	% of Total Actions
Livestock	**107**	**146**	**2**	**48%**	**0%**	**51%**	**100%**	**1%**	**0%**	**0%**	**0%**
Crop Production	1012	1459	29	71%	31%	13%	34%	16%	28%	0%	7%
Metal Mining	142	211	10	52%	0%	40%	40%	8%	30%	0%	30%
Coal Mining	362	765	22	56%	82%	40%	14%	4%	5%	0%	0%
Oil and Gas Extraction	874	1,173	34	82%	68%	10%	9%	9%	24%	0%	0%
Non-Metallic Mineral Mining	1,481	2,451	91	87%	89%	10%	9%	3%	2%	0%	0%
Textiles	172	295	12	66%	75%	17%	17%	17%	8%	0%	0%
Lumber and Wood	279	507	52	51%	30%	6%	5%	44%	25%	0%	40%
Furniture	254	459	11	66%	45%	2%	0%	32%	45%	0%	9%
Pulp and Paper	317	788	74	54%	73%	32%	19%	14%	7%	0%	1%
Printing	892	1,363	53	63%	77%	4%	0%	33%	23%	0%	0%
Inorganic Chemicals	200	548	31	35%	59%	26%	9%	39%	25%	0%	6%
Resins and Manmade Fibers	173	419	36	38%	51%	24%	38%	38%	5%	0%	5%
Pharmaceuticals	80	209	14	43%	71%	11%	14%	45%	14%	0%	0%
Organic Chemicals	259	837	56	40%	54%	13%	13%	47%	34%	0%	0%
Agricultural Chemicals	105	206	11	48%	55%	22%	0%	30%	36%	0%	9%
Petroleum Refining	132	565	132	49%	67%	17%	8%	34%	15%	0%	10%
Rubber and Plastic	466	791	41	55%	64%	10%	13%	35%	23%	0%	0%
Stone, Clay, Glass and Concrete	255	678	27	62%	63%	10%	7%	28%	30%	0%	0%
Iron and Steel	197	866	34	52%	47%	23%	29%	26%	24%	0%	0%
Metal Castings	234	433	26	60%	58%	10%	8%	30%	35%	0%	0%
Nonferrous Metals	108	310	28	44%	43%	15%	20%	41%	30%	0%	7%
Fabricated Metal	849	1,377	83	46%	41%	11%	2%	43%	57%	0%	0%
Electronics	420	780	43	44%	37%	14%	5%	43%	53%	0%	5%
Automobile Assembly	507	1,058	47	53%	47%	7%	6%	41%	47%	0%	0%
Aerospace	119	216	11	37%	36%	7%	0%	54%	55%	1%	9%
Shipbuilding and Repair	22	51	4	54%	0%	11%	50%	35%	50%	0%	0%
Ground Transportation	1,585	2,499	103	64%	46%	11%	10%	26%	44%	0%	1%
Water Transportation	84	141	11	38%	9%	24%	36%	38%	45%	0%	9%
Air Transportation	96	151	12	28%	33%	15%	42%	57%	25%	0%	0%
Fossil Fuel Electric Power	1,318	2,430	135	59%	73%	32%	21%	9%	5%	0%	0%
Dry Cleaning	1,234	1,436	16	69%	56%	1%	6%	30%	38%	0%	0%

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VI. REVIEW OF MAJOR LEGAL ACTIONS AND COMPLIANCE/ENFORCEMENT STRATEGIES

This section provides summary information about major cases that have affected the livestock production industry, as well as regional highlights of CAFO compliance/enforcement strategies.

Usually, this section also contains information on any supplemental environmental projects (SEPs) that were negotiated. SEPs are compliance agreements that reduce a facility's stipulated penalty in return for an environmental project that exceeds the value of the reduction. However, no information on SEPs in this sector was discovered during the research process. Often, these projects fund pollution prevention activities that can significantly reduce the future pollutant loadings of a facility. To learn more about SEPs, go to http://www.epa.gov/oeca/sep.

Review of Major Cases

A review of EPA's FY92 and FY93 *Enforcement Accomplishments Report* and the FY94 through FY98 *Enforcement and Compliance Assurance Accomplishments Report* identified several cases involving the livestock production industry. These cases are discussed below.

- In February 1999, EPA cited David Jaindl, president of Jaindl Land Company, for filling in federally protected wetlands at a turkey farm. EPA has alleged that Mr. Jaindl violated the Clean Water Act by filling three acres of wetlands at the farm in September and October 1998 without a required permit from the U.S. Army Corps of Engineers. EPA is seeking a $44,000 penalty for this violation.

- In October 1996, an Administrative Penalty Order (APO) with a $25,000 penalty was administered against *Del Oro Dairy* of New Mexico for failing to provide a Pollution Prevention Plan as required by the NPDES General Permit for Concentrated Animal Feeding Operations. This violation occurred from 1994 thru 1996. In March 1997, another Administrative Penalty Order and $5,500 fine was issued for failure to complete and implement a Pollution Prevention Plan. These enforcement actions are intended to prevent the pollution of the groundwater by requiring the facility to apply good management practices.

- *United States v. Harry James Saul and Ronnie Snead:* Harry Saul, part owner and operator of Harry Saul Minnow Farm, Inc., Prairie County, Arkansas, and a company employee, Ronnie Snead, were sentenced on June 19, 1996 by Federal Magistrate Henry Jones for a misdemeanor

violation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The defendants had mixed furadan, a restricted use pesticide, with minnows and spread the treated minnows on a levee on the minnow farm to control nuisance birds. Saul was ordered to pay a $5,000 fine and Snead a $1,000 fine for use inconsistent with the label. The defendants are appealing the Court's judgement.

- During fiscal year 1996, *Esplin Dairy* allegedly discharged approximately 900,000 pounds per year of animal waste to a slough discharging to Nehalem Bay, Oregon. In response to an EPA order, the dairy set up a system to keep manure from contaminating clean water and installed a 10,000 gallon tank to collect wastewater before pumping it to larger containment facilities. The wastewater is high in fecal coliform bacteria, BOD, TSS, and nutrients.

- The *Four Brothers Dairy* paid a penalty of $7,350 in fiscal year 1996 for the alleged unpermitted discharge of an estimated 561,000 gallons of wastewater from its Shoshone, Idaho dairy to a canal draining to the Snake River. EPA measured fecal coliform levels as high as 180,000 colonies/100ml in the wastewater in the canal.

- *Gienger Farms, Inc.* allegedly discharged approximately 1.3 million gallons of manure-laden wastewater to drainage ditches flowing into the Tillamook Bay, Oregon, without a permit. In fiscal year 1996, in response to an EPA administrative complaint, the farm paid a $20,000 penalty and modified its operations to separate clean water from contaminated material, thereby extending the holding capacity of its wastewater storage lagoon from two to 57 days. In addition, the facility began monitoring and managing its land application practices, thus preventing the discharge of wastewater containing about 6,435 pounds of BOD and TSS to waters of the U.S.

- In fiscal year 1996, *Misty Meadow Dairy* agreed to pay a $6,000 fine for the alleged unpermitted discharge of about 685,000 pounds of manure per year to navigable waters flowing into Tillamook Bay, Oregon. The dairy is expected to sell half of its herd in order to allow more flexibility in managing waste accumulations.

- In fiscal year 1996, *Veeman Dairy* paid a $1,000 penalty for allegedly discharging 52 to 78 million gallons of wastewater to navigable waters flowing into the Willamette River, Oregon. In response to a separate compliance order, the dairy will repair and maintain its wastewater storage ponds to eliminate future discharges.

- In March 1998, a significant criminal enforcement case was taken by the California Resource Board. The U.S. District Court assessed the operator of the *3H Dairy Farm* in Oakdale, CA a $100,000 fine; $101,000 in farm improvements; 90 days in jail; 90 days of home confinement; and 4 years of probation for repeatedly violating state water pollution laws.

Regional Initiatives

According to the FY 1997 and FY 1998 *Enforcement and Compliance Assurance Accomplishments Reports*, several regions targeted their enforcement efforts on agricultural practices during these fiscal years. It should be noted that while CAFOs were the primary focus within the agriculture sector, there were other agriculture activities as well. Some of the Regional initiatives included the following:

- During FY 96, **Region 6** conducted CAFO inspections in the states of Oklahoma, Texas, and New Mexico. These resulted in the EPA issuing five Orders for non-compliance and two Administrative Penalty Orders. The State of Texas also issued penalty actions to three dairies for violation of the State permit. Region 6's emphasis on CAFOs was on the NPDES general permit and its implementation. Six EPA and 24 state CAFO inspections were conducted in FY97 to determine whether facilities were compliant with the CAFO general permit. The region continues to improve its knowledge of the numbers of facilities by the improvement of the database in all states.

- In FY 1997, **Region 7** states took 26 enforcement actions against feedlots for water quality-related violations. In FY 1998, Iowa settled 13 CAFO cases with penalties of $21,238; Kansas settled 4 CAFO cases with $77,520 in penalties; Missouri settled 12 CAFO cases with $20,256 in penalties; and Nebraska settled 2 CAFO cases with $1,700 in penalties.

- In February 1997, **Region 9** initiated a Regional Agriculture Team to complement the Agriculture Initiative team by developing a Regional Agriculture Strategy and incorporating agriculture pollution prevention principles into core agency programs.

- Through the **Region 10** CAFO Whatcom County Initiative, the Region conducted NPDES inspections at 67 targeted facilities; six were issued penalties, three were designated as significant contributors of pollutants, six were issued certificates of merit, and 52 were issued warning letters.

CAFO Compliance/Enforcement Strategies

EPA concluded a total of 93 enforcement cases against this sector in fiscal years 1997, 1998, and 1999 with a total of $163,000 in penalties. In FY 98, Regions conducted 339 compliance inspections. Each Region is working with its NPDES States to develop and implement individual state specific CAFO strategies. Regional highlights include:

- **Region 3** served as the EPA lead on the recently concluded national Poultry Dialog which included recommendations for actions by the poultry industry. Recently, in a key action growing out of the dialog, Perdue Farms Inc. agreed to help farmers dispose of chicken waste in the Delmarva peninsula region.

- **Region 6** held 5 outreach meetings in 4 states in 1998. The Region conducted 95 inspections resulting in 20 administrative orders and 2 administrative penalties.

- **Region 7** initiated a compliance tracking system to collect accurate and readily available information about state CAFO enforcement actions and penalty amounts. The Region also developed maps of CAFO locations in Iowa and Kansas by using state databases.

- **Region 9's** approach combines compliance assistance and inspections/enforcement. The Region is one of 20+ partners of the California Dairy Initiative which seeks to combine education, outreach, nutrient management plans with third party certification. In addition, the Region has developed an inspection targeting approach based on herd size and proximity to surface water. In 1998, the region conducted 133 inspections in 3 counties. The region issued 3 compliance orders and 2 penalty orders against dairy operators.

- **Region 10** expanded its compliance enforcement focus to include an additional 4 other counties in Western Washington State. The Region conducted 58 inspections resulting in 11 compliance orders/penalties; 3 compliance orders only; and 33 warning letters. Facilities found in compliance were issued courtesy letters. EPA’s efforts have succeeded in raising public awareness as indicated by real-estate appraisers asking if EPA has any concerns about the facilities they are appraising.

VII. COMPLIANCE ASSURANCE ACTIVITIES AND INITIATIVES

This section highlights the activities undertaken by this industry sector and public agencies to voluntarily improve the sector's environmental performance. These activities include those independently initiated by industrial trade associations. In this section, the notebook also contains a listing and description of national and regional trade associations.

VII.A. Sector-Related Environmental Programs and Activities

There are several federal programs available to the agricultural community to assist agricultural producers in complying with environmental regulations and reducing pollution. The following examples represent some industry initiatives that promote compliance or assess methods to reduce environmental contamination.

National Agriculture Compliance Assistance Center

The U.S. Environmental Protection Agency (EPA), with the support of the Department of Agriculture (USDA), has developed a national Agriculture Compliance Assistance Center (Ag Center) to provide a base for "first-stop shopping" for the agricultural community -- one place for the development of comprehensive, easy-to-understand information about approaches to compliance that are both environmentally protective and agriculturally sound. The Ag Center, a program offered by EPA's Office of Compliance, seeks to increase compliance by helping the agricultural community identify flexible, common sense ways to comply with the many environmental requirements that affect their business. Initial efforts will focus on providing information about EPA's requirements. The Ag Center will rely heavily on existing sources of agricultural information and established distribution mechanisms. The Ag Center is designed so growers, livestock producers, other agribusinesses, and agricultural information/education providers can access its resources easily -- through telephone, fax, mail, and Internet. The Ag Center website can be accessed at http://www.epa.gov/oeca/ag.

Unified National Strategy for Animal Feeding Operations

As part of President Clinton's Clean Water Action Plan (CWAP), a USDA-EPA unified national strategy has been developed to minimize the water quality and public health impacts of animal feeding operations (AFOs). AFOs are agricultural enterprises where animals are kept and raised in confined situations and have been shown to contribute to significant problems in surface waters. Such problems have included nutrient loading, fish kills, and odors. AFOs are agricultural livestock facilities that confine feeding activities, concentrating livestock and their manure. There are approximately

450,000 AFOs in the U.S. Of these, 6,600 were concentrated AFOs, or CAFOs. CAFOs pose a greater environmental threat, since they confine larger numbers of animals. Less than a quarter of CAFOs have Clean Water Act permits to control the amount of wastes that run off into waterways.

The Unified National Strategy for Animal Feeding Operations presents USDA and EPA's plan for addressing the water quality and public health impacts associated with AFOs. USDA and EPA issued the final Strategy in March 1999. The USDA-EPA Unified National Strategy for Animal Feeding Operations reflects several guiding principles:

- Minimize water quality and public health impacts from AFOs.
- Focus on AFOs that represent the greatest risks to the environment and public health.
- Ensure that measures to protect the environment and public health complement the long-term sustainability of livestock production in the United States.
- Establish a national goal and environmental performance expectations for all AFOs.
- Promote, support, and provide incentives for the use of sustainable agricultural practices and systems.
- Build on the strengths of USDA, EPA, State and Tribal agencies, and other partners and make appropriate use of incentive-base approaches.
- Foster public confidence that AFOs are meeting their performance expectations and that USDA, EPA, local governments, States, and Tribes are ensuring the protection of water quality and public health.
- Coordinate activities among the USDA, EPA, and related State and Tribal agencies and other organizations that influence the management and operation of AFOs.
- Focus technical and financial assistance to support AFOs in meeting the national goal and performance expectation established in this Strategy.

USDA and EPA's goal is for AFO owners and operators to take actions to minimize water pollution from confinement facilities and land application of manure. To accomplish this goal, this Strategy is based on a national performance expectation that all AFOs should develop and implement technically sound, economically feasible, and site-specific Comprehensive Nutrient Management Plans (CNMPs) to minimize impacts on water quality and public health.

This Strategy describes short- and long- term activities to implement and improve the existing regulatory program using a two-phased approach to permitting CAFOs. During Round I, beginning in about 2000, EPA and States will issue permits to CAFOs under the existing National Pollutant Discharge

Elimination System (NPDES) regulations. During Round II, beginning in about 2005, EPA and States will reissue NPDES permits to CAFOs based on revised effluent guidelines for feedlots, as well as revised regulations for NPDES permitting and any other new information. During Round I and Round II, State NPDES permitting authorities will have flexibility to define specific permitting approaches within their existing programs. For more information, the complete unified national strategy can be accessed at http://www.epa.gov/owm/finafost.htm.

Compliance Assurance Implementation Plan For Concentrated Animal Feeding Operations

The Office of Enforcement and Compliance Assurance (OECA) is making implementation of the existing concentrated animal feeding operation (CAFO) regulations a priority. The purpose of the implementation plan is to protect and enhance water quality by ensuring compliance with the Clean Water Act and its implementing requirements. The Plan's major elements are: 1) strong state and regional compliance/enforcement partnerships; 2) effective state specific compliance/enforcement strategies; 3) productive, coordinated compliance assistance activities; 4) strong compliance monitoring programs; 5) effective enforcement; 6) better data/information on CAFOs for targeting compliance assistance and inspections; and 7) plans for developing a feedback mechanism to EPA, states, and other federal agencies. This plan was finalized in March 1998. For more information, refer to http://es.epa.gov/oeca/strategy.html.

VII.B. EPA Programs and Activities

Section 319 Nonpoint Source Management Program

In 1987, Congress amended the Clean Water Act (CWA) to establish the §319 Nonpoint Source Management Program in recognition of the need for greater federal leadership to help focus state and local nonpoint source efforts. Under §319, states, territories, and Indian tribes receive grant money to support a wide variety of activities, including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and monitoring to assess the success of specific nonpoint source implementation projects. For more information about the Clean Water Act §319 Program refer to EPA's Office of Water website at http://www.epa.gov/OWOW/NPS/sec319.html.

Clean Lakes Program

EPA's Clean Lakes Program supports a variety of lake management activities including classification, assessment, study, and restoration of lakes. The program, authorized in §314 of the Clean Water Act, was established to provide technical and financial assistance to states/tribes for restoring the

quality of publicly owned lakes. The Clean Lakes Program has funded approximately $145 million for grant activities since 1976 to address lake problems, but there have been no appropriations for the program since 1994. EPA has not requested funds for the Clean Lakes Program in recent years, but has encouraged states to use §319 funds to fund "eligible activities that might have been funded in previous years under Section 314." Information on the Clean Lakes Program is available at the following Internet site: http://www.epa.gov/owow/lakes/cllkspgm.html.

National Estuary Program

EPA's National Estuary Program is a national demonstration program, authorized in §320 of the Clean Water Act, that uses a comprehensive watershed management approach to address water quality and habitat problems in 17 estuaries. Nonpoint source pollution is a major contributor of contaminants in the estuary and coastal waters around the country. In this program, EPA and states/tribes develop conservation and management plans that recommend priority corrective actions to restore estuarine water quality, fish populations, and other designated uses of the waters. Information on the National Estuary Program is available at the following Internet site: http://www.epa.gov/owowwtr1/estuaries/nep.html or by contacting the National Estuary Program Office at (202) 260-1952.

Chesapeake Bay Program and The Great Lakes National Program

EPA's Chesapeake Bay Program and the Great Lakes National Program focus substantial resources on understanding the extent of nonpoint source pollution problems in their respective watersheds and supporting State implementation of non-point source pollution controls. Since 1984, the Chesapeake Bay Program, in particular, has supported the implementation of a substantial amount of animal waste management practices through State cost share programs funded jointly by the Bay States and EPA. Information on the Chesapeake Bay Program is available at http://www.epa.gov/owowwtr1/ecoplaces/part1/site2.html. Information on The Great Lakes National Program is available at http://www.epa.gov/glnpo/.

AgSTAR Program

The AgSTAR program is a voluntary program that promotes the use of profitable manure management systems that reduce pollution. The program, a component of President Clinton's Climate Action Plan, is based on a computer model that shows the economic value of capturing the methane naturally produced by manure.

AgSTAR, a joint program of EPA, USDA, and the Department of Energy, helps agricultural producers determine which methane recovery and use technologies will work best for them, and develops financing sources to help with start-up costs. By investing in these technologies, AgSTAR participants

realize substantial returns through reduced electrical, gas, and oil bills, revenues from high quality manure by-products, and savings on manure management operational costs. Partners also reduce pollution associated with water resources, odors, and global warming. Information on AgSTAR is available at the following Internet site: http://yosemite.epa.gov/methane/home.nsf/pages/agstar.

Ruminant Livestock Efficiency Program (RLEP)

Ruminant livestock such as cattle and sheep are the largest source of methane emissions resulting from human activity. Methane, produced as part of the animals' normal digestive process, is a potent greenhouse gas that contributes to global climate change. By improving livestock production efficiency, producers can both increase profits and reduce methane emissions.

The RLEP is a joint EPA-USDA program helping livestock producers improve their operations' efficiency, preserve the nation's natural resources and reduce methane emissions. The program focuses on reducing livestock methane emissions and producing economic benefits by offering technical assistance to producers around the country. For more information, review the Program Overview at http://yosemite.epa.gov/methane/home.nsf/pages/rlep to learn how RLEP is helping improve the environment and livestock producers' profits.

Pesticide Environmental Stewardship Program

EPA's Pesticide Environmental Stewardship Program (PESP) is a voluntary program dedicated to protecting human health and preserving the environment by reducing the risks associated with pesticide use. The partnership is a key element of the program, which is sponsored by EPA, USDA, and FDA. Current partners include agricultural producers as well as non-agricultural interests. Partners in PESP volunteer to develop and implement a well designed pesticide management plan that will produce the safest and most effective way to use pesticides. In turn, EPA provides a liaison to assist the partner in developing comprehensive, achievable goals. Liaisons act as "customer service representatives" for EPA, providing the partner with access to information and personnel. EPA also promises to integrate the partners' stewardship plans into its agricultural policies and programs.

So far, agricultural producers have committed to a number of projects, including conducting more research into IPM techniques, developing computer prediction models for more precise pesticide applications, educating their members and the public regarding pesticide use, and working with

Focus on Pesticides

EPA's Endangered Species Protection Program is designed to protect Federally-listed endangered and threatened species from exposure to pesticides.

equipment manufacturers to refine application techniques. Information on PESP is available at the following Internet site: http://www.pesp.org, or contact the PESP hotline at (800) 972-7717.

Endangered Species Protection Program

The Endangered Species Protection Program (ESPP) began in 1988. This program is largely voluntary at the present time and relies on cooperation between the U.S. Fish and Wildlife Service (FWS), EPA Regions, States, and pesticide users. ESPP is intended to provide information concerning and regulation for the use of pesticides that may adversely affect the survival, reproduction and/or food supply of listed species. Due to labeling requirements, potential users will be informed prior to making a purchase that there may be local limitations on product use due to endangered species concerns. Information on the Endangered Species Protection Program is available at the following Internet site: http://www.epa.gov/oppfead1/endanger/index.htm.

Energy Star® Buildings and Green Lights® Partnership

In 1991, EPA introduced Green Lights®, a program designed for businesses and organizations to proactively combat pollution by installing energy-efficient lighting technologies in their commercial and industrial buildings. In April 1995, Green Lights® expanded into Energy Star® Buildings— a strategy that optimizes whole-building energy-efficiency opportunities. The energy needed to run commercial and industrial buildings in the United States produces 19 percent of U.S. carbon dioxide emissions, 12 percent of nitrogen oxides, and 25 percent of sulfur dioxide, at a cost of $110 billion a year. If implemented in every U.S. commercial and industrial building, the Energy Star® Buildings upgrade approach could prevent up to 35 percent of the emissions associated with these buildings and cut the nation's energy bill by up to $25 billion annually.

The more than 2,900 participants include corporations, small businesses, universities, health care facilities, nonprofit organizations, school districts, and federal and local governments. As of March 31, 1999, Energy Star®Buildings and Green Lights® Program participants are saving $775 million in energy bills with an annual savings of 31.75 kilowatt per square foot and annual cost savings of $0.47 per square foot. By joining, participants agree to upgrade 90 percent of their owned facilities with energy-efficient lighting and 50 percent of their owned facilities with whole-building upgrades, where profitable, over a seven-year period. Energy Star® participants first reduce their energy loads with the Green Lights® approach to building tune-ups, then focus on "right sizing" their heating and cooling equipment to match their new energy needs. EPA's Office of Air and Radiation is responsible for operating the Energy Star® Buildings and Green Lights® Program. (Contact: Energy Star Hotline,

1-888-STAR-YES (1-888-782-7937) or Maria Tikoff Vargas, Co-Director at (202) 564-9178 or visit the website at http://www.epa.gov/buildings.

WasteWi$e Program

The WasteWi$e Program was started in 1994 by EPA's Office of Solid Waste and Emergency Response. The program is aimed at reducing municipal solid wastes by promoting waste prevention, recycling collection, and the manufacturing and purchase of recycled products. As of 1998, the program had about 700 business, government, and institutional partners. Partners agree to identify and implement actions to reduce their solid wastes by setting waste reduction goals and providing EPA with yearly progress reports for a three-year period. EPA, in turn, provides partners with technical assistance, publications, networking opportunities, and national and regional recognition. (Contact: WasteWi$e Hotline at (800) 372-9473 or Joanne Oxley, EPA Program Manager, (703) 308-0199.)

Climate Wise Program

In October 1993, President Clinton unveiled the Climate Change Action Plan (CCAP) in honor of the United States' commitment to reducing its greenhouse gas emissions to 1990 levels by the year 2000. Climate Wise, a project jointly sponsored by the U.S. Department of Energy and EPA, is one of the projects initiated under CCAP.

Climate Wise is a partnership between government and industry that offers companies a nonregulatory approach to reducing greenhouse gas emissions. Climate Wise state and local government "allies" work with U.S. industries to develop flexible, comprehensive strategies for achieving energy efficiency and pollution prevention. They help local business identify and implement projects that often require little capital investment, but promise a high rate of return. Companies that become Climate Wise partners receive technical assistance and financing information to help them develop and implement cost-effective changes. (Contact: Climate Wise Clearinghouse at (301) 230-4736 or visit the Climate Wise website at http://www.epa.gov/climatewise/allies.htm or http://www.epa.gov/climatewise/index.htm.)

VII.C. USDA Programs and Activities

Environmental Quality Incentives Program

The Environmental Quality Incentives Program (EQIP) is a USDA funded program (led by Natural Resources Conservation Service) that was established in the 1996 Farm Bill to provide a voluntary conservation program for farmers and ranchers who face serious threats to soil, water, and related natural resources. EQIP embodies four of USDA's former conservation programs, including the Agricultural Conservation Program, the Water Quality

Incentives Program, the Great Plains Conservation Program, and the Colorado River Basin Salinity Control Program.

EQIP offers 5 to 10 year contracts that provide *incentive payments* and *cost-sharing* for conservation practices called for in a site-specific conservation plan that is required for all EQIP activities. *Cost-sharing* may include up to 75 percent of the costs of certain conservation practices, such as grassed waterways, filter strips, manure management facilities, capping abandoned wells, and other practices. *Incentive payments* may be made to encourage land management practices such as nutrient management, manure management, integrated pest management, irrigation water management, and wildlife habitat management. These payments may be provided for up to three years to encourage producers to carry out management practices they may not otherwise use without the program incentive.

EQIP has an authorized budget of $1.3 billion through the year 2002. It was funded for $174 million in 1999. Total cost-share and incentive payments are limited to $10,000 per person per year and $50,000 for the length of the contract. Eligibility is limited to persons who are engaged in livestock or agricultural production. Fifty percent of the funds must be spent on livestock production. The 1996 Farm Bill prohibits owners of large confined livestock operations from being eligible for cost-share assistance for animal waste storage or treatment facilities. However, technical, educational, and financial assistance may be provided for other conservation practices on such operations. Further information relating to EQIP may be found on NRCS's website located at http://www.nhq.nrcs.usda.gov/OPA/FB96OPA/eqipfact.html.

Conservation Reserve Program

The Conservation Reserve Program (CRP) is a highly successful conservation program administered by USDA. Since 1986, CRP has provided financial incentives to farmers and ranchers to take land out of agricultural production and plant trees, grass and other types of vegetation. The result has been reduced soil erosion, improved air and water quality and establishment of millions of acres of wildlife habitat.

With the New Conservation Reserve Program, launched with the final rule published in the Federal Register on February 19, 1997, the Farm Service Agency (FSA) begins a renewed effort to achieve the full potential of government-farmer conservation partnerships. Only the most environmentally-sensitive land, yielding the greatest environmental benefits, will be accepted into the program.

The 36.4-million-acre congressionally mandated cap on enrollments is carried over from the previous program, meaning that the new CRP has authority to

enroll only about 15 percent of the eligible cropland. To make the most of the program's potential, a new Environmental Benefits Index (EBI) was developed. The new EBI will be used to select areas and acreages offering the greatest environmental benefits.

Conservation priority areas (CPAs) are regions targeted for CRP enrollment. The four national CPAs are the Long Island Sound region, the Chesapeake Bay and surrounding areas, an area adjacent to the Great Lakes, and the Prairie Pothole region. FSA State Committees may also designate up to 10 percent of a State's remaining cropland as a State Conservation Priority Area. The NRCS is responsible for determining the relative environmental benefits of each acre offered for participation.

Continuous Sign-Up. For certain high-priority conservation practices yielding highly desirable environmental benefits, producers may sign up at any time, without waiting for an announced sign-up period. Continuous sign-up allows farmers and ranchers management flexibility in implementing certain conservation practices on their cropland. These practices are specially designed to achieve significant environmental benefits, giving participants a chance to help protect and enhance wildlife habitat, improve air quality, and improve the condition of America's waterways. Unlike the general CRP program, sign-up for these special practices is open continuously. Provided certain eligibility requirements are met, acreage is automatically accepted into the program at a per-acre rental rate not to exceed the Commodity Credit Corporation's maximum payment amount, based on site-specific soil productivity and local prevailing cash-equivalent rental rates. For more information on the CRP, see USDA's website at http://www.fsa.usda.gov/dafp/cepd/crpinfo.htm.

Conservation Reserve Enhancement Program

The Conservation Reserve Enhancement Program (CREP), a refinement of the CRP, is a state-federal conservation partnership program targeted to address *specific* state and nationally significant water quality, soil erosion and wildlife habitat issues related to agricultural use. The program uses financial incentives to encourage farmers and ranchers to voluntarily enroll in contracts of 10 to 15 years in duration to remove lands from agricultural production. This community-based conservation program provides a flexible design of conservation practices and financial incentives to address environmental issues. For more information about CREP, refer to USDA's website at http://www.fsa.usda.gov/dafp/cepd/crep/crephome.htm.

Wetlands Reserve Program

Congress authorized the Wetlands Reserve Program (WRP) under the Food Security Act of 1985, as amended by the 1990 and 1996 Farm Bills. USDA's Natural Resources Conservation Service (NRCS) administers the program in

consultation with the Farm Service Agency and other Federal agencies. WRP is a voluntary program to restore wetlands. Landowners who choose to participate in WRP may sell a conservation easement or enter into a cost-share restoration agreement with USDA to restore and protect wetlands. The landowner voluntarily limits future use of the land, yet retains private ownership.

WRP offers landowners three options: *permanent easements*, *30-year easements*, and *restoration cost-share agreements* of a minimum 10-year duration. In exchange for establishing a *permanent easement*, the landowner receives payment up to the agricultural value of the land and 100 percent of the restoration costs for restoring the wetland. In exchange for the *30-year easement*, the landowner receives a payment of 75 percent of what would be provided for a permanent easement on the same site and 75 percent of the restoration cost. The *restoration cost-share agreement* is an agreement (generally for a minimum of 10 years) to re-establish degraded or lost wetland habitat, in which USDA pays the landowner 75 percent of the cost of the restoration activity. Restoration cost-share agreements establish wetland protection and restoration as the primary land use for the duration of the agreement. In all instances, landowners continue to control access to their land. For more information about WRP, see NRCS's website at: http://wl.fb-net.org.

Conservation Farm Option

The Conservation Farm Option (CFO) is a voluntary pilot program for producers of wheat, feed grains, cotton, and rice. The program purposes include conservation of soil, water, and related resources, water quality protection and improvement, wetland restoration, protection and creation, wildlife habitat development and protection, or other similar conservation purposes. Eligibility is limited to owners and producers who have contract acreage enrolled in the Agricultural Market Transition program. Participants are required to develop and implement a conservation farm plan. The plan becomes part of the CFO contract which covers a ten year period. CFO is not restricted as to what measures may be included in the conservation plan, so long as they provide environmental benefits. During the contract period the owner or producer (1) receives annual payments for implementing the CFO contract, and (2) agrees to forgo payments under the Conservation Reserve Program, the Wetlands Reserve Program, and the Environmental Quality Incentives Program in exchange for one consolidated program.

Wildlife Habitat Incentives Program

The Wildlife Habitat Incentives Program (WHIP) is a voluntary program (administered by NRCS) for people who want to develop and improve wildlife habitat primarily on private lands. It provides both technical assistance and cost-share payments to help establish and improve fish and wildlife habitat.

Under this program, NRCS helps participants prepare a wildlife habitat development plan in consultation with the local conservation district. The plan describes the landowner's goals for improving wildlife habitat, includes a list of practices and a schedule for installing them, and details the steps necessary to maintain the habitat for the life of the agreement. This plan may or may not be part of a larger conservation plan that addresses other resource needs such as water quality and soil erosion.

USDA and the participant enter into a cost-share agreement that generally lasts between 5 to 10 years from the date the agreement is signed. Under the agreement: the landowner agrees to install and maintain WHIP practices and allow NRCS or its agent access to monitor the effectiveness of the practices; and USDA agrees to provide technical assistance and pay up to 75 percent of the cost of installing the wildlife habitat practices.

WHIP is currently budgeted for $50 million total through the year 2002. WHIP funds are distributed to States based on State wildlife habitat priorities, which may include wildlife habitat areas, targeted species and their habitats, and specific practices. WHIP may be implemented in cooperation with other Federal, State, or local agencies; conservation districts; or private conservation groups. For more information, see NRCS's website at http://www.nrcs.usda.gov.

Conservation of Private Grazing Land Initiative

The Conservation of Private Grazing Land initiative will ensure that technical, educational, and related assistance is provided to those who own private grazing lands. It is not a cost share program. This technical assistance will offer opportunities for better grazing and land management; protecting soil from erosive wind and water; using more energy-efficient ways to produce food and fiber; conserving water; providing habitat for wildlife; sustaining forage and grazing plants; using plants to sequester greenhouse gases and increase soil organic matter; and using grazing lands as a source of biomass energy and raw materials for industrial products.

The Wetland Conservation Provision (Swampbuster)

This provision, part of the 1985, 1990, and 1996 farm bills, requires all agriculture producers to protect wetlands on the farms they own or operate if they want to be eligible for USDA farm program benefits. The Swampbuster program generally allows the continuation of most ongoing farming practices as long as wetlands are not converted or wetland drainage increased. The program discourages farmers from altering wetlands by withholding Federal farm program benefits from any person who does the following:

- Plants an agricultural commodity on a converted wetland that was converted by drainage, dredging, leveling or any other means after December 23, 1985.
- Converts a wetland for the purpose of or to make agricultural commodity production after November 28, 1990.

In order to ensure farm program benefits under the Swampbuster provisions, the local NRCS office should be contacted before clearing, draining, or manipulating any wet areas on any farmland.

VII.D. Other Voluntary Initiatives

NICE^3

The U.S. Department of Energy sponsors a grant program called National Industrial Competitiveness through Energy, Environment, and Economics (NICE^3). The NICE^3 program provides funding to state and industry partnerships (large and small businesses) for projects demonstrating advances in energy efficiency and clean production technologies. The goal of the NICE^3 program is to demonstrate the performance and economics of innovative technologies in the U.S., leading to the commercialization of improved industrial manufacturing processes. These processes should conserve energy, reduce waste, and improve industrial cost-competitiveness. Industry applicants must submit project proposals through a state energy, pollution prevention, or business development office. Awardees receive a one-time, three-year grant of up to $400,000, representing up to 50 percent of a project's total cost. In addition, up to $25,000 is available to support the state applicant's cost share. (Contact: View the website at http//www.oit.doe.gov/Access/nice3; Steve Blazek, DOE, (303) 275-4723; or Eric Hass, DOE, (303) 275-4728.)

ISO 14000

ISO 14000 is a series of internationally-accepted standards for environmental management. The series includes standards for environmental management systems (EMS), guidelines on conducting EMS audits, standards for auditor qualifications, and standards and guidance for conducting product lifecycle analysis. Standards for auditing and EMS were adopted in September 1996, while other elements of the ISO 14000 series are currently in draft form. While regulations and levels of environmental control vary from country to country, ISO 14000 attempts to provide a common standard for environmental management. The governing body for ISO 14000 is the International Organization for Standardization (ISO), a worldwide federation of over 110 country members based in Geneva, Switzerland. The American National Standards Institute (ANSI) is the United States representative to ISO. Information on ISO is available at the following Internet site: http://www.iso.ch/welcome.html.

VII.E. Summary of Trade Associations

There are more than 200 trade associations that deal with agricultural issues. Many of these are at the national level, while others deal specifically with regions of the country or individual states. The following identify some of the major associations addressing agricultural production.

American Dairy Goat Association
Ronald E. Gelvin, Secretary Treasurer
P.O. Box 865
209 W. Main Street
Spindale, NC 28160
Telephone: 704-286-3801
Fax: 704-287-0476

American Dairy Association
10255 W. Higgins
Rosemont, IL 60018
Telephone: 847-803-2000
Fax: 847-803-2077

Washington, DC office
600 Maryland Avenue, SW
Washington, DC 20024
Telephone: 202-484-3600
Fax: 202-484-3604

American Hereford Association
Craig Huffhines,
Executive Vice President
P.O. Box 014059
Kansas City, MO 64101
Telephone: 816-842-3757
Fax: 816-842-6931

American Horse Council
James J. Hickey, Jr., President
1700 K Street, NW, # 300
Washington, DC 20006
Telephone: 202-296-4031
Fax: 202-296-1970

American Equine Association
Carol Winterburger, Executive Director
Box 658
Newfoundland, NJ 07435
Telephone: 973-697-9668
Fax: 973-697-1538

American Farm Bureau Federation
Headquarters office
225 Touhy Avenue
Park Ridge, IL 60068
Telephone: 847-685-8600
Fax: 847-685-8896

National Broilers Council
George B. Watts
1015 15th Street, NW, Suite 950
Washington, DC 20005
Telephone: 202-408-1339

National Cattlemen's Beef Assoc.
Charles Schroeder, CEO
1301 Pennsylvania Avenue, NW,
Suite 300
Washington, DC 20004-1701
Telephone: 202-347-0228
Fax: 202-638-0607

National Farmers Organization
2505 Elwood Drive
Ames, IA 50010-2000
Telephone: 515-292-2000
Fax: 515-292-7106

American National Cattle Women
4278 Highway 196
Lamar, CO 81052
Telephone: 303-829-4475
Fax: 303-694-2390

American Poultry Association
Lorna Rhodes, Secretary Treasurer
133 Millville Street
Mendon, MA 01756
Telephone and Fax: 508-473-8769

American Sheep Industry Association
Peter Orwick, Executive Director
6911 South Yosemite St.
Englewood, CO 80112-1414
Telephone: 303-771-3500
Fax: 303-771-8200

Association of American Pesticide Control Officials
P.O. Box 1249
Hardwick, VT 05843
Telephone: 802-472-6956
Fax: 802-472-6957

National Pork Producers Council
Jerry King, President
P.O. Box 10383
Des Moines, IA 50306
Telephone: 515-223-2600
Fax: 515-223-2646

National Farmers Union
Leland Swenson, President
11900 E. Cornell Avenue
Aurora, CO 80014-3194
Telephone: 303-337-5500
Fax: 303-368-1390

National Fisheries Institute
Dick Gutting,
Executive Vice President
1901 N. Fort Myer Drive, Suite 700
Arlington, VA 22209
Telephone: 703-524-8880
Fax: 703-524-4619

National Live Stock Producers Association
R. Scott Stuart, CEO
660 Southpointe Court, Suite 314
Colorado Springs, CO 80906
Telephone: 719-538-8843
Fax: 719-538-8847

National Turkey Federation
1225 New York Avenue, NW
Washington, DC 20005
Telephone: 202-898-0100
Fax: 202-898-0203

VIII. CONTACTS/RESOURCE MATERIALS/BIBLIOGRAPHY

For further information on selected topics within the agricultural livestock production industry, a list of contacts and publications are provided below:

Contacts[2]

Name	Organization	Telephone	Subject
Ginah Mortensen	EPA, Office of Enforcement and Compliance Assurance (OECA), Agriculture Division, Agriculture Branch	913-551-5211	Notebook Contact
Arty Williams	EPA, Office of Prevention, Pesticides and Toxic Substances (OPPT)	703 305-5239	Ground Water Pesticide Management Plan Rule
Jean Frane	EPA, OPPT	703 305-5944	Food Quality Protection Act
David Stangel	EPA, OECA	202 564-4162	Stored or Suspended Pesticides; Good Laboratory Practice Standards; Pesticide Management and Disposal
Joseph Hogue	EPA, OPPT	703 308-9072	FIFRA Restricted Use Classifications
Robert McNally	EPA, OPPT	703 308-8085	FIFRA Pesticide Tolerances
Joseph Nevola	EPA, OPPT	703 308-8037	FIFRA Pesticide Tolerances
Ellen Kramer	EPA, OPPT	703 305-6475	FIFRA Pesticide Tolerances
Robert A. Forrest	EPA, OPPT	703 308-9376	FIFRA Exemptions
Nancy Fitz	EPA, OPPT	703 305-7385	FIFRA Pesticide Management and Disposal
John MacDonald	EPA, OPPT	703 305-7370	Certification and Training
Kevin Keaney	EPA, OPPT	703 305-5557	FIFRA Worker Protection Standards
Al Havinga	EPA, OECA	202-564-4147	Livestock Issues
Carol Galloway	EPA, OECA	913-551-5008	Livestock Issues

[2] Many of the contacts listed above have provided valuable information and comments during the development of this document. EPA appreciates this support and acknowledges that the individuals listed do not necessarily endorse all statements made within this notebook.

Sharon Buck	EPA, OWOW	202-260-0306	NonPoint Source Issues
Greg Beatty	EPA, OWM	202-260-6929	NPDES Permniting Issues
Roberta Parry	EPA, OPEI	202-260-2876	Livestock and Crop Issues
Robin Dunkins	EPA, OAQPS	919-541-5335	Air Issues
Kurt Roos	EPA, OAR	202-564-9041	Atmospheric Programs
Howard Beard	EPA, OGWDW	202-260-8796	Drinking water Issues
Tracy Back	EPA, CCSMD	202-564-7076	Compliance Assistance Centers

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Operations and Pollution Prevention

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- Manure Liquid-Solids Separation
- Design Criteria for Swine Waste Flushing Systems

- Components of a Complete Manure Management Plan
- Lagoon Design and Management For Livestock Waste Treatment and Storage
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	055-000-00634-2	Profile of the Oil and Gas Extraction Industry,	$16.00	

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