ILLINOIS POLLUTION CONTROL BOARD

November 14, 1974

IN THE MATTER OF )
CHAPTER 5: AGRICULTURE-RELATED POLLUTION ) R72-9
SECTION 1: LIVESTOCK WASTE REGULATIONS )

OPINION OF THE BOARD (by Dr. Odell)

This Opinion supports the Livestock Waste Regulations adopted by the Board on August 29, 1974, and amended September 5, 1974.

## INITIAL PROPOSAL

On June 23, 1972, in Newsletter #49, the Pollution Control Board (Board) announced that public hearings would be held on a Proposed Animal Waste Regulation designed to avoid odor nuisances and to reduce pollution of "waters of the State." Approximately 4,000 persons attended and actively participated in six public hearings on this Proposal during the winter of 1972-73. Many farm witnesses questioned the basic need for the Proposed Regulation and pointed out specific deficiencies in the Proposal. Also, the final guidelines and regulations governing animal feedlots had not been promulgated by the U.S. Environmental Protection Agency under the Federal Water Pollution Control Act Amendments (FWPCA) of 1972. Because of these problems, the Illinois Environmental Protection Agency (Agency) requested that the Board hold these hearings in abeyance for six to twelve months to permit redrafting the Proposed Regulations to resolve the problems that had been presented during the hearings. The Board granted the Agency's Motion, agreed not to hold further hearings for at least six months, but retained jurisdiction of this matter and ruled that all testimony to date would be included as part of the record upon the resumption of hearings (Agriculture-Related Pollution, R72-9; 7 PCB 123, February 14, 1973).

## DEVELOPMENT OF THIS REGULATION

Soon thereafter the Agency asked the Illinois Institute for Environmental Quality (Institute) to convene an Agricultural Advisory Committee to draft proposed livestock waste regulations which would (a) be in compliance with federal guidelines, (b) meet the requirements of the Illinois Environmental Protection Act (Act), and (c) be generally acceptable to the agricultural community (R. 13). This Agricultural Advisory Committee comprised 22 members and represented state and federal agencies, seven agricultural producer organizations, the Illinois Agricultural Association, agricultural lending institutions, the League of Women Voters, the Sierra Club, and the Izaak Walton League. On November 6, 1973, the Institute submitted to the Board its Agricultural Advisory Committee's "Proposed Regulations for Livestock

Management Facilities and Livestock Waste-Handling Facilities" (Exhibit 1). The Board conducted four public hearings on these Proposed Regulations at Springfield, Macomb, Mt. Vernon, and Amboy, Illinois, during January and February, 1974.

## NEED FOR POLLUTION ABATEMENT

The primary objective of these Regulations is to protect surface and ground waters from pollution caused by feedlot wastes. During the hearing at Macomb, Illinois, the Agency presented information concerning six widely scattered livestock facilities to illustrate the scope and incidence of some current pollution problems (R. 269-336). Analyses were presented of water quality in streams both above and below the six livestock facilities (Exhibits 16, 17, 20, 21, 22, and 23). These data showed that although upstream water was of good quality, contamination at the various facilities caused downstream water to violate the general water quality standards of Chapter 3, Water Pollution Regulations, in properties such as dissolved oxygen (DO), fecal coliforms, and ammonia nitrogen. There were also point discharges from these livestock facilities which violated the effluent standards of Chapter 3 in properties such as the five-day biological oxygen demand ($BOD_5$), total suspended solids (TSS), and fecal coliforms. It was stressed that these six facilities were not typical, but that they illustrated "some of the worst" livestock waste pollution problems (R. 335). These serious pollution problem facilities probably represent "under 5 percent" of the livestock operations in Illinois (R. 357).

The Agency also submitted a "Livestock Facility Complaint List" (Exhibit 9) summarizing complaints in their files concerning alleged pollution by 113 livestock management facilities. The Agency believes that there is "a much greater problem" (R. 367) than is indicated by either the 6 or 113 problem farms cited above. Many farmers testified that although a few livestock facilities caused significant pollution, most operators used good management practices to control pollution and were eager to maintain a healthful environment, because they lived near their livestock operations. On a nation-wide basis, it is estimated that approximately 40% of the dairy, 35% of the beef, and 30% of the swine operations have some kind of feedlot runoff which may cause pollution. Poultry operations have few problems, if they are properly managed, because most of them are in confinement (R. 357).

Livestock wastes may pollute groundwater supplies because of improper management and siting and also under some soil and geological conditions. During the January 8, 1973, hearing in Urbana, Illinois, Mr. W.H. Walker of the Illinois State Water Survey presented analyses of water (pages 82 and 83 of that record) from farm wells in Washington County, Illinois, which contained more than 45 milligrams per liter of nitrates (equivalent to 10 mg/l of nitrates expressed as nitrogen, which is the standard in Chapter 3, Water Pollution Regulations). The elevated level of nitrates in water from these shallow wells was attributed in part to pollution from livestock wastes and in part to the characteristics of

the glacial drift in which the wells were dug.

There is concern about excessive nitrates in water, because there have been "cases of methemoglobinemia in certain infants under 3 months of age (and some other susceptible individuals) at nitrate levels which are close to, or only 2 to 3 times, the recommended limit of 10 mg nitrate-nitrogen/l" (Exhibit 46, page 2). Considerably higher levels are safe for normal adults. This problem is discussed more fully in our current R73-13, Public Water Supplies proceeding.

Data from the Agency indicate that some surface water supplies are increasing in nitrate content. Single samples from the water supplies of the 7 cities of Bloomington, Charleston, Danville, Decatur, Eureka, Pontiac, and Streator contained 10 mg/l nitrate (expressed as N) or slightly more during part of 1972 (R.84 and Exhibit 5). Since these highest concentrations of nitrates in surface water supplies are in areas of low livestock numbers and usually occur during the spring months, they are probably not caused by livestock wastes.

The Illinois Water Survey has outlined some of the non-point sources of water pollution from feedlot runoff and livestock wastes (Exhibit 13), and also studied pathogenic bacteria in the Spoon River in western Illinois, 1971-1973 (Exhibit 27). In the latter study, the number of fecal coliforms was found during extended periods to be above our Board standard in Rule 203(g) of Chapter 3, Water Pollution Regulations. The ratios of fecal coliforms to fecal streptococci indicate that the fecal bacteria in the upper reaches of the Spoon River originated primarily from human wastes, but they originate primarily from livestock wastes in the lower one-third of the River (R. 392).

## RELATIONSHIP OF CHAPTER 5 TO OTHER REGULATIONS

These Chapter 5 Regulations deal primarily with concentrated animal feeding operations. Such feedlot operations have been designated as point sources under Section 502(14) of the Federal Water Pollution Control Act of 1972 (Public Law 92-500, 33 U.S.C. 1151 et seq., hereinafter referred to as the FWPCA) and therefore are required to secure National Pollutant Discharge Elimination System (NPDES) Permits in accordance with the provisions of Section 402 of the FWPCA (see 40 CFR 124 in Exhibit 3 and 40 CFR 412 in Exhibit 93). Part III of Chapter 5 authorizes the Agency to require and to issue NPDES Permits for certain other agricultural activities (fish farming and irrigation farming) if these activities occur in Illinois at the size levels for which NPDES Permits are required.

The Livestock Waste Regulations in Chapter 5 are closely related to the Water Pollution Regulations in Chapter 3. In fact, the applicable water quality standards (and effluent standards if there is a point discharge in the absence of an unusual rain-storm) in Chapter 3 are also used in determining compliance with Chapter 5, as will be explained later in connection with Rule 104(a)(1).

In addition to complying with Chapter 5 Regulations, livestock feedlots must comply with provisions of the Illinois Environmental Protection Act (Act), especially Sections 12(a), 12(b), and 9(a), and applicable Air Pollution Regulations of Chapter 2 which deal with odor and dust nuisance problems. Although livestock odors are not harmful to health, they may be objectionable to some persons and create a nuisance. Local zoning for mutual protection and guidance of rural-urban development would be desirable to minimize such nuisance problems.

## PROPERTIES OF LIVESTOCK WASTES

Livestock wastes are biodegradable and contain readily available plant nutrients. Therefore, they should be recycled promptly and properly to avoid excessive odors and to utilize the nutrients for producing more food without causing water pollution. The application of livestock manure to soil returns nutrients that originally were stored in the soil and is an excellent example of recycling. This common practice reduces the application rates of commercial fertilizers needed, thus saving cash costs and scarce resources. Therefore, livestock manure is a valuable by-product of animal production -- not just waste that requires disposal.

Properties of livestock wastes are dependent upon many factors, such as kind of livestock, age of animals, and the kind and amount of feed. Manure from milk cows and grazing and young animals is less rich than that from animals being fattened on concentrates. Poultry manure contains a greater percent of total solids than does manure from larger animals (Table 1). One ton of average beef cattle manure contains approximately 12 pounds of nitrogen, 5 pounds $P_2O_5$, and 8 pounds $K_2O$.

Table 1. Manure production and characteristics per 1,000 pounds live weight in confinement animal production*

| Item | Dairy cow | Beef feeder | Swine feeder | Hens |
|---|---|---|---|---|
| Raw manure** (RM), lb. per day | 82 | 60 | 65 | 53 |
| Total solids (TS), lb. per day | 10 | 7 | 6 | 13 |
| Total solids, percent RM | 13 | 12 | 9 | 25 |
| Nitrogen, percent TS | 3.9 | 4.9 | 7.5 | 5.4 |
| Phosphorus, percent TS | 0.7 | 1.6 | 2.5 | 2.1 |
| $P_2O_5$, percent TS | 1.6 | 3.7 | 5.7 | 4.8 |
| Potassium, percent TS | 2.6 | 3.6 | 4.9 | 2.3 |
| $K_2O$, percent TS | 3.1 | 4.3 | 5.9 | 2.8 |

*Exhibit 87. Farm Animal-waste Management. North Cent. Reg. Pub. 206, 1971, as revised from Amer. Soc. Agr. Eng. Structures and Environment Com. 412 Report AW-D-1, June 14, 1973.
**Feces and urine with no bedding.

Many livestock operations are growing in size and converting to confinement systems with slatted floors over pits, in which wastes are stored temporarily. The typical nutrient content of liquid livestock manure (feces and urine) in such pits is listed in Table 2. Liquid manure is usually hauled directly from these pits and spread on the field.

Table 2. Pounds of nutrients contained in liquid manure from confinement animal production*

| Item | Beef feeder | Swine feeder |
|---|---|---|
| Nitrogen, per 1,000 gallons | 36 | 55 |
| Nitrogen, per ton | 9 | 13 |
| $P_2O_5$, per 1,000 gallons | 18 | 27 |
| $P_2O_5$, per ton | 4 | 6 |
| $K_2O$, per 1,000 gallons | 27 | 34 |
| $K_2O$, per ton | 6 | 8 |

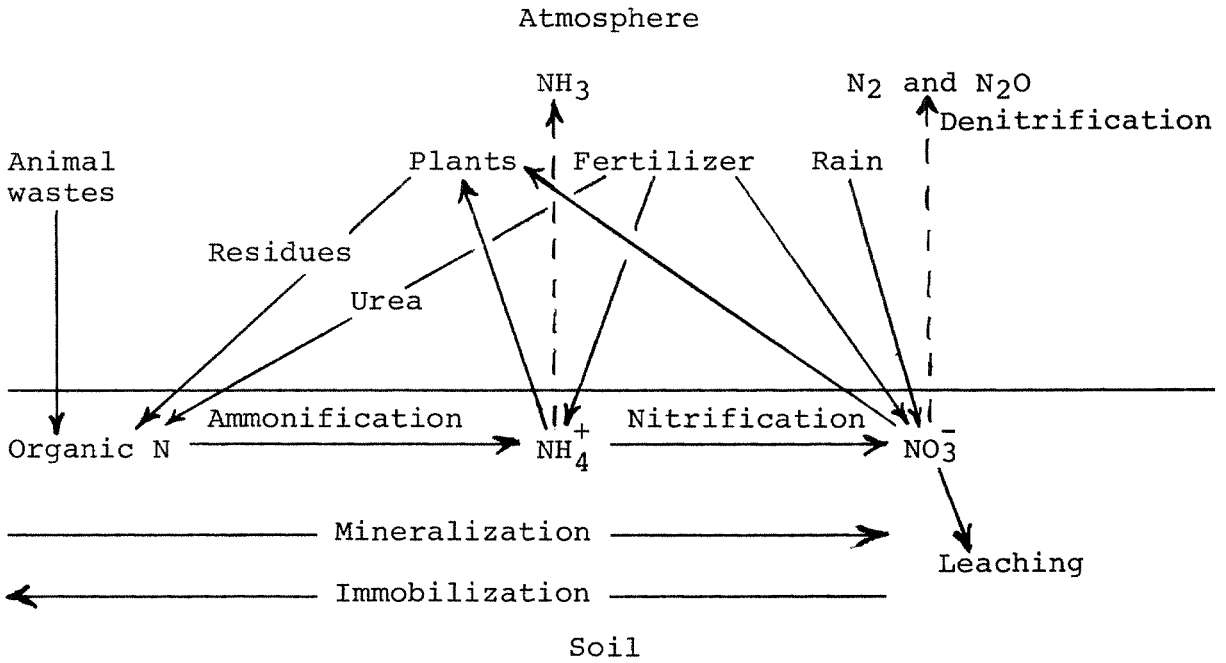
*Exhibit 56. Braids, O.C. Land Disposal Management of Livestock Wastes. 1972.

Other methods of handling liquid livestock manure are to use anaerobic treatment in lagoons outside or use aerobic treatment either inside or outside. Under aerobic treatment, which minimizes odors, nitrogen is converted to microbial tissue and is oxidized to nitrates in the liquid. During anaerobic biological breakdown, much nitrogen is volatilized as ammonia and lost. Other nutrients settle in bottom sludge, which should be returned periodically to the land.

## NITROGEN TRANSFORMATIONS AND MOVEMENT IN SOILS

Soils have large adsorptive capacities for phosphorus and potassium, and these nutrients are less mobile than nitrate nitrogen. Therefore, if soil erosion is controlled, losses of phosphorus and potassium are minimal, and pollution is usually not a problem.

Nitrogen occurs in various forms in soils. "Nitrogen added to the soil in manure solids occurs largely in organic forms (undigested proteins and the bodies of micro-organisms), whereas liquid manure may also contain significant amounts of ammonia, the latter having been formed from urea through hydrolysis" (R.870). As organic matter in animal manures decays, the more complex nitrogen-bearing compounds are broken down and nitrogen undergoes transformations to more simple forms. Common transformations that nitrogen undergoes are illustrated in the following diagram which was adapted from testimony given by Drs. L.T. Kurtz (Exhibit 54) and F.J. Stevenson (R. 870), Professors in the University of Illinois Agronomy Department:



"In considering mineralization and immobilization, we are involved with the quantity of nitrogen that will be present in inorganic forms. It is a well-known fact that when organic residues low in nitrogen (<1.2%) are added to soil, there is an initial net loss of inorganic nitrogen through consumption by microorganisms. On the other hand, when residues high in nitrogen (>1.8%) are applied, there will be an initial net gain in inorganic nitrogen. In any event, at the end of the growing season, some of the nitrogen added in the residues will remain behind in the soil in an organic form" (R. 871).

The addition of animal manure and plant residues to the soil stimulates the growth of organisms which attack the organic constituents. Part of the carbon is volatilized as $CO_2$ and part is incorporated into the bodies of microorganisms. "For soils in the temperate region of the earth, about one-third of the carbon will remain in the soil. There is evidence that a higher percentage (~50%) will remain when manures are applied at high rates" (R.872). Nitrogen is preserved along with carbon in the ratio of approximately 10 parts carbon to one part nitrogen. Table 3 gives the amounts of potential inorganic nitrogen released by the application of 10 tons of manure (dry-weight basis) containing variable amounts of nitrogen (retention of one-third and one-half of the carbon).

Table 3. Nitrogen balance for application of 10 tons of animal manure (dry-weight basis) (R.875 and 876).

| N in manure | Total nitrogen | One-third retention of carbon | | One-half retention of carbon | |
|---|---|---|---|---|---|
| | | Retained in residues | Inorganic N | Retained in residues | Inorganic N |
| % | lbs | lbs | lbs | lbs | lbs |
| 2.0 | 400 | 300 | 100 | 450 | * |
| 2.5 | 500 | 300 | 200 | 450 | 50 |
| 3.0 | 600 | 300 | 300 | 450 | 150 |
| 3.5 | 700 | 300 | 400 | 450 | 250 |
| 4.0 | 800 | 300 | 500 | 450 | 350 |
| 5.0 | 1,000 | 300 | 700 | 450 | 550 |

* For nitrogen contents less than 2%, there may be a net loss of mineral nitrogen from the soil through immobilization.

Table 4 gives the approximate tons of manure (dry-weight basis) that would be required to provide 200 pounds of available mineral nitrogen. The quantity required does not follow a 1:1 relationship to nitrogen content, because increasing the nitrogen content lowers the percentage of the nitrogen that will remain in the soil at the end of the first season.

Table 4. Estimated tons of manure (dry-weight basis) per acre required to provide 200 pounds of available mineral nitrogen (R.878).

| Nitrogen in manure | One-third retention of carbon | One-half retention of carbon |
|---|---|---|
| % | tons | tons |
| 2.0 | 20 | * |
| 2.5 | 10 | 40 |
| 3.0 | 7 | 13 |
| 3.5 | 5 | 8 |
| 4.5 | 4 | 6 |

*Very high rates required because of net immobilization.

The data given in Tables 3 and 4 apply to a single application of manure. "The residual organic matter remaining in the soil after the first year, representing one-third to one-half of the manure initially applied, undergoes further decomposition during subsequent years with the release of bound nitrogen. Approximately one-half of the nitrogen remaining after each year will be mineralized the succeeding year until complete 'humification' has occurred after about 5 years (R.879). . . . In practical terms, this means that application rates for an equivalent amount of inorganic nitrogen will need to be reduced each succeeding year for five years, after which the rate would be constant and equivalent to the addition of an equal quantity of inorganic nitrogen" (R.880). Successive manure applications on a given field for five or more years are rare except where a small area is used for disposal. Common farm practice is to apply manure over larger areas, usually to the most responsive crop in the rotation, for economic utilization of nutrients. Guidelines for field application of livestock wastes will be discussed in connection with Rule 104(e).

Dr. Kurtz summarized the transformations that nitrogen undergoes in soils in the following language (see Exhibit 54 and the diagram on page 6). "Nitrogen in organic materials, such as animal manures, is usually transformed during decay processes to the ammonium ($NH_4^+$) form. . . . Under some conditions (such as alkaline reaction), appreciable amounts of ammonia ($NH_3$) nitrogen may escape to the atmosphere. . . . Ammonium nitrogen, in turn, is normally converted by microbes to the nitrate form ($NO_3^-$) of nitrogen. . . . Ammonium and nitrate forms of nitrogen are thus the inorganic forms that eventually result from breakdown of nitrogenous materials. These are the forms in the soil that are utilized by plants. These, along with urea, are the forms contained in commercial fertilizers. . . . Ammonium and nitrate nitrogen released from decomposition of manure are the same as ammonium and nitrate from commercial fertilizer. Their behaviors in the soil are the same regardless of whether these forms of nitrogen originated in manure or fertilizer."

"Nitrate and ammonium forms behave differently in soils (Exhibit 54, Kurtz). . . . The ammonium ($NH_4^+$) form of nitrogen is strongly attracted to clay particles and to soil organic matter and its movement in the soil is quite limited. . . . Nitrate nitrogen is not held appreciably upon the surface of particles in the soils of our region. The nitrate ion is virtually free in the soil solution and moves about in the soil with the soil water." This mobile nitrate nitrogen is the form that is primarily implicated in water pollution.

"Denitrification is the process whereby nitrate is converted to inert gases ($N_2$ and $N_2O$) through the activities of microorganisms (Stevenson, R.881). . . . Denitrification -- the least understood aspect of the nitrogen cycle in soil -- could well be the most important single factor causing variability in soil nitrate levels when nitrogenous organic wastes are applied to the soil. The process has long been considered undesirable but, from the standpoint of waste disposal, it may be an asset in that the content of nitrate in drainage waters may be drastically reduced." Optimum conditions for denitrification are poor aeration and drainage, generous supply of readily decomposable organic matter for microorganisms, temperatures of 75°F and above, soil reaction near neutral, and a long residence time of nitrate in the soil. Experiments in Illinois indicate that an average of approximately one-third of the nitrate added to or formed in soils will be lost in gaseous products through denitrification (Exhibit 54 and R.885). Exceptions to this generalization include sandy soils and perhaps soils with pH values below about 5.5.

From the above discussion it can be seen that the amount of nitrate available to plants, or subject to leaching, will re-

present the difference between the total nitrogen applied (in animal manure, plant residues, fertilizer, and rain) and the amounts which volatilize ($NH_3$, $N_2$, and $N_2O$) and remain in organic nitrogen.

Nitrate nitrogen moves through Illinois soils at approximately the same rate as the water in which it is dissolved (Exhibit 54). Water movement is determined by soil permeability which, in turn, is influenced by properties such as the texture, structure, and porosity of various soil horizons. If nitrate is added to the surface of a wet soil and water is added at a uniform rate, the nitrate will move down through the soil, beginning in a relatively narrow concentrated wave. If "water additions are continued, and the concentrated wave of nitrate continues to move down, the wave gradually spreads in a vertical direction and becomes less concentrated as it mixes with additional water. With continued leaching, the wave of nitrate moves on down through the profile, gradually becoming broader in the vertical direction and less concentrated. Under ideal conditions the wave of nitrate is symmetrical and the crest of the wave occurs at the front of the water entering the soil after the nitrate addition" (Exhibit 54, Kurtz). Under actual soil conditions, the wave of nitrate is often not symmetrical because of variations in rainfall, evaporation and transpiration, changes in direction of water movement, and differences in soil properties within the profile. In addition to downward movement of water in response to gravity, water and dissolved nitrates may move laterally to tile drains or along textural discontinuities, such as in sand layers or above claypans or bedrock. Information published in "Soils of Illinois" (Exhibit 76) and county soil reports indicates the distribution, properties, suitability for various uses, and management requirements for each soil type in the State. This information will be helpful in developing guidelines for field application of livestock wastes in connection with Rule 104(e).

## OTHER USES OF LIVESTOCK WASTES

There has been a recent resurgence of interest in anaerobic digestion of livestock wastes for methane production because of energy shortages and costs. According to Dr. D.L. Day, Professor of Agricultural Engineering, University of Illinois, "this certainly has a potential for an energy supply; however, many problems are inherent in the successful operation of anaerobic digesters in addition to the cost of the digester and the disposal of the remaining liquids and sludge. . . . Another problem is the large gas storage capacity required because of the dilute energy concentration in digester gas compared to gasoline" (Exhibit 87). An anaerobic digester "would involve a higher

initial cost than does the construction of a lagoon and would require more sophisticated management. In return, this unit offers a higher degree of organic removal, the production of a useful gas, an escape from the problem of lagoon odors, and a means of preventing groundwater pollution" (Exhibit 87. Farm Animal-waste Management. North Cent. Reg. Pub. 206. 1971). Adoption of this method of handling livestock wastes is governed more by economic relationships than by technology, and it is probably more applicable to large operations than to small ones. However, some small farm digesters have been reported recently in popular farm magazine articles.

Research results and practical interest are increasing in the use of nutrients in animal wastes for feeding livestock. This method of recycling is promising and it is likely to become more widespread. See "Farm Animal-waste Management" (North Cent. Reg. Pub. 206. 1971), which is part of Exhibit 87, and "Processing and Management of Agricultural Waste" (Proc. of Cornell Agr. Waste Mgt. Conf., March 25-27, 1974), which was not officially submitted in this record but contains much valuable information.

## ECONOMIC IMPLICATIONS OF THIS REGULATION

There are approximately 121,000 farms in Illinois. 81,000 of these farms have some kind of livestock, of which 40,000 have enough livestock to be considered as feedlots (R.365). The numbers of various kinds of livestock farms (with annual sales of $2,500 and over) in Illinois at the time of the 1969 Census of Agriculture were as follows:

| | |
|---|---|
| Poultry farms | 660 |
| Dairy farms | 6,599 |
| Other livestock farms, mostly beef cattle and hogs | 33,622 |
| Total | 40,881 |

Dr. R.N. Van Arsdall, Agricultural Economist, U.S. Department of Agriculture and stationed at the University of Illinois since 1949, presented detailed results of recent U.S.D.A. research concerning the economic implications of water pollution abatement in livestock production. Impacts considered "include those on individual farmers for whom remedial action will be necessary, those unaffected by proposed guidelines, pressures on local community service firms, supply availability, and prices of livestock products to consumers" (R.795).

Dr. Van Arsdall's testimony is based largely on economic impact studies in 1973 by U.S.D.A. of water pollution abatement on beef, dairy, and hog farms, two Ph.D. theses at the University of Illinois concerning beef and hog farms, and U.S.D.A. Econ. Res. Serv. Pub. 508, entitled "Economic Implications of Water Pollution

Abatement in Family Farm Livestock Production", by R.N. Van Arsdall and J.B. Johnson (Exhibit 49). Results of the U.S.D.A. "analyses generally do not go below the regional level, but results for the Corn Belt-Lake States reflect the situation for Illinois. And since I was concerned with this region, naturally Illinois was kind of central in my thinking in the research" (R.796). These economic impact analyses were initiated prior to the announcement of the proposed effluent guidelines of September 7, 1973. Although the guidelines assumed for research do not coincide exactly with those announced in September 1973, they are sufficiently close to allow meaningful judgments to be made concerning the economic impact of the implementation of the official guidelines.

Dr. Van Arsdall summarized the results of the above economic impact studies in the following language (R.797-806). It should be remembered that prices have risen sharply since these studies were made during 1972 and 1973. "Livestock producers confronted with a need to control runoff from production sites have several alternatives ranging from cessation of production to construction of totally confined systems, with all livestock activities under roof. . . . So long as open lot systems of production are extensively employed, as they are in Illinois and throughout the Corn Belt, the best practical technology is to prevent runoff from entering and leaving the production area. This is commonly achieved with a system of diversion terraces, settling basin, retention pond and some means for dispersing the polluted runoff over farmland. This solution forms the basis for the U.S.D.A. Economic Research Service estimates of direct investments and annual costs for controlling runoff in U.S. livestock production. Contract costs are assumed with each producer installing all necessary facilities. . . .

"Nationally, such control measures would require more than 280,000 beef, dairy, and hog producers to invest nearly three-quarters of a billion dollars (an average of about $2,700 per farm). This amount of new investment and its associated annual costs are large sums of money, but they are small in comparison with existing investments in production facilities and annual gross receipts from cattle, hogs, and dairy products. . . .

"What is of great significance is that investments and annual costs for runoff control do not fall equally on all farmers and service firms, nor on all regions of the country. . . . Some farmers will find the cost of runoff control too expensive for them to bear; others will gain from it to the extent that supplies drop and prices rise. States (such as Illinois) with good crop-growing rainfall will be disadvantaged in livestock production. If supply is reduced during the adjustment period, consumers will pay higher prices.

"Producers with the smallest enterprises will be confronted with the highest unit costs for control of runoff. Cattle feeders

needing additional runoff control in the Eastern region, which includes Illinois, would have to invest an average of about $145 per head of lot capacity on farms selling fewer than 100 head annually. This would increase cost of production about $4.00 per 100 pounds of gain. Estimated new investment per head drops to $21 for feedlots selling 100 to 199 head and to $12 for those selling 200 to 499 head. It is only about $3 per head for feedlots turning out more than 1,000 cattle." A somewhat elaborate demonstration cattle feedlot runoff control facility constructed in 1973 on the Ronald Lawfer farm in Jo Daviess County, Illinois, cost a total of $8,000 for a capacity of 200 animals, or $40 per head (R. 477, 813).

"In this region, dairymen with 15-cow herds would have to invest an average of $187 per cow, which would add $50 per cow to annual costs or about $0.40 per 100 pounds of milk produced. Investment per cow drops to $70 for 30-cow herds, $35 for 80-cow herds, and $25 for 150-cow herds. With a 150-cow herd, control of runoff adds only $0.06 to the cost of producing 100 pounds of milk.

"Hog producers with uncontrolled runoff in the Corn Belt-Lake States would have an average new investment requirement of $56 per head sold if they were in the 1- to 99-head sales class; but only $4.35 per head if they exceeded 1,000 head sold annually. . . . Corresponding added annual costs for these two extremes would be $3.90 and about $0.25 per 100 pounds of pork produced.

"Most of the fed cattle, hogs, and milk produced in Illinois comes from relatively small enterprises. In 1969, sixty-five percent of Illinois hog producers sold fewer than 200 hogs a year. Another 24 percent sold 200 to 499 head annually. Combined, these producers accounted for 57 percent of total output. In dairying, over half the farmers with milk cows had less than 20 cows; 91 percent had fewer than 50 cows. Together, farms with these dairy enterprises accounted for nearly three-fourths of all dairy cows in the State. Cattle feeding reflected the same situation. Over 90 percent of the feeders sold fewer than 200 slaughter cattle a year, accounting for about half of total output for the State of Illinois. Obviously, we are going to fall in the high unit-cost category for most of our operations and most of our production. Control of surface runoff from all sizes of livestock operations will generate high unit-costs for many farmers and a substantial proportion of livestock production of the State. The same situation holds for other states in the region dominated by family farm size livestock operations.

"Generally, the impact of controlling runoff from livestock operations will be to accelerate most on-going adjustments. Specifically, the outcomes will be as follows:

1. "The drop-out rate for small enterprises, which is already rather high, will increase with farmers suffering loss of income as a result of runoff control requirements to the extent that they cease production sooner than they would have due to other economic forces.

2. "The shift to totally confined systems of production will increase. Confinement has proven economically advantageous, especially for the larger hog enterprises, even without consideration of runoff control. This system of production minimizes the possibility of damaging runoff from the site of production.

3. "Given a size of enterprise, costs of runoff control will be greater in the more humid states. Cost differences are sufficient to encourage the on-going east-to-west shift in this region in hog production, but they are not great enough to give one state an overwhelming economic advantage over another. Cattle feeding, however, will be disadvantaged in favor of the strongly developing cattle feeding areas in the Plains States, where precipitation is relatively low and large feedlots are dominant.

4. "Local business firms geared to the servicing of small livestock enterprises will be affected in proportion to the increase in the drop-out rate for producers. Some will doubtless have to make more rapid adjustments or cease operations sooner than they would have during the normal course of industry adjustment.

5. "Long-range impacts of runoff control on supply of livestock products, hence costs to consumers, are expected to be small. In part, production shifts will be made to sizes of enterprises and to regions of the country where the annual costs of runoff control amount to only a few cents per hundredweight of beef, pork, or milk. In part, farmers will adopt totally confined systems which control runoff and are competitive with open-lot systems if they are large enough.

6. "Impacts during the adjustment period, however, may well be rather severe. Certainly the smaller producers and those with severe problem situations who are forced to go out of business will experience economic loss. The same applies to affected service businesses.

   "Consumers could pay more for pork if some producers liquidate their hog enterprises faster than others increase theirs, resulting in a smaller supply. Price change will be much greater than change in supply in relative terms. Prices would remain high until remaining producers have time to expand their facilities and increase output. Of course, producers remaining in business will have the advantage of such price increases.

"The same situation exists in dairying, and milk is already in short supply. Currently, the dairy industry is operating at full capacity. An accelerated drop-out of smaller dairymen will reduce supply, which will result in higher prices to consumers. It will also result in more dairy cows going to slaughter since dairymen remaining in business do not presently have the capacity to absorb them. Such impairment of productive capacity could keep supply down and prices high for a number of years.

"Consumers will experience only a nominal increase in the price of beef as a result of runoff control, even during the adjustment period when many of the smaller feeders might cease production in a short time. Feeder animals previously headed for feeding in these small lots will simply go to larger feedlots, especially in the Plains States, where extra capacity already exists or could be created quickly at nominal added cost.

7. "The shorter the time period available to achieve runoff control, the greater will be the disruption of the livestock industry, hence the greater the magnitude of the economic impacts during the adjustment period. More gradual application of runoff control measures will moderate the undesirable effects of such a program and make it possible for many more farmers to get the technical assistance necessary to apply runoff control measures properly."

Most commercial poultry operations, except for some replacement stock rearing and turkeys, are in total confinement. Therefore, runoff should not be a serious problem with good management practices, including handling of waste that is removed from the house, and new investment in water pollution control for poultry should be less than for hogs and cattle (R.808).

Overall, sufficient funds are available to agriculture to install necessary pollution control facilities. However, "it is entirely different when you get to individual farms" (R. 811). This latter point was emphasized by several agricultural lenders (R. 244, 753) and many farmers, especially young farmers who have to borrow money to operate (R. 423, 856, 895, 967, 977, and Exhibit 50). Pollution control improvement costs present special problems on rented farms because two people are involved -- the owner and the operator. Dr. F.J. Reiss, Professor of Agricultural Economics, University of Illinois, outlined alternative ways of sharing these costs through appropriate lease arrangements (R. 635-647).

The new Illinois Industrial Pollution Control Financing Authority can stamp bonds to make them exempt from federal tax so that a bank which obtains these bonds can loan the funds for pollution control facilities at lower than normal interest rate (R. 970). However, it is doubtful whether this will be as available to small livestock feeders and their banks as to larger organizations, because of the cost of arranging such bonds.

## EVALUATION OF INDIVIDUAL NEEDS

The achievement of pollution abatement will involve action and understanding by many people and organizations. Farmers should become informed (through the Cooperative Extension Service and others) concerning situations where pollution is often a problem and various methods for controlling it. Each farmer should evaluate his livestock operations and, if additional measures for pollution control are needed, he can consult with representatives of the Extension Service, Soil Conservation Service, Environmental Protection Agency, agricultural businesses, and other sources to plan effective pollution control measures for his farm. Each livestock operation will require individual attention. After making financial arrangements, the necessary physical alterations should be made to adequately control pollution from livestock operations.

## EXPLANATION OF SPECIFIC RULES

The explanations given in the remainder of this Opinion are intended to provide background for specific rules in the Livestock Waste Regulations, which were adopted by the Board on August 29 and amended September 5, 1974. Major attention is given to those rules which were most controversial, with little or no explanation of rules which are self-explanatory.

### 101 AUTHORITY

The Regulations begin with a statement setting forth the authority of the Board to adopt regulations in this field. The Illinois Environmental Protection Act, as amended in 1973, directs the Board to adopt requirements, standards, and procedures which will enable the State to participate in the National Pollutant Discharge Elimination System (NPDES) established by the Federal Water Pollution Control Act Amendments (FWPCA) of 1972.

### 102 POLICY

The Regulations include a statement of policy pointing out that the livestock industry is essential to the well-being of Illinois citizens and the nation, and pointing out also that livestock produce wastes which, when properly used, supply nutrients and organic matter to soils and which, when improperly used or disposed of, may undesirably affect the environment. Rule 102 indicates that the purpose of these Regulations is to prevent air and water pollution which might be caused by failure to plan the construction,

location, and operation of feedlots with regard to proper environmental safeguards. It also points out that the purpose of these Regulations is to establish a permit program for certain feedlots to meet federal requirements.

103 DEFINITIONS

The technical terms used in these Regulations are defined in accordance with extended discussions with experts in the field. It should be noted that these Regulations pertain only to livestock feedlots, which are defined as those structures and confinement areas whose sole purpose is as concentrated feeding areas. The Regulations do not deal with pastures or other areas used in the growing of crops or vegetation.

The following definitions are identical to definitions of the same terms which appear in the Illinois Environmental Protection Act, and the Pollution Control Board Regulations, Chapter 3, Water Pollution:

> Act, Administrator, Agency, Air Pollution, Board, FWPCA, NPDES, Person, Pollutant, and Water Pollution.

The other definitions are self-explanatory except for the following ones in which the intent needs to be expanded.

Impermeable: Impermeable is usually defined as "not permitting passage"; but in this Chapter it is interpreted as "not permitting perceptible passage of fluids under the usual pressure differences found in constructed livestock waste-handling facilities." Concrete manure-holding tanks can be made impermeable, but most soils in which manure-holding ponds and lagoons are constructed [Rule 104(d)(3)(A) and (B)] are not strictly impermeable. Therefore, "perceptible" and "usual pressure" were incorporated into the definition of "impermeable" to recognize the practical necessity of this usage; but it does not give license to have structures from which liquids seep or contaminate surface water or groundwater (R. 59, 1104).

Livestock Feedlot is defined as an area in which livestock are fed and concentrated in such a limited area ($\leq$600 square feet per 1000 pounds live weight) that crop or forage growth is not sustained in the area of confinement (R.455, 461, and Exhibit 65).

Livestock Waste-Handling Facility includes a variety of constructions and devices, such as manure-holding pits and lagoons, as well as acceptable disposal areas in fields. Acceptable field disposal areas were discussed repeatedly during the hearings (R. 115, 495, 503, 666, 913-918, and Exhibit 63). "In many instances, agricultural land can be used as an adequate filtering device to settle out and assimilate pollutants before the clarified water reaches any flowing stream" (R. 916). Acceptable field disposal

areas include pasture or cultivated land where liquids from a holding pond could move down into a distributive, broad-based, almost parallel terrace system to provide adequate vegetative filtering before the clarified water reaches a channelized stream (R. 503). Under some circumstances, grass waterways may be used as part of the treatment works, but these must be used carefully to avoid overloading and pollution (R. 495). Feedlots that are on nearly level land, receive no outside water, and have an adequate area of good vegetative filter between the feedlot and any surface waters may not need containment facilities (R. 914).

Modification refers specifically to changes in facilities which increase the amount of livestock waste over the level authorized by the NPDES Permit. This does not apply to ordinary maintenance of livestock facilities where the authorized level of livestock wastes is not exceeded.

104 LIVESTOCK MANAGEMENT FACILITY AND LIVESTOCK WASTE-HANDLING FACILITY OPERATIONS

Rule 104 sets forth requirements which are applicable to any livestock management facility or livestock waste-handling facility, whether or not it is required to secure an NPDES Permit. This Rule is intended to describe the minimum requirements for operating such a facility in a manner which will be consistent with good practice and the NPDES Permit system.

(a) General Criteria

(1) Besides the Regulations contained within this Chapter, each feedlot operator needs to be familiar with the Act and Chapter 2 (Air Pollution), and should pay particular attention to the following Rules in Chapter 3 by which many water pollution violations are determined. Every person shall comply with Rules 201, 203, and 205 of Part II, Chapter 3, and Rules 301 and 302 of Part III, Chapter 3, Water Pollution Regulations of Illinois. The water quality standards listed in Rules 203 and 205 shall apply to water in the receiving channelized stream or other body of water, outside a proper mixing zone. In addition, no discharge shall, alone or in combination with other sources, cause a violation of any applicable water quality standard. When the Agency finds that a discharge that complies with water quality standards in Rules 203 and 205 of Chapter 3 is causing a violation of other applicable water quality standards, the Agency shall take appropriate action under Section 31 or Section 39 of the Act to require the discharge to meet whatever discharge limits are necessary to ensure compliance with the other applicable water quality standards. When such a violation is caused by the cumulative effect of more than one source, several sources may be joined in an enforcement or variance proceeding, and measures for necessary discharge alterations will be determined on the basis of technical feasibility, economic reasonableness, and fairness to all dischargers.

As is explained below for Rule 104(a)(2), feedlots should have waste-handling facilities so that there is no discharge directly to a channelized stream except in the case of an unusual storm. A problem arises if discharges occur more frequently than allowed by the unusual rain-storm exceptions. For example, there may be chronic seepage from a holding pond through an unacceptable disposal area and thence downhill to the creek, causing water quality violations even in the absence of severe rainfall. In such a case a violation would have occurred.

Of course, water in feedlot runoff must either evaporate, enter a stream,or join the groundwater. However, when the precipitation that falls on feedlots does find its way back to streams or groundwater, normally after flowing through an area planted with crops or pasture, it is the intent of these Regulations that it will be pure enough not to cause a violation of water quality standards nor to cause groundwater pollution. This purification will occur if the operator locates the facility properly, stores manure in a suitable manner, maintains adequate diversion dikes and roof gutters, as needed, and properly disposes of the waste through an acceptable field disposal area or by direct application to agricultural land.

If there should be a point discharge from a livestock feedlot, in the absence of an unusual rain-storm [see explanation of Rule 104(a)(2) below], effluent standards of Part IV, Chapter 3, Water Pollution Regulations of Illinois, shall apply, as well as the water quality standards specified above.

Although air pollution rules are not specifically included herein, livestock operations are subject to the nuisance provisions of Chapter 2, Air Pollution, and the Act. Odor problems are especially troublesome and should be avoided by good management practices.

(2) According to federal effluent guidelines which are operative, livestock feedlots are designated as a point source, which "is any discernible, confined or discrete conveyance including . . . a concentrated animal feeding operation from which pollutants are or may be discharged" (R. 208). These feedlots should have waste-handling facilities so that there is no discharge directly to a channelized stream except in the case of an unusual rain-storm (10-year, 24-hour rainfall event by 1977, and a 25-year, 24-hour rainfall event by 1983) (40 CFR 412 in Exhibit 93 and R. 355, 792).

(3) To prevent any possible misunderstanding, this Rule is included to indicate that stockyards and similar operations where animals are held briefly, as well as conventional livestock operations, shall comply with these Regulations.

(4) Livestock wastes are sometimes transported on public roads past homes. During such transportation, care should be taken to prevent odor nuisance or waste spillage which would violate the Act or applicable regulations.

(b) Location of New Livestock Management Facilities and New Livestock Waste-Handling Facilities

After much discussion in the record and careful review by the Board, all four subsections of Rule 104(b) are restricted to new livestock facilities.

(1) This was one of the most widely discussed rules during the hearings. On December 17, 1973, the Agency submitted to the Board a proposed amendment to this Rule to delete the second word (new) so that the amended Rule would apply to all livestock facilities instead of only new ones. The Agency indicated that outright prohibition of streams flowing through feedlots would simplify enforcement and prevent water quality degradation (R. 112-116). Mrs. Louise Rome (R. 87) and Mr. Ralph Evans (R. 393) supported this proposed amendment by the Agency. Numerous farmers and agriculturists (R. 154, 181, 407, 463, 530, 574, 616, 625, 660, 951, 965, and 1026) urged that the original language be retained and pointed out the hardship and disruption that would be caused to existing facilities by such an amendment. Existing cattle operations, such as in northwestern Illinois, would be especially affected by such an amendment.

There are genuine problems, as presented by both sides. The Board retained the original language, with an outright prohibition of streams or other surface waters in new feedlots. However, all livestock feedlots must avoid water pollution (Rule 203). Therefore, each operator should examine his livestock facility and, if necessary, take steps (diversions, fencing, etc.) to prevent water pollution if a stream or other surface waters are in or near his feedlot.

(2) The Agency suggested an amendment to this Rule which would have simplified it, but it would have still applied to both new and existing livestock facilities within 10-year flood heights. Grave concern was expressed by several farmers (R. 406, 452, and 455), especially in the Rock River floodplain (R. 891, 892, 894, 898, and 1026), that if this Rule applied to existing livestock feedlots

it would cause many of them on floodplains to discontinue operations. On the basis of testimony given, the Board decided to restrict this Rule to new livestock facilities.

(3) Although these Regulations are concerned primarily with water pollution, this Rule prohibits the location of new livestock facilities close enough to populated areas to cause air pollution as defined in Section 9(a) of the Act and Chapter 2, Air Pollution Regulations. No minimum distance is specified because of differences in the size and character of livestock operations, air movement, and differences in populated areas. Both new and existing livestock facilities shall be operated so as to not cause air pollution.

(4) In locating new livestock facilities, special care should be taken to avoid rapidly permeable soils and geological formations where groundwater can be easily polluted by livestock wastes. Rapidly permeable soils occupy approximately 5 percent of the area of Illinois (R. 1106). If it is necessary to locate new livestock facilities on such areas, special construction and supplementary measures (concrete floors, impermeable holding ponds, etc.) shall be used to prevent water pollution (R. 94, 107).

(c) Protection of Livestock Management Facilities and Livestock Waste-Handling Facilities

(1) In existing livestock feedlots, proper precautions will be required to divert outside surface water from entering the feedlot, and where the feedlot runoff is not tributary to agricultural land, to store the runoff. The manner in which this can be accomplished may be through the construction of dikes, or similar manners of diversion. Such diversions decrease the volume of surface waters which enter the feedlot and permit the operator to minimize the volume of waste which is tributary to agricultural land or which has to be collected, stored, transported, and spread.

(2) These Regulations require that new livestock facilities divert outside surface water. In addition, they require that a holding pond be provided which is capable of storing 12 inches of feedlot runoff from earthen areas and 15 inches from concrete areas unless the operator has justifiable reasons for showing that a lesser storage volume is necessary or that no storage is necessary due to the runoff being tributary to agricultural land. These amounts (12 inches and 15 inches) were determined on the basis that they would provide approximately six months of storage capacity in a year of average rainfall. These design criteria have successfully been used in Illinois by the Soil Conservation Service for approximately 3 years. This amount of storage capacity is necessary, because dur-

ing certain periods of the year it may not be possible for the operator to adequately dispose of his wastes. The federal guidelines for feedlots require that sufficient capacity must be provided by 1977 to handle all process waste water (e.g., wash water from a milking parlor), if any, plus the precipitation for a 10-year 24-hour rain-storm, and by 1983, for a 25-year 24-hour storm. These requirements have been included in this Regulation. A 25-year 24-hour rain-storm in various parts of Illinois ranges from approximately 4.5 to 5.8 inches.

(d) Handling and Storage of Livestock Waste

Rule 104(d) sets forth requirements which are intended to make sure that livestock waste is handled and stored in a manner that will protect our water resources. There is an obvious hazard in permitting rainfall to penetrate manure stacks and then directly enter ground or surface waters or endanger a water supply well. These Regulations are intended to prevent such occurrences. They are also intended to ensure that manure storage facilities are built in a manner to prevent escape of the contents. Rule 104(d)(3)(B) was clarified to indicate that holding ponds must be impermeable or so sealed as to prevent water pollution (R.1029, 1105).

(e) Field Application of Livestock Waste

Farmers expressed concern about the lack of specificity in this Rule and the possibility that arbitrary application guidelines would be developed without opportunity to review them (R. 529, 604, 628, 662, 704, 1014, 1040, 1072, 1094, and 1099). The Agency plans to adopt guidelines establishing the maximum quantities of livestock waste which may be applied to various soil types under different conditions. These guidelines will be made freely available to owners and operators of feedlots, as specified in Rule 105. The Agency will carefully review the state of the art and consult knowledgeable agricultural and ecological experts before adopting these guidelines (R. 490).

Some important principles underlying the proper field application of livestock wastes were discussed previously in this Opinion in the sections concerning "Properties of Livestock Wastes" and "Nitrogen Transformations and Movement in Soils." More details are given in Exhibit 55, "Determining Application Rates of Livestock Wastes to Land" by Dr. S.R. Aldrich, and Exhibit 56, "Land Disposal Management of Livestock Wastes" by Dr. O.C. Braids, both of whom are staff members in the University of Illinois Agronomy Department.

Under common farm practice, typical field application rates per acre are 10 to 20 tons of manure from large animals and one-half those rates for poultry manure.

Since nitrogen is an essential element in plant nutrition, and is also of concern in water pollution, it is useful to consider rates of nitrogen application in manure in relation to plant uptake. The pounds of nitrogen in the harvested portion of various crops are as follows (R. 908):

| Crop and yield per acre | Pounds of nitrogen |
|---|---|
| Corn grain, 150 bu. | 135 |
| Wheat grain, 60 bu. | 75 |
| Soybean grain, 50 bu. | 200 |
| Alfalfa hay, 6 tons | 270 |

Soybeans and alfalfa are legumes and through symbiotic bacteria can obtain much of their nitrogen from the air instead of the soil. However, "research has shown that if adequate amounts of inorganic nitrogen are present in the soil, legumes use this inorganic nitrogen" and little nitrogen is provided by the bacteria (R. 908). Dr. L.F. Welch, Professor of Agronomy at the Unviersity of Illinois, estimates that no more than 50 percent of the total nitrogen is readily available to plants during the first year (R. 910) because of the nitrogen transformations in soils that were discussed previously in this Opinion. If average beef cattle manure (one ton contains about 12 pounds of nitrogen) is applied for corn and 50 percent of the nitrogen is available during the first year, it would require 22.5 tons of manure to supply the 135 pounds of nitrogen in 150 bushels of corn grain, plus more manure to provide nitrogen in the corn forage. Gaseous losses of ammonia and denitrification would further increase the amounts of manure needed to supply nitrogen for this corn before there was surplus nitrogen which could be leached. It is clear that the potential for nitrogen leaching is less with high crop yields than with low crop yields and with no crop growth. Likewise, the greater the amount of nitrogen removed in harvested plants, the greater is the rate of manure application that would be environmentally satisfactory.

Some livestock operations with very large numbers or with relatively small acreages on which to apply livestock wastes are interested in increasing manure application rates up to the maximum rate that is environmentally satisfactory. In Exhibit 55, Dr. S.R. Aldrich gives much information on effects of high manure application rates. Dr. Aldrich's summary states that "The amount of nitrogen that can be introduced into the soil annually without substantial buildup in $NO_3^-$ is probably in the range of 150 to 250 pounds (per acre)." If one assumes that the average ton of large-animal manure contains 10 pounds of nitrogen and that 25 percent is lost through all channels, the calculated annual rate of manure application is 20 to 33 tons. If the assumed loss is 50 percent, the maximum annual application is 30 to 50 tons. Single applications might reasonably be two or three times the average of yearly applications. Sites that maximize denitrification -- poorly drained, fine-textured soils --

will tolerate heavier rates than well-drained, coarse-textured soils. Techniques for increasing denitrification may become practical."

It is obvious that many technical factors must be considered in order to develop satisfactory guidelines for field application of livestock waste under the wide range of conditions that occur in Illinois.

105 ADOPTION OF DESIGN AND MAINTENANCE CRITERIA

Rule 105 requires the Agency to set forth publicly those criteria which are utilized in evaluating permit applications. Among those criteria will be manure application rates as referred to in Rule 104(e). Permit applicants are entitled to know the procedures by which the Agency determines whether or not a proposed facility will meet the requirements of the Act and these Regulations. In order to make sure that those directly involved receive adequate notice of any major changes in requirements, the Agency shall follow the notification procedures specified in Rule 105(b).

106 INSPECTIONS AND DISEASE PREVENTION

Maintaining animal health is one of the greatest problems in raising livestock. There was lengthy and vigorous debate concerning the original language in the proposed Regulation versus an amendment proposed by the Agency to the Board on December 17, 1973 (R. 128-132). The words "as approved by the owner or operator, or his duly authorized agent" caused the Agency concern. "The Agency is willing to follow the sanitary measures practiced by the operator of the facility, or normally used or prescribed sanitary precautions used by veterinarians. However, we do not want to be placed in the position of being legally refused the right to inspect the facility due to unreasonable sanitary precautions which the operator could prescribe under the existing language. Due to the wide variation of disease prevention equipment or clothing which may be used by various operations, the Agency feels that these should be provided by the owner or operator" (R. 131).

Farmers and agriculturists repeatedly emphasized the livestock health hazard of an inspector traveling from one facility to another, and especially visiting unannounced during a very contagious disease outbreak (such as transmissible gastroenteritis) which could be avoided by prior contact and suitable scheduling with the operator (R. 141, 180, 214, 223, 237, 239, 397, 408, 451, 464, 466, 598, 617, 672, 757, 1031, 1062, and 1095). Several farmers stated that when they have a disease outbreak that requires the help of a veterinarian, they often take a sick animal to him rather than have him visit their farm in order to avoid the possibility of a veterinarian's carrying a disease to their farm.

A veterinarian, Dr. A. Bottorf, supported the expressed concern of the farmers, and also recognized that the Agency may have difficulty in meeting some sanitary precautions specified

by individual farmers (R. 134). Dr. Al Leman, a University of Illinois veterinarian, suggested a six-point program for Agency inspectors "to minimize the possibility of transmitting costly diseases and to avoid accusations that may be surrounding this transmission" (R. 557). This suggested program included inspector training, visiting only one livestock enterprise per day, parking and notification of farmer, coveralls and boots, order of inspection, and cleanup prior to departure. The Agency responded (Exhibit 64) to Dr. Leman's suggestions and accepted them but with two modifications. With respect to Dr. Leman's second suggestion, the Agency stated that it "cannot promise that only one feedlot will be visited on any given day. Scheduling might not permit it. But the Agency will direct field personnel to avoid visiting more than one feedlot of the same species, except in a case of emergency." With respect to Dr. Leman's fourth suggestion, the Agency indicated that they proposed to provide boots and disinfection equipment for their feedlot inspectors, but not disposable coveralls. Mr. L.D. Hudson of the Agency explained their policy concerning the administration of these Regulations and their training program for feedlot inspectors (R. 534-541).

Compromise language was finally proposed (R. 569) which eliminated the phrase that was most objectionable to the Agency and retained health safeguards which are so important to farmers. This compromise language is incorporated into Rule 106.

201 NPDES Permits

These Regulations require that large feedlots must obtain NPDES Permits, as specified in Rule 202, and also smaller feedlots which are threatening to cause or causing pollution, as specified in Rule 203. It is not wise to use Illinois resources to require more permits than are necessary to control pollution through the provisions in Rules 202 and 203. Paper work associated with permit applications and possible exposure to civil sanctions under these Regulations may unduly deter small livestock operations from continuing production. The Board does not believe that there will be significant environmental injury if smaller feedlots which are not causing problems are exempt from the permit requirements.

202 PERMITS REQUIRED FOR LARGE OPERATORS

Rule 202 sets forth the numerical limits above which NPDES Permits are required. These limits are identical to those presently required by federal regulations. They apply to both new and existing feedlots.

203 PERMIT PROCEDURES FOR OTHER OPERATORS

Rule 203 authorizes the Agency to make a determination (for livestock operations in which there are 1,000 to 100 animal units) that a particular facility may be causing a violation of the Act or applicable regulations. In such a case the Agency is authorized to notify the operator that he is required to apply for a permit. The terms of the permit will be established after taking into consideration the factors listed in Rule 203, and the applicant will be granted a permit with a

compliance schedule.

For livestock operations in which there are less than 100 animal units, an NPDES Permit is not required unless the Board determines that it is a significant polluter. Since the economic implications of these Regulations are greatest on small producers and the volume of waste per producer is small, the Board believes that they should be spared costs beyond what is necessary to control pollution.

204 APPLICATION - CONTENTS

Rule 204 sets forth the kind of information which the Agency will require in order to issue an NPDES Permit for a feedlot. The Agency expects to use the federal forms as part of its permit application, but does intend to request additional information when necessary.

205 APPLICATIONS - REGISTERED OR CERTIFIED

Rule 205 provides that the permit applications shall be sent by registered or certified mail. This rule is strictly for the protection of the applicant.

206 APPLICATIONS - TIME TO APPLY

Rule 206 makes provision for adoption by the State of any permits issued by the USEPA before approval of the State program, and for use by the State of applications that may be filed with the USEPA during that period of time. Insofar as is possible, there should be no duplication of effort because of the change within Illinois from a federal to State program. The requirement that applications for permit renewals be filed 180 days before expiration of an NPDES Permit is parallel to the requirement in the FWPCA. The Agency will notify the applicant 60 days prior to the time the renewal application must be submitted.

207 APPLICATIONS - FILING AND FINAL ACTION BY AGENCY

Rule 207(a) provides that a person required to obtain an NPDES Permit for his facility must apply at least 180 days in advance of the date the facility is to commence operation minus the number of days of available manure storage time.

The provision in Rule 207(b) governing the signature requirements is identical to the federal provision.

208 STANDARDS OF ISSUANCE

Rule 208 requires that the applicant show that his proposed facility will be in compliance with the applicable law and will produce consistently satisfactory results. No construction permit is required in these Regulations, but operators should check their plans with the Agency before construction begins to insure that the completed facility will achieve adequate pollution control to meet operating permit requirements. Such checking should avoid the possibility of constructing a

facility for which an operating permit could not be obtained.

209 DURATION OF PERMITS

(a) Almost all bankers, farm managers, and farmers testified vigorously that, because of credit and amortization considerations, the NPDES Permits should be for periods longer than five years (R. 213, 243, 505, 530, 617, 668, 705, 754, 897, 947, 1063, and 1071). The Agency explained that this permit period is consistent with federal regulations, and that in order for Illinois to participate in the NPDES program we must meet certain federal standards, one of which is that no permit shall be issued for periods to exceed five years (R. 671).

(b) However, a provision in the FWPCA Section 306(d) states that a new source, the construction of which is commenced after the date of the enactment of the federal Act, shall not be required to meet stricter federal "standards of performance" for a period of time which corresponds to either ten years or the period of depreciation or amortization of the facility, whichever period ends first. This provision is incorporated into these Regulations so that operators will be alerted to the fact that they are protected from having to meet a moving target, at least to this extent.

Reference is made to Section 167 (depreciation and amortization) and Section 169 (pollution abatement equipment) of the Internal Revenue Code. Mr. Mike McCreery, Illinois Agricultural Association, explained that if a person follows normal depreciation tables, he can have ten-year protection from a more stringent federal "standard of performance" according to Section 167 (R. 776-779). However, if one takes rapid write-off on certified pollution abatement equipment (which is a tax advantage that is provided for in Section 169), he does not have protection from the ten-year more stringent federal "standard of performance." One cannot have both rapid write-off and ten-year protection. Another factor is involved in that one cannot get investment credit under rapid write-off. It is clear that individuals should investigate income tax considerations in relation to protection from more stringent federal "standards of performance."

210 ISSUANCE AND CONDITIONS OF PERMITS

(a) The same NPDES Permit procedures that are used in Subpart A of Chapter 3, Water Pollution Regulations, are also used in administering these Chapter 5 Regulations.

(b) This Rule permits the Agency to impose special conditions where they may be required to protect the environment.

211 APPEALS FROM CONDITIONS IN PERMITS

Rule 211 provides for challenge of conditions which the applicant may believe to be unjustified. It is consistent with parallel provisions in other chapters of the Board's regulations.

212 DEFENSES

Rule 212 sets forth the defenses available to an operator who is in compliance with his NPDES Permit. Compliance with a permit under state law should provide a defense to the same extent that it does under federal law, and these Regulations so provide.

213 AUTHORITY TO MODIFY OR TERMINATE PERMITS

Rule 213 sets forth the bases for terminating or modifying permits as required by the FWPCA and the Act. Once a permit is issued, termination or modification should be as a result of a hearing before the Board in order to preserve the rights of the permit holder.

301 FISH AND AQUATIC ANIMAL PRODUCTION FACILITIES

Rule 301 authorizes the Agency to require and to issue NPDES Permits, where they are required by USEPA regulations, to fish farms and similar operations. The Agency must possess that authority in order to have a complete NPDES program which can secure federal approval, but it knows of no fish operations in the State of a size which will require an NPDES Permit.

302 IRRIGATION ACTIVITIES

Rule 302 authorizes the Agency to require and to issue NPDES Permits, where they are required by USEPA regulations, to irrigation return flow discharges. Again, this is an authority which the Agency must possess in order to have a complete NPDES program which can secure federal approval, but very few, if any, permits are expected to be issued for irrigation return flows under this Rule.

401 COMPLIANCE DATES

Existing sources not required to obtain an NPDES Permit shall comply with the general provisions of Part I by December 31, 1976. This is in response to the testimony received in the hearings which indicated that a reasonable period of time is necessary to make decisions with respect to continuation of operation and compliance with the program. This period of time is adequate, even for the beef industry, to use up feed inventories and sell livestock on a favorably priced market. This also provides adequate time to install any livestock waste-management facilities that may be needed to bring facilities into compliance.

All new facilities, whether required to secure NPDES Permits or not, will be required to meet Part I general standards when they begin operation.

Existing facilities requiring NPDES Permits will have to meet Part I standards as of the compliance dates listed in the NPDES Permit for the facility. The deadline dates which may be allowed for existing facilities are: July 1, 1977, for con-

trolling runoff equivalent to the 10-year 24-hour storm; and, July 1, 1983, for controlling runoff equivalent to the 25-year 24-hour storm. However, if these criteria can be met at an earlier date, that date shall be used in the compliance schedule.

New facilities which require NPDES Permits must provide for control of runoff from a 25-year 24-hour storm at the time operation commences.

402 SEVERABILITY

This is a standard severability clause which specifies that a determination invalidating one provision in these Regulations does not affect the validity of other provisions of the Regulations. It is consistent with parallel provisions in other chapters of the Board's regulations.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify that the above Opinion and Order was adopted on the 14th day of November, 1974, by a vote of 5 to 0.

Christan L. Moffett