

# TECHNICAL NOTES

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## 208 WATER QUALITY PLANNING AND THE CATTLE INDUSTRY

The following statements were prepared by Dr. John M. Sweeten, Agricultural Engineer-Animal Waste Management, Texas Agricultural Extension Service, Texas A&M University, College Station, Texas, member of the National Cattlemen's Association Environmental Management Committee.

These statements will be of value to conservationists concerned with water quality and livestock.

Attachment

208 WATER QUALITY PLANNING AND THE CATTLE INDUSTRY \*

AMERICAN NATIONAL CATTLEMEN'S ASSOCIATION  
Now the NATIONAL CATTLEMEN'S ASSOCIATION

- #1 During the 1960s, fed cattle production in the United States increased by 80%, reaching a peak of 14 million head on feed in 1973. With this increase came rising concerns about water pollution from cattle feedlots.
- #2 This was because stormwater runoff from cattle feedlots, though varying widely in composition, contains pollutant concentrations that are 10 times higher than raw domestic sewage.
- #3 As a result, the mid-1960s saw an average of 15 documented fish kills per year in Kansas attributed to feedlots, with a similar pattern in neighboring states subject to high intensity storms where large feedlots were located next to lakes or flowing streams
- #4 State water pollution agencies in the Great Plains, Midwest and Southwest responded to these water quality problems by enacting stiff regulations requiring large feedlots to install water pollution abatement systems to contain all feedlot runoff,...
- #5 And dispose of it on pasture or cropland.
- #6 The 1972 Federal Water Pollution Control Act Amendments required the U.S. Environmental Protection Agency to establish a permit program for 27 industrial "point source" categories of water pollution. The general category of "feedlots", was included in this statutory list of "point sources".
- #7 After its initial attempt to define what constitutes a "feedlot point source" and stricken by a Federal Court, the Environmental Protection Agency enacted a regulation in 1976 requiring each feedlot with more than 1000 animal units to obtain a Federal permit if it discharges off-premises.
- #8 A 300 to 1000 head capacity feedlot needs a permit if it discharges to an adjacent navigable stream or through a man-made structure.

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- #9 Smaller feedlots are "point sources" only if on-site inspection proves they discharge into navigable waters through man-made structures or if runoff into adjacent navigable waters occurs.
- #10 These state and federal programs, plus excellent cooperation from the cattle industry and support groups, have lead to almost complete elimination of water pollution from cattle feedlots in major cattle feeding states. For instance, cattle feedlots have not caused a single fish kill in Texas and Kansas in more than 5 years.
- #11 Remarkable progress toward abating point source pollution has exposed a "whole new generation of problems", to quote one high EPA official. These are the heretofore unregulated "nonpoint sources" of water pollution.
- #12 The term nonpoint sources encompasses all of man's activities not otherwise specifically defined as point sources. Construction sites, surface mines and urban areas are all classified as nonpoint sources, as are...
- #13 Pastures, rangelands, forest and small or unconfined livestock operations.
- #14 Nonpoint sources have certain characteristics in common. They are diffuse and discharge pollutants by dispersed pathways. Discharge is Precipitationdependent rather than manmade.
- #15 Pollutants from agricultural and silvicultural nonpoint sources include sediment, fertilizers, pesticides, naturally occurring salts, pathogenic organisms, and organic residues such as plant tissue and manure.
- #16 Sediment from soil erosion is the greatest single pollutant of surface waters. On a tonnage basis, the nation's streams receive 500 times more sediment than municipal sewage.
- #17 Though not toxic in itself, sediment is a primary carrier of chemical pollutants.
- #18 About half of the sediment in the nations streams comes from cropland. Estimated erosion losses nationally average as high as 9 tons per acre per year, with an extreme loss of 60 to 100 tons per acre annually.
- #19 The Council for Agricultural Science and Technology (CAST) reported that under normal farming practices new topsoil forms at the rate of only 1.5 tons per acre per year--about 1/100 inch soil depth. To prevent a gradual decline in soil productivity, several states have enacted sediment control laws that allow corrective measures to be imposed when soil loss exceeds 2 to 5 tons per acre.

- #20 Long, steep unterraced slopes, with furrows parallel to the slope contribute to high sediment yield. Other adverse conditions include absence of crop residues or cover crop and intensive farming along a stream.
- #21 To control water pollution from cropland, conservation practices such as terracing, contour farming and vegetated waterways can be installed where needed.
- #22 Cultural practices to protect bare soil are also effective. For example, in Nebraska, soil loss during fallow was reduced 95 percent with stubble mulch tillage; half as much energy was required for plowing; and runoff water loss was reduced 57%. In South Dakota, limited tillage cut water erosion in half.
- #23 Most eroded soil particles never actually enter a flowing stream, but are deposited enroute. Sediment delivery from agricultural watersheds usually amounts to only 10 to 30% of the gross soil erosion.
- #24 As much as 10% of the nitrogen and phosphorus applied as fertilizers may be transported to streams. Both are carried on soil particles, while nitrogen may also be transported in dissolved form.
- #25 Except when heavy rainfall occurs only hours after treatment, the amount of pesticide that runs off the land is usually much less than 5% of the amount applied. The toxicity, persistence, and transport mechanisms of pesticides varies widely from one compound to the next.
- #26 "Background levels" of pollutants exist even without man's activity. For example, at a given flow velocity, streams have inherent capacity for sediment transport which they often satisfy by undercutting stream banks.
- #27 The nitrogen yield unit area (in shaded bars) is about the same from precipitation, forest lands, croplands, manure disposal areas, and urban drainage. Precipitation and rangeland runoff yield less phosphorus than does runoff from forest, cropland, manure disposal sites, and urban drainage. Nitrogen and phosphorus yields for open fieldlots (on the right) are two or three orders of magnitude higher than for nonpoint sources on a unit area basis.
- #28 The water quality impact of range or pasture beef cattle production depends on many variables including stocking density, vegetative cover, distance--to--stream, soils and climatic circumstances.

- #29 Manure is deposited on rangeland at less than 1/2 ton of dry solids per acre annually. As a result, nutrient concentrations in rangeland runoff are very low and constitute natural or background levels.
- #30 For instance, pastured cattle in Florida had little or no impact on runoff water quality even at a relatively high stocking rate of 480 cow-calf units per section. Losses of nitrogen and phosphorus in surface runoff were less than one pound per acre per year, or . . .
- #31 . . . About the same as for this ungrazed forest area.
- #32 In Southwest Texas experiments, soil erosion and nutrient losses were much greater from continuously grazed pastures than from pastures receiving deferral rotational grazing.
- #33 At the same stocking rate of 50 animal units per section, the deferred rotational grazing system produced markedly higher soil infiltration and much lower runoff volume than from the continuously grazed system.
- #34 A livestock wintering operation in Montana had negligible effect on chemical properties of a stream, even with 600 cattle, 1200 sheep, and 85 hogs held in partial confinement along a 2 mile stream segment. However, bacterial contamination was significantly increased where animals had access to the stream and was detectable for 3 miles downstream.
- #35 A study of 12 watersheds in North Carolina concluded that the effects of pastured or semi-confined livestock in water quality are minimal, except where direct manure discharge or animal access to streams occurs.
- #36 Cattle access to streams can accelerate streambank erosion to the extent of 2800 tons per acre per year in localized spots, according to a Wisconsin study.
- #37 A pilot program of fencing cattle away from a stream was begun on the headwaters of Otter Creek in Western Nebraska after rainbow trout had become almost extinct due to stream sedimentation and elevated water temperatures.
- #38 Only the streambank was fenced in 1969 and within 3 years rainbow trout multiplied 250% from the initial restocking. But heavy sedimentation still occurred from steep slopes and side canyons along the watershed.
- #39 In 1973, fences were moved back beyond the ridges. The steep slopes and gulleys quickly became revegetated and stabilized within 6 months.

- #40 As a result of fencing 115 acres along the upper 2 miles of Otter Creek, the shallow, muddy stream has become . . .
- #41 Cleaner, swifter, deeper, cooler and 6 times as productive for rainbow trout only 8 years since the program began. The Nebraska Game and Parks Commission is now embarking on a program to pay landowners for fencing and for leasing of fenced-off land along key Nebraska streams.
- #42 The U.S. Environmental Protection Agency has recommended several range management practices that will minimize nonpoint source water pollution. Those practices familiar to most cattlemen, include maintaining adequate land-to-livestock ratio to avoid animal concentrations; dispersal of feeding and watering areas; maintaining good vegetative cover through stocking density control, and rotational grazing.
- #43 Other EPA-recommended practices include locating water and feed troughs away from streams with an adequate buffer strip; periodically relocating feed troughs; and preventing livestock access to streams and reservoirs by fencing. Artificial watering systems and shades are recommended in lieu of cattle access to tree-lined streams.
- #44 Land disposal areas for feed lot manure and feedlot runoff are also considered nonpoint sources that can contribute to water pollution if not properly managed.
- #45 On the other hand, nutrients added by manure application promote growth of vegetative cover. This may in turn reduce erosion, resulting in less stream enrichment than from watersheds devoid of livestock wastes.
- #46 Controlled land application is recognized as an environmentally sound approach to disposal of sludges and residues from point sources such as sewage treatment and industrial processing plants.
- #47 The soil has enormous capacity to assimilate organic wastes, as borne out by West Texas experiments in which up to 900 tons of cattle feedlot manure were applied with deep plowing without adversely affecting chemical pollutant concentrations in irrigation water runoff.
- #48 In Alabama, research runoff from pastures receiving 120 tons of dairy manure solids per acre had the same quality as runoff from check plots that received no manure.
- #49 Application of cattle manure to Tennessee soils for 6 years reduced soil erosion by 2/3 while cotton production was tripled. Other research around the country leads to the same conclusion: that prudent application of livestock manure does not adversely affect stream quality.

- #50 Guidelines for land application of manure to reduce nonpoint source pollution include: Having enough land available when disposal is necessary; applying manure at a rate that corresponds to crop nutrient requirements; and planting crops with high nutrient uptake.
- #51 Other steps include prompt plowdown of surface-applied manure, avoidance of gulleys and steep slopes; and application of soil erosion control principles.
- #52 Feedlot runoff stored in holding ponds must be disposed of agricultural land within a specified time period, according to regulations in many states.
- #53 Feedlot runoff disposal sites are considered nonpoint sources of water pollution since secondary discharge to streams could occur.
- #54 Soil application rates for feedlot runoff are restricted mainly by salt content in drier areas, rather than by the amount of water applied.
- #55 But in humid areas, it is often desirable to provide either surplus runoff storage capacity or large tracts of land to manage feedlot runoff without secondary discharge.
- #56 General guidelines for controlling nonpoint source pollution from feedlot runoff disposal include:
- (a) Providing sufficient land area for prompt disposal, or surplus storage capacity.
  - (b) Restrict application rates to control soil salinity.
  - (c) Maintain a cover crop to utilize applied effluent.
  - (d) Apply effluent uniformly.
  - (e) Control tailwater discharge and soil erosion.
- #57 Broad guidelines such as these, when combined with specific research - based criteria for local areas, can constitute a set of "Best Management Practices". Best Management Practices for a multitude of agricultural and silvicultural activities are the cornerstone of the nationwide water quality management program for nonpoint sources.
- #58 Best Management Practices include those agronomic, managerial and structural practices which are used either singly or in combination to reduce nonpoint source pollution to a level compatible with water quality goals specified in the 1972 Federal Water Pollution Control Act Amendments.
- #59 The principal water quality goal states that ". . .Wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish and wildlife and provides for recreation in and on the water (shall) be achieved by July 1, 1983."

- #60 In other words, we as a nation are to achieve the goal of "fishable, swimmable streams" by mid-1983.
- #61 Criteria used to gauge compliance with that goal are listed in the state water quality standards for each stream segment and EPA criteria which define water quality characteristics needed to meet designated water uses, such as livestock watering, contact recreation, and municipal water supply.
- #62 In Section 208 of the 1972 Federal Water Pollution Control Act Amendments, Congress established the mechanism for a coordinated, intensive attack on water quality problems by local, state and federal governments.
- #63 Section 208 defines a process for developing "areawide waste treatment management plans," geared to solving major local water quality problems. The Act provides for the Governor of each state to delineate those areas having substantial water quality problems and to designate a local or regional planning agency to head up the planning effort. These agencies must develop, adopt and submit to the Environmental Protection Agency an areawide water pollution abatement plan that includes, among other things, a process to identify and control agricultural and silvicultural nonpoint sources.
- #64 These so-called "Designated Areas" chosen by the Governors encompass urban and industrial concentrations as well as some outlying agricultural land. The designated planning agencies--either regional planning commissions or Councils of Government--receive Federal funds to carry out Section 208 planning.
- #65 In Texas, for example, 8 such designated areas are currently engaged in 208 planning.
- #66 A Federal Court decision in 1975 expanded the scope of 208 planning to include all tracts of land within the states, regardless of how remote or whether water quality problems exist.
- #67 Planning for these so-called nondesignated areas is the responsibility of state agencies, who in turn may contract with local agencies, river basin authorities, and engineering consultants.
- #68 Virtually each state has structured its own unique program of 208 planning for nondesignated areas.
- #69 The State of Texas, for example, has been divided into 15 river basins for planning purposes. Within these river basins, 208 planning is conducted either by river basin authorities or by regional planning commissions supported by engineering consultants.

- #70 Planning funds come from the Federal government down to the state water pollution control agency, and are ultimately passed down to river basin planning authorities.
- #71 To assist river basin planners with their work, the Governor has appointed Policy Advisory Committees. According to Federal regulations, memberships of these Policy Advisory Committees must be broadly representative of the planning area and include 51% elected local officials. Bonafide landowners and others make up the remaining 49%.
- #72 The State Soil and Water Conservation Board has a key role in 208 planning. The Board will work with river basin planners and the state-level coordinating committee to identify agricultural and silvicultural nonpoint source pollution problems and to define Best Management Practices.
- #73 Ideally, Best Management Practices will provide agencies a practical alternative to expensive stream monitoring to check compliance. They will be localized to fit specific land uses and physiographic conditions and will be easily understood by producers. BMP's hopefully will be flexible enough to fit either voluntary or regulatory programs and to incorporate new production or environmental technology that becomes available. And most important, BMP's should be cost-effective from both the landowner's and society's viewpoint.
- #74 Most of the nation's 3000 Soil and Water Conservation Districts will be involved in 208 planning to the extent of helping define Best Management Practices for local areas. Most will also be directly involved in implementing 208 plans for agriculture once they are adopted.
- #75 Whether 208 plans for agriculture will require mandatory adoption of BMP's or will provide voluntary programs spiced by financial incentives to landowners will largely be a matter of local discretion.
- #76 Most of the crucial decisions on 208 planning will be made during the next 10 to 15 months. Most states are requiring that local and basin plans be finalized by Summer, 1978. States must submit their 208 plans to the Environmental Protection Agency by November 1, 1978.
- #77 EPA approval of 208 plans will depend upon whether proposed technical solutions, institutional arrangements, financing methods, educational programs, and regulations would appear to work. Where 208 plans are not approved, EPA has limited authority to impose its own programs.

#78 Cattlemen have an enormous stake in 208 planning. They own much of the land about which planning decisions are being made. They will be called upon to pay taxes on that land to underwrite water quality management systems and programs prescribed by 208 plans.

#79 Therefore, cattlemen should seek an understanding of water quality management issues, abatement alternatives, and cost in their local areas. They should express their views about nonpoint source pollution abatement at every public input opportunity promised by Congress and EPA as an integral and unique part of section 208 planning.