4.0 RESULTS

This section presents EPA's estimate of the water quality effects of Meat and Poultry Processing (MPP) discharges under baseline conditions and following the adoption of the proposed limits and standards. In addition, analytical results are presented for regulatory options that were evaluated by EPA, but not included in today's proposal.

EPA used the National Water Pollution Control Assessment Model (NWPCAM) to estimated the potential benefits of controlling discharges of bio-chemical oxygen demand (BOD5), total suspended solids (TSS), total Kjeldahl nitrogen (TKN) and fecal coliform bacteria (FCB) from MPP facilities. A total of 97 MPP facilities were modeled for this analysis, including 36 direct and 61 indirect dischargers. EPA estimates that 246 direct and 731 indirect discharges are within scope of the regulatory options evaluated for this proposed rule.

The first subsection (4.1) presents a summary of the overall results, modeled treatment options, modeled facilities, environmental scale-up factor and limitations of the Water Quality Environmental Assessment (WQEA). The second subsection, 4.2., presents documented impacts.

4.1 WQEA RESULTS SUMMARY

EPA modeled a sample set of 97 MPP facilities with a combined baseline loading of 49.9 million lb/yr (see Table 4-1). The baseline loadings consist of the following pollutants: BOD, TSS, nitrogen, phosphorus and TKN.

EPA estimates the preferred treatment option (Scenario 7) for this proposed rule would reduce pollutant discharges from 36 MPP facilities by 4.8 million lb/yr. For this 10 percent reduction, EPA estimates that this proposed rule would improve the WQI of 949 reach miles (6,687 miles for the national set). The average WQI for these 949 reaches increases from 74.9 to

75.9 (see Table 4-1) which is still just below the boatable criteria breakpoint of WQI = 79. The standard deviation suggest that 67 percent of the reaches impacted are located in the WQI range of 60 - 92.

Table 4-1: Benefits Scenarios Modeled (97 facilities)[1]

Scenario[2]	Regulatory Options[3]	Pollutant[4] Load (million lbs/yr)	Pollutant Reduction (percent)	Step[5] Improvement: Overall use (reach miles)		Contiuous[6] Improvement: Water Quality Index (reach miles)	
				Sample[7]	National[8]	Sample	National
Baseline		49.9					
1	BAT2	47.5	5	17	116	926	6,325
2	BAT3	45.0	10	21	143	949	6,482
3	BAT4	44.8	10	21	143	952	6,502
4	BAT2 + PSES1	36.2	27	24	200	1216	9,799
5	BAT3 + PSES1	33.7	32	28	227	1240	9,968
6	BAT4 + PSES1	33.5	33	28	227	1244	10,000
7	BAT3 (meat, poultry), BAT2 (Rendering)	45.1	10	21	143	949	6,687
8	BAT3 (meat, poultry), BAT2 (Rendering) + PSES1	33.7	32	28	227	1240	9,813

[1] This table corrects several errors reported in preamble Table IX.G-1. For more information, please see Appendix A.
[2] EPA is proposing Scenario 7 for the MPP effluent guideline rule making
[3] BAT = Best Available Treatment (for Direct Discharges)
PSES= Pretreatment Standards for Existing Sources (for Indirect Dischargers)
[4] Pound totals include BOD, TSS, Nitrogen, Phosphorus and TKN. Some overlap between categories may be occurring
[5] Improvement credited when threshold conditions are met.
[6] Improvement credited for any measurable change in water quality.
[7] Sample set represents 97 facilities (36 direct and 61 indirect).
[8] National set represents 977 facilities (246 direct and 731 indirect).

In addition to estimating the continuous change in water quality, EPA also analyzed the

use category or step change approach. The reductions in loadings from the Scenario 7 with this approach would result in the improved overall use of 21 reach miles (for the sample set), which scales up to 143 reach miles (for the national set).

The large differences in miles of stream reaches affected attributable to these two approaches is intuitively consistent: the continuous approach will count all stream reaches where decreases in pollutants occur, whereas the use category approach will only estimate those instances where a change in water quality results in migrating from one use category to another. The continual approach is considered to be the preferred method of estimating water quality impacts. The Economic Assessment presents the monetized benefits for this proposed rule, which are based on the continuous approach.

Table 4-2: Water Quality Index (WQI) Baseline and Proposed Treatment Level Statistics

Scenario	Average WQI [1]	Standard Deviation (SD)	Mean $\pm$ SD Range [2]	Min.	Max. [3]
Baseline	74.9	16	59 - 91	6	99
BAT3 (meat, poultry), BAT2 (Rendering)	75.9	16.3	60 - 92	6	99

[1] Boatable criteria is 79. Reaches with WQIs less than 79, are designated as supporting no use.
[2] Represent the interval by which 67% of reaches are represented
Fishable criteria is 94.4.
[3] Swimmable criteria is 99.

4.1.1 Treatment Options Modeled

EPA modeled four treatment options for analysis (see Table 4-3). Three of the treatment options are for facilities which discharge directly to a water body (i.e., direct dischargers). EPA designates the treatment options for direct dischargers as best available technology (BAT). One of the treatment options is for facilities which discharge indirectly to a water body (i.e., indirect dischargers), through a publicly owned treatment work (POTW). EPA designates the treatment

options for existing indirect dischargers as pretreatment standards for existing sources (PSES). The combination of BAT and PSES scenarios modeled is presented in Table 4-1.

Table 4-3: MPP Regulatory Treatment Options

Regulatory Option [1]	Technical Component
BAT2	Dissolved Air Flotation (DAF) (advanced oil/water separation), Lagoon, and Disinfection (Oil and Grease, BOD_5, TSS, Pathogen removal) + Nitrification (NH_3 removal)
BAT3	BAT2 + Denitrification (Nitrate removal)
BAT4	BAT3 + (Phosphorus removal)
PSES1	DAF, Equalization (Oil and Grease, TSS, removal)

[1] BAT = Best Available Treatment (covers existing Direct Dischargers)
PSES = Pretreatment Standards for Existing Sources (covers existing Indirect Dischargers)

4.1.2 Facilities Modeled

EPA had sufficient data to model 97 out of the 977 meat, poultry, and rendering facilities which are in scope of the regulatory options evaluated in this proposed rule. To prepare for the Water Quality Environmental Assessment (WQEA) and a separate economic analysis, EPA mailed out 350 detailed surveys to generate both environmental and economic data. EPA received 241 detailed surveys in time for data analysis of this proposed rule making. Of the 241 detailed surveys, EPA received sufficient data to model the environmental impacts of 97 facilities (36 direct dischargers and 61 indirect dischargers). EPA did not evaluate 79 facilities with zero discharges or 65 facilities for which EPA had insufficient data to conduct the water quality analysis.

4.1.3 Simplified Environmental Scale-up Factor

EPA developed environmental scale-up factors for both the direct and indirect facilities.

The environmental scale-up factors are ratios between the number of facilities in scope and modeled. These scale-up factors allow EPA to approximate what the environmental impact of the proposed rule might be on the national level. These weighting factor were only used for estimating water quality impacts. EPA presents the separate methodology used for scaling of the monetized benefits in the Economic Analysis.

EPA estimates that 246 direct discharger facilities are in scope of the evaluated BAT options. Since EPA modeled 36 direct dischargers, the ratio of in scope directs (246) to modeled directs (36), is 6.83, or

$$\text{Scaling Factor direct dischargers} = \frac{\text{246 (in scope direct dischargers)}}{\text{36 (modeled direct dischargers)}} = 6.83$$

EPA estimates that 731 indirect discharger facilities are in scope of the evaluated PSES1 option. Since EPA modeled 61 indirect dischargers, the ratio of in scope indirects (731) to modeled indirects (61) is 11.98, or

$$\text{Scaling Factor indirect dischargers} = \frac{\text{731 (in scope indirect dischargers)}}{\text{61 (modeled indirect dischargers)}} = 11.98$$

4.1.4 Limitations of the WQEA

EPA believes that its analysis likely underestimates the potential benefits of the regulatory options evaluated for this proposal. Specifically, the current version of the NWPCAM

model used for this environmental assessment only models DO, BOD, fecal coliform bacteria, TKN and TSS. (See Chapter 2.) Accordingly, the analysis presented in today's proposal addresses only a subset of MPP effluent contaminants. EPA intends to modify the model in support of the final rule to include the following: (1) modeling of nutrients for an eutrophication analysis of ponds and lakes; and 2) modeling of other pollutants for rivers and streams.

EPA did not evaluate the human health benefits associated with reduction of toxic pollutant discharges, because MPP effluents do not contain significant levels of toxic contaminants. Nonetheless, it is possible that MPP pollutants, especially nitrates could have an impact on certain human receptors, if contaminants reach drinking water supplies.
EPA also did not evaluate the effects of MPP discharges on POTWs. MPP facilities discharge mostly conventional pollutants (BOD5, TSS, oil and grease, and fecal coliform bacteria), which POTWs are designed to treat.

4.2 DOCUMENTED ENVIRONMENTAL IMPACTS AND PERMIT VIOLATIONS

In addition to modeling environmental effects of MPP facilities using the NWPCAM model, EPA performed a literature search to document cases where meat and poultry processing facilities have been identified as sources of water quality impairment. The results of this literature search are published in the Administrative Record as part of the public docket.

While the literature search was not comprehensive and was limited mostly to newspaper articles and government press releases covering the last five years, EPA found 20 cases in which plant operators were cited for for a variety of permit violations. One meat processing facility was cited for more than 5,000 permit violations, which led to degradation of water quality in the affected river. In fact, this facility received the highest fine ever issued under the Clean Water Act. Other documented impacts cited in the articles included ten stream reaches with nutrient loadings, two sites with contaminated well water, one site with contaminated ground water, and

one lake threatened by nutrient loadings. In all cases, the identified source of contamination or perceived threat is an MPP facility. In cases in which permit levels were violated or alleged to be violated, NH3-N, PO4 , fecal coliform bacteria, and TSS were the most common contaminants of concern.

Eighteen of the articles document legal action in criminal cases taken against meat and poultry processing facility owners or operators . Documented legal action includes: (1) conspiracy of five facilities to violate the CWA; (2) one case of illegal dumping of waste; and (3) five cases of falsifying records, diluting waste samples, and/or destroying records. These legal actions resulted in possible cases of incarceration and fines ranging from $0.25 million to $12.6 million. Table 4-4 summarizes the environmental impacts identified and type of legal action pursued.

Table 4-4. Documented Environmental Effects of MPP Wastes on Water Quality

	Identified Impacts
Case #1	High concentrations of fecal coliform, an indicator of the presence of animal intestinal waste found in receiving waters. Also excessive discharges of phosphorus, ammonia, cyanide, oil, and grease. Plant was fined $12.6 million , the largest Clean Water Act fine ever (1997).
Case #2	Operators of five poultry processing facilities were indicted for actions leading to more than 5,000 permit violations during a 20-year period from 1975-1995.. Indictment (01/2000) alleged one of the plants pined pollutants in the form of ammonia nitorgen, fecal coliform, oil and grease, suspended solids, and other rotting materials directly into receiving waters.
Case #3	Poultry processing plant agreed to pay $500,000 (1998) for permit violations. Parameters on the discharge of phosphorus were also established for the first time for this facility.
Case #4	Meat processing facility operators agreed to pay fine of $250,000 for permit violations. Permit violations included falsification of discharge monitoring reports, exceedances of effluent limitations, and inadequate record-keeping practices (1998)
Case #5	Turkey processor agreed to make improvements is wastewater treatment system and pay $300,000 fine for permit violations. Violations included exceeding limitations fro phosphorus and ammonia (1997). High levels of these pollutants were found downstream from plant. Biologists also found a dearth of aquatic insects.
Case #6	Rendering facility officials agreed to pay $600,000 in fines for polluting river with dead animal parts and falsifying sewer discharge records (2000).
Case #7	Chicken processing plant was fined $10,800 for permit violations. Wastewater exceeded limits on fecal coliform and also exceeded volume limits. During 1998, a fish kill caused by oxygen depleted water was tied to facility's treatment plant.
Case #8	Two poultry plants were fined more than $46,000 for 206 water quality violations that took place during 1998 and 1999. Waste with high bacteria levels was running off sprayed fields.

Table 4-4. Documented Environmental Effects of MPP Wastes on Water Quality (continued)

	Identified Impacts
Case #9	A poultry plant was fined $6 million for allowing excessive runoff from its farms and processing plants.
Case #10	Pork Processing plant cited 20 times since 1994 for permit violations. Tests of receiving water body indicated high levels of several pollutants including ammonia and fecal bacteria.
Case #11	High levels of phosphorous were detected downstream from poultry processing plant. In addition, state alleged that high levels of ammonia and high temperatures resulted from plant's discharges.
Case#12	State Conservation Commission study indicated that waste from poultry processing plans threatened viability of lake due to discharges of phosphorous and nitrogen.
Case#13	Water Quality data collected by EPA indicated marked increase in phosphorous in many areas downstream from chicken plants.
Case#14	State Department of Natural Resources obtained a court order to compel poultry processor to adhere to State Water Quality Laws. The plant will reduce its discharge by about 50 percent under the court order.
Case#15	State environmental official filed suit against poultry processor for willfully contaminating groundwater in the vicinity of fields where the plant had sprayed with wastewater. Wastewater was laden with nitrates (1998)
Case#16	Owner of meat slaughter house indicted for allegedly dumping blood and other animal waste products into nearby water bodies (2000)
Case#17	State issued an order containing a $25,000 fine for violating permit limits for ammonia, solids, and other pollutants.
Case #18	Operator of rendering plant sentenced for one month in prison for illegally discharging pollutants int river (1998). Ammonia and other pollutants were discharged and monitoring reports falsfied.
Case #19	Meat further processing firm was fined $28,000 for railing to file proper forms for discharge of oil, grease, TSS, and BOD (1998). Consent agreement also required company to install pollution equipment.