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Technical Development Document for the Final Effluent Limitations Guidelines and Standards for the Meat and Poultry Products Point Source Category (40 CFR 432)

Volume 2 of 4

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SECTION 10

INCREMENTAL CAPITAL AND OPERATION AND MAINTENANCE COSTS FOR THE FINAL REGULATION

This section presents EPA's estimates of costs for the meat and poultry products (MPP) industry to comply with the technology options EPA considered as the basis for the final effluent limitations guidelines (ELGs) and standards. A detailed description of the cost methodology and detailed cost estimates are provided in the supplementary technical document *Detailed Costing Document for the Final Effluent Limitations Guidelines and Standards for the Meat and Poultry Products Point Source Category* (hereinafter referred to as the Cost Report). Costs were specifically evaluated for each type of direct discharging MPP facility, including meat, poultry, combined meat and poultry (mixed), and independent rendering facilities. EPA estimated the compliance costs for each technology option to determine potential economic impacts on the MPP industry and to weigh those costs against the benefits of the reduction in pollutants and nutrients resulting from implementation of the technology options.

10.1 BACKGROUND

For the proposed rule, EPA developed compliance cost estimates based on the use of model facilities. Specifically, EPA subdivided the entire MPP industry into 19 groups and 4 size classes. EPA used these groups and size classifications to develop 76 model facility groups (19 groups x 4 class sizes = 76) to represent the range of potential MPP facilities currently operating. Costs were developed for each model facility group (MFG). To derive compliance costs for each MFG, the Computer Assisted Procedure for Design and Evaluation of Wastewater Treatment Systems (CAPDET) (Hydromantis, 2001), a computerized cost model, was used for developing construction and annual operation and maintenance costs for required treatment units. Construction costs were used to determine the capital cost of necessary treatment units. To provide the incremental costs for each set of model facilities, the model facility costs were then multiplied by the estimated number of facilities that require the upgrade. For selected technology options, EPA also estimated retrofit costs based on data collected as part of the rule development. Each set of model facility category costs and the retrofit costs were combined separately to

determine costs for each regulatory subcategory (regulatory subcategories A through D, F through I, J, K, and L). A detailed description of the cost method and cost estimates for the proposed rule are available in the development document for the proposed rule (USEPA, 2002).

In response to the proposed ELGs, the Industry Coalition commented that the model facilities EPA had developed were not representative of the MPP industry and that the cost estimates derived were not representative of actual industry costs (Industry Coalition, 2002). The Industry Coalition also criticized the use of CAPDET, which, they asserted, was primarily developed for estimating costs for municipal wastewater treatment.

10.2 REVISED METHODOLOGY FOR ESTIMATING COMPLIANCE COSTS

In response to comments provided on the methods used for the proposed rule and to incorporate additional data collected after the proposed rule was published, EPA revised the methodology for estimating the costs to be incurred by MPP facilities to comply with the final ELGs. In particular, the revised methodology differed from that used for the proposed rule in two significant ways: (1) the costs were estimated on a facility-specific basis for all direct discharging facilities that received a detailed survey and for some that received only a screener survey (rather than using modeled facilities), and (2) the cost models used were customized for the MPP industry. EPA provided the documentation for the revised methodology in the NODA for review and comment (see 68 FR 48479; August 13, 2003).

Since the NODA was published, EPA made some additional changes to the cost methodology and model based on comments received. EPA modified the cost models as appropriate including, for example, revising the values for many of the constants and assumptions used in the model (e.g., labor rates, chemical costs), including costs for the addition of a holding/polishing pond with 7-day retention, and limiting the nitrate recycle rate to a maximum of five times the influent flow when costing facilities for Option 2.5 technology and higher. The Cost Report provides a more detailed description of the cost methodology used for the final rule, including all the equations, constants, and other cost information used by EPA to estimate the incremental capital and operation and maintenance costs associated with achieving the performance levels of the technology options considered by EPA for the final rule.

The resulting facility-specific compliance cost estimates were then used to estimate compliance costs for the MPP industry (national estimates of costs). In particular, the facility-specific cost estimates were multiplied by the survey weight established for the particular facility. Further discussion of how survey weights were derived for each surveyed facility is provided in Appendix B. The weighted facility estimates were then grouped by regulatory subcategories (e.g., subcategories A through D, F through I, J, K and L) for use in analysis of the technology options.

Costs were specifically estimated for all direct discharging facilities that submitted detailed surveys and perform first processing, further processing, and/or rendering operations, and for direct discharging facilities that submitted only screener surveys and perform further processing and/or rendering operations. Because of the small amount of information available, facilities that had received only screener surveys were costed using additional information obtained from facilities that had performed further processing and/or rendering operations and had submitted a detailed survey. As shown in Table 10-1, cost estimates were derived for 74 direct discharging facilities. Among the 74 direct discharging facilities, 58 submitted detailed surveys and 16 submitted screener surveys.

Table 10-1. Number of Facilities for Which Specific Costs Were Estimated for Each MPP Regulatory Subcategory

Regulatory Subcategory	Facility Size	Number of Direct Discharge Facilities	
		Detailed Surveys	Screener Surveys
A–D	Small	1	0
	Non-small	19	0
K	Small	3	0
	Non-small	33	0
F–I and L [a]	Small and Non-small	1	12
J	Non-small	1	4
Total number of surveys		58	16

[a] Includes mixed facilities (facilities that process both meat and poultry).

As described further in Section 10.5, EPA developed a series of cost models to estimate compliance costs for the 74 direct discharging MPP facilities for each of the technology options considered by the Agency. These models were developed based on cost and performance data related to treatment technologies in use at MPP facilities, supplemented as necessary with a combination of vendor supplied information, data and information provided in the comments on the proposal and NODA, and information from the literature.

Finally, the revisions to the cost estimates were also based on the use of all data available to EPA as part of the data collection efforts for the rule, including data from the detailed and screener surveys of the MPP industry, survey follow-up requests, and other data collection efforts. The MPP industry detailed survey, in particular, included data and information related to MPP facility wastewater characteristics, wastewater flows, and wastewater treatment system operation. Subsequent to the proposed rule, EPA visited and sampled several additional MPP facilities. Section 3 of this document describes EPA's data collection efforts for the development of the final rule.

10.3 TECHNOLOGY OPTIONS CONSIDERED AS BASIS FOR EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS

As described in more detail in Section 9, EPA identified a number of potential technology options that were considered as the basis for developing effluent limitations for the MPP industry. In response to comments on the proposed rule, the technology options EPA considered for the final rule were slightly modified from those considered for the proposed rule. The most significant modification is development of a technology option that accounts for treatment systems that employ partial denitrification of MPP wastewaters (Option 2.5). This technology option does not achieve the same degree of denitrification as the proposed Option 3 (complete denitrification). A summary of the technology options EPA considered as the basis for establishing final ELGs for MPP facilities is provided in Table 10-2. These technology options are applicable to pretreated MPP wastewaters. Pretreatment of MPP wastewater includes any combination of screening, flotation, equalization, dissolved air flotation (with or without chemical addition) and anaerobic treatment.

It should be noted that EPA develops ELGs based on the performance of a combination of processes and treatment technologies but does not require their use. Instead, selection of the specific processes and technologies used to treat MPP wastewaters is left to the discretion of individual MPP facilities. After promulgation of the final rule, EPA will require compliance with the final numerical limitations and standards; MPP facilities will not be required to use specific processes or technologies.

Table 10-2. Technology Options Considered by EPA for MPP Facilities

Technology Option	Description
1	Biological treatment[a] plus limited nitrification and disinfection
2	Biological treatment with complete nitrification and disinfection
2+P[b]	Option 2 plus phosphorus removal
2.5	Option 2 plus partial denitrification
2.5+P	Option 2 plus partial denitrification + phosphorus removal
3[b]	Option 2 plus more complete denitrification
4	Option 2 plus more complete denitrification and phosphorus removal
5[b]	Option 2 plus more complete denitrification plus chemical phosphorus removal plus filtration

[a] Biological treatment for the MPP ELGs is defined as the removal of biochemical oxygen demand from wastewater by an aerobic biological process.

[b] After the proposed rule was published, EPA no longer considered Option 3 because of difficulty finding facilities with Option 3 in place that had total nitrogen effluent data and no longer considered Options 2 + P and 5 because of the costs involved.

10.4 LONG-TERM AVERAGE CONCENTRATIONS USED FOR ESTIMATING COSTS FOR THE TECHNOLOGY OPTIONS

EPA identified treatment in-place at MPP facilities that form the basis for the technology options considered for the final ELGs for the MPP industry. The expected performance of each technology option can be described in terms of the long-term average (LTA) pollutant concentrations observed in the effluent at those MPP facilities that have the technology option. Table 10-3 presents the LTAs EPA derived for each technology option, which were used in the

cost models as the basis for estimating compliance costs. The option LTA concentrations for mixed facilities (i.e., those facilities that process both poultry and meat) were weighted based on the flow and production at the facilities (as reported in the detailed or screener surveys) and the option LTA concentrations in Table 10-3.

Table 10-3. Long-Term Average Concentrations Used for Developing Cost Estimates for the Technology Options Considered for the Final MPP Industry Effluent Guidelines

Type of Operation	Technology Option	Technology Option LTA Concentrations (mg/L)						
		Bio-chemical Oxygen Demand	Total Kjeldahl Nitrogen	Ammonia-N	Nitrate+ Nitrite	Total Nitrogen	Total Phosphorus	Total Suspended Solids
Poultry	1	8.8	7.17	5.19	N/A	N/A	N/A	10.21
	2	8.8	4.97	1.0	N/A	N/A	N/A	10.21
	2.5	8.8	4.97	1.0	29.24	34.2	N/A	10.21
	2.5+P	8.8	4.97	1.0	29.24	34.2	4.2	10.21
	4	7.0	1.34	0.17	0.52	1.86	2.27	5.05
Meat/ Rendering	1	7.0	8.095	6.115	N/A	N/A	N/A	25.10
	2	7.0	3.615	0.895	N/A	N/A	N/A	25.10
	2.5	7.0	3.615	0.895	30.59	34.2	N/A	25.10
	2.5+P	7.0	3.615	0.895	30.59	34.2	8.28	25.10
	4	6.45	3.17	0.185	10.34	13.51	5.12	18.65

N/A - not applicable.

10.5 COST MODELS

EPA developed a series of cost models to estimate the costs required to modify an existing MPP wastewater treatment system to achieve the technology option LTA concentrations (target effluent concentrations) shown in Table 10-3. For the final rule, EPA evaluated four technology options for non-small facilities, including Options 2, 2.5, 2.5+P, and 4. For small facilities, EPA evaluated two technology options for the final rule, including Options 1 and 2.

EPA developed four cost models for each of the technology options considered for non-small facilities (Options 2, 2.5, 2.5+P, and 4). EPA did not specifically develop a cost model for

Option 1 due the small number of facilities that were evaluated and the fact that the technology option included less complicated unit processes (as compared to those for Options 2, 2.5, 2.5+P, and 4). Therefore, the Option 2 cost model with minor modification (e.g., use of LTAs representing Option 1) was used to cost for Option 1. The costs estimated by the models include capital and operation and maintenance (O&M) costs. Within each model, EPA developed cost equations or curves derived from a combination of vendor-supplied information, data and information provided in the MPP detailed surveys, and data and information provided in comments on the proposed rule.

A brief summary of each cost model is provided below; a detailed description of each cost model is available in the Cost Report; and the electronic versions of the cost models are available in Sections 19.5 and 29.2 of the Administrative Record.

10.5.1 Option 1 Cost Model (Biological Treatment with Limited Nitrification)

The Option 1 cost model estimates the incremental cost required to modify an existing nitrifying MPP facility to achieve the Option 1 LTA concentrations shown in Table 10-3. EPA used the Option 2 cost model (see discussion in Section 10.5.2) with Option 1 LTAs to estimate Option 1 costs for small facilities. This approach produced acceptable cost estimates because the only difference between Options 1 and 2 is the LTAs for total Kjeldahl nitrogen (TKN) and ammonia (as nitrogen).

10.5.2 Option 2 Cost Model (Nitrification)

The Option 2 cost model estimates the incremental cost required by an existing nitrifying MPP facility to achieve the Option 2 performance levels (LTA concentrations) shown in Table 10-3. The capital cost estimated for this option includes the cost for the addition of a polymer feed system and a holding pond (that could serve as an emergency or polishing pond). The O&M costs include maintenance costs, energy costs for oxygen transfer to remove biochemical oxygen demand (BOD) and ammonia (as nitrogen), alkalinity costs, polymer costs, sludge disposal costs, sampling and analysis costs, and performance costs. The cost model also includes estimated labor costs and energy costs for the polymer feed system.

10.5.3 Option 2.5 Cost Model (Nitrification + Partial Denitrification)

The Option 2.5 cost model estimates the incremental cost to be incurred by a nitrifying MPP facility to move from its baseline to Option 2.5 performance levels. The capital costs include, as needed, costs for anoxic tanks, pumps, mixers, methanol and polymer feed systems, a lagoon bypass, a sludge dewatering system, and a holding pond. The O&M costs include alkalinity costs, methanol costs, polymer costs, sludge disposal costs, sampling and analysis costs for process control, performance costs, compliance costs, and methane revenue loss due to lagoon bypass. The O&M costs also include maintenance costs, labor costs, and energy costs for anoxic tanks, pumps, mixers, methanol and polymer feed systems, a sludge dewatering system, and a holding pond.

10.5.4 Option 2.5+P Cost Model (Nitrification + Partial Denitrification + Phosphorus Removal)

The Option 2.5+P cost model estimates the incremental cost to be incurred by a nitrifying MPP facility to move from its baseline to Option 2.5+P performance levels. The capital costs include, as needed, costs for anoxic tanks, pumps, mixers, methanol and polymer feed systems, an alum feed system, mix tanks, a lagoon bypass, a sludge dewatering system, and a holding pond. The O&M costs include alkalinity costs, polymer costs, alum costs, sludge disposal costs, sampling and analysis costs for process control, performance costs, compliance costs, and methane revenue loss due to lagoon bypass. The O&M costs also include estimated maintenance costs, labor costs, and energy costs for anoxic tanks, pumps, mixers, alum and polymer feed systems, mix tanks, a sludge dewatering system, and a holding pond.

10.5.5 Option 4 Cost Model (Nitrification + Denitrification + Phosphorous Removal)

The Option 4 cost model estimates the incremental cost to be incurred by a nitrifying MPP facility to move from its baseline to Option 4 performance levels. The capital costs include, as needed, costs for anoxic tanks, aeration tanks, pumps, mixers, an aeration system, methanol, polymer and alum feed systems, mix tanks, a lagoon bypass, a filtration system, a sludge dewatering system, and a holding pond. The O&M costs include alkalinity costs, polymer costs, alum costs, sludge disposal costs, sampling and analysis costs for process control, performance

costs, compliance costs, and methane revenue loss due to installation of a lagoon bypass. The O&M costs also include maintenance costs, labor costs, and energy costs for anoxic tanks, aeration tanks, pumps, mixers, an aeration system, an alum and polymer feed system, mix tanks, a filtration system, a sludge dewatering system, and a holding pond. A filtration system is included in the model and used as necessary, particularly when a poultry facility requires use of a filter to achieve the LTA for total suspended solids (TSS).

10.6 ESTIMATING FACILITY COSTS

The primary cost model inputs required for each MPP facility are wastewater treatment plant flow, and influent and effluent pollutant concentrations for select parameters. The data inputs for each facility were obtained from a variety of sources, including the MPP detailed and screener surveys, sampling episode reports, site visit reports, and discharge monitoring reports. In the absence of influent concentrations for a facility, the concentrations were derived from influent concentrations from facilities having similar processing operations and the expected performance (i.e., removal) based on the facility's treatment in place. EPA then classified each facility's wastewater treatment system based on the description provided in the detailed survey and the summary of monitoring data submitted with the survey. After reviewing the current effluent concentrations, treatment in place, Option LTA concentrations, and technology options, EPA decided whether new or additional treatment units would be required to achieve the Option LTA concentrations.

The four cost models (without modifications) estimate costs to convert a nitrification facility to the various technology options. According to the MPP detailed surveys responses, most direct discharging facilities in the MPP industry have treatment systems in place that are already nitrifying. The models described above were used to develop cost estimates for those facilities. However, for some MPP facilities with treatment systems that are not efficiently nitrifying, EPA determined that additional costs for the addition of, or modification to, tanks and/or the aeration system would be required to achieve the Option LTA concentrations. For those facilities the estimated additional costs were added to the costs generated by the cost models.

To estimate costs for Options 2.5, 2.5+P, and 4 for facilities that are currently denitrifying, the cost models were run twice:

- The first run was used in calculating the costs by identifying equipment sizes involved for attaining the facility's current level of denitrification. The facility-level nitrate/nitrite concentrations for MPP facilities were obtained from survey responses. This run provided the design parameters (e.g., tank size, pump size, horsepower requirements) needed to achieve the nitrate/nitrite effluent concentrations reported by the facility.

- The second run was used in calculating the costs by identifying the equipment sizes involved for attaining the option LTA concentration levels. This run provided the facility-specific design parameters needed to achieve the option LTA concentrations.

The difference in the design parameters from the two model runs was then used to calculate the incremental costs for the facility (for all necessary components). More details regarding how the cost model accounted for existing MPP facilities that already have treatment systems that achieve some level of denitrification are provided in the Cost Report.

In some instances an MPP facility uses a unique treatment system (e.g., sequencing batch reactors) that the cost models were not designed to handle specifically. For these unique instances, the cost models were slightly modified to calculate costs for those particular facilities. However, the concepts and the design and cost equations used in the models remained the same when estimating costs for such facilities.

After costs were estimated for each detailed survey facility for each technology option, EPA multiplied the cost estimate for each facility by the applicable survey weight for the facility to derive a survey-weighted estimate. Weighted estimates were then summed. The result represents a national estimate of the compliance costs for achieving the performance levels associated with each technology option.

10.7 SUMMARY OF ESTIMATED COMPLIANCE COSTS

For the final rule, EPA estimated the incremental costs for complying with the performance levels associated with the regulatory options considered by EPA for the final rule. The results of the cost analysis for each of the non-small direct discharging first processing facilities are provided in Table 10-4. Due to the need for protection of confidential business information (CBI), the individual facility results for the non-small direct discharging further processing and independent rendering facilities are not provided in this section, but are included in the CBI portion of the Administrative Record. A summary of the national cost estimates for all non-small direct discharging facilities is provided in Table 10-5.

Due to the need for protection of CBI, the individual facility results for all small direct discharging facilities are not provided in this section, but are also included in the CBI portion of the Administrative Record. A summary of the national cost estimates for all small direct discharging facilities is provided in Table 10-6. It should be noted that Table 10-6 also includes costs for mixed processors that are attributable to small levels of production of further processed meat (Subcategories F through I) and poultry (Subcategory L). The facility counts presented in these tables include the double counting of seven facilities with production in both non-small Subcategory L and small Subcategories F through I, and three facilities with production in small Subcategory L and small Subcategories F through I.

Table 10-4. Summary of Estimated Compliance Costs for Non-Small Direct Discharging First Processing Facilities by Facility and Regulatory Option

DETID	Category	Option 2		Option 2.5		Option 2.5+P		Option 4	
		Incremental Capital Cost	Incremental O&M Cost	Incremental Capital Cost	Incremental O&M Cost	Incremental Capital Cost	Incremental O&M Cost	Incremental Capital Cost	Incremental O&M Cost
0011	P12	$736,700	$156,200	$1,399,300	$278,400	$1,592,900	$706,700	$2,876,000	$926,900
0012	M123 (R123/P2)	$918,000	$47,600	$2,039,100	$171,000	$2,773,700	$1,921,700	$4,103,800	$2,268,000
0019	P13	$508,100	$84,100	$1,105,200	$168,100	$1,105,200	$173,100	$2,716,100	$571,800
0020	P12	$833,700	$93,900	$1,482,100	$214,700	$1,679,700	$645,100	$3,710,600	$1,072,900
0022	P123	$587,800	$134,800	$1,335,400	$252,000	$2,892,300	$967,200	$4,517,700	$1,263,500
0026	P123	$834,600	$170,900	$1,671,200	$299,800	$2,080,500	$1,409,200	$3,631,500	$1,689,900
0027	P12	$726,700	$155,700	$1,033,700	$250,000	$1,212,700	$639,300	$2,247,400	$790,200
0029	P1	$475,500	$155,200	$1,148,700	$249,800	$1,229,500	$412,300	$3,955,300	$651,400
0032	P12	$490,400	$83,600	$490,400	$98,600	$655,600	$469,800	$2,273,800	$773,800
0039	P12	$682,200	$89,300	$1,397,200	$165,600	$1,510,600	$399,000	$3,331,300	$772,600
0042	P12	$577,100	$86,200	$814,100	$184,300	$975,400	$537,300	$3,298,600	$731,300
0044	P123	$654,000	$143,500	$664,000	$152,600	$2,224,600	$851,300	$3,113,000	$969,400
0045	P12	$1,089,900	$105,000	$1,099,900	$167,200	$1,169,300	$172,200	$2,015,600	$376,100
0046	R13	$282,400	$28,500	$965,200	$150,900	$1,028,400	$269,300	$1,568,800	$420,200
0054	P12	$693,500	$177,400	$1,232,500	$259,100	$1,371,000	$559,900	$4,527,000	$886,100
0256	R13	$752,600	$170,300	$1,991,600	$168,300	$3,520,000	$804,600	$3,616,100	$1,071,300
0271	P12	$145,200	$109,900	$145,200	$124,900	$145,200	$129,900	$185,200	$148,900
0272	P12	$501,900	$213,800	$501,900	$213,800	$501,900	$218,800	$1,938,300	$439,500
0273	P1	$507,400	$84,100	$1,255,800	$216,800	$1,321,200	$335,300	$2,871,100	$557,600
0274	P1	$0	$20,000	$0	$35,000	$0	$40,000	$0	$48,600
0275	R13	$866,200	$126,600	$1,429,200	$160,100	$2,951,500	$809,100	$3,056,100	$1,078,100
0277	R13	$0	$20,000	$4,368,900	$216,800	$4,939,800	$1,317,400	$6,322,300	$1,840,300

Table 10-4. Summary of Estimated Compliance Costs for Non-Small Direct Discharging First Processing Facilities by Facility and Regulatory Option (Continued)

DETID	Category	Option 2		Option 2.5		Option 2.5+P		Option 4	
		Incremental Capital Cost	Incremental O&M Cost	Incremental Capital Cost	Incremental O&M Cost	Incremental Capital Cost	Incremental O&M Cost	Incremental Capital Cost	Incremental O&M Cost
0280	R13	$558,700	$36,800	$3,213,700	$267,000	$3,360,500	$1,101,300	$3,618,600	$1,173,400
0283	R13	$501,800	$53,900	$1,835,000	$156,700	$2,120,600	$814,700	$2,786,000	$1,054,400
0287	M13 (R13/P3)	$0	$35,100	$1,360,900	$169,600	$1,451,500	$348,200	$2,163,100	$598,400
0289	P12	$151,600	$123,700	$634,000	$223,400	$757,200	$490,400	$2,944,100	$719,700
0290	P1	$339,700	$30,200	$339,700	$45,200	$339,700	$50,200	$835,600	$254,600
0291	P12	$432,700	$33,000	$1,030,100	$148,400	$1,174,800	$461,600	$2,829,500	$750,200
0292	P123	$547,400	$85,300	$988,000	$191,400	$988,000	$196,400	$2,760,500	$490,500
0293	P123	$585,200	$86,400	$1,581,800	$219,000	$1,649,000	$295,700	$3,237,400	$529,800
0297	P12	$522,300	$60,700	$532,300	$65,100	$1,916,200	$429,700	$3,168,100	$704,200
0300	P123	$1,631,500	$252,700	$1,641,500	$210,200	$1,865,200	$687,700	$2,393,800	$1,003,800
0304	P1	$447,700	$82,300	$457,700	$84,100	$555,200	$267,000	$1,496,300	$409,000
0307	P123	$371,500	$31,200	$1,159,600	$155,600	$1,179,500	$268,400	$2,688,900	$527,500
0308	P12	$449,500	$82,500	$426,100	$122,100	$581,300	$399,800	$2,140,900	$694,400
0309	P1	$429,100	$157,400	$441,000	$159,500	$506,600	$321,500	$1,923,400	$529,600
0310	P123	$677,400	$89,200	$687,400	$-81,400	$756,900	$-76,400	$1,658,800	$129,800
0312	P12	$435,300	$49,700	$1,009,300	$122,700	$1,109,200	$328,700	$2,840,700	$617,500
0314	P1	$432,000	$81,800	$432,000	$96,800	$505,600	$206,300	$2,024,400	$486,000
0317	R13	$367,200	$102,000	$1,738,100	$319,000	$1,806,700	$481,800	$1,952,600	$508,800
0318	R13	$885,000	$46,600	$3,204,600	$49,900	$3,672,700	$1,179,400	$4,763,600	$1,521,300
0321	R13	$1,621,700	$279,200	$2,850,500	$201,100	$4,589,900	$1,277,900	$4,715,200	$1,532,800
0322	R13	$1,947,700	$78,500	$6,475,400	$250,200	$7,463,400	$2,575,200	$8,494,600	$3,174,400

Table 10-4. Summary of Estimated Compliance Costs for Non-Small Direct Discharging First Processing Facilities by Facility and Regulatory Option (Continued)

DETID	Category	Option 2		Option 2.5		Option 2.5+P		Option 4	
		Incremental Capital Cost	Incremental O&M Cost	Incremental Capital Cost	Incremental O&M Cost	Incremental Capital Cost	Incremental O&M Cost	Incremental Capital Cost	Incremental O&M Cost
0325	R13	$960,000	$50,500	$2,435,700	$5,000	$4,231,300	$1,148,700	$4,407,900	$1,455,500
0326	R13	$214,500	$26,500	$1,159,700	$176,000	$1,262,500	$399,800	$1,593,100	$572,300
0328	R13	$573,300	$37,200	$3,438,100	$475,900	$3,535,000	$590,300	$3,661,000	$706,200
0332	M123 (R123/P2)	$773,300	$43,900	$2,394,600	$143,300	$4,304,900	$1,626,000	$5,393,700	$1,950,700
0333	R13	$4,555,200	$2,992,700	$11,068,100	$4,960,000	$11,689,500	$5,085,900	$12,015,800	$5,307,000
0336	R13	$1,019,300	$137,200	$1,676,400	$166,700	$1,919,800	$747,600	$2,524,200	$972,800
0339	P123	$1,233,000	$105,800	$3,763,200	$23,500	$3,845,900	$115,100	$5,921,800	$611,400
0340	P13	$619,600	$138,500	$2,137,000	$261,900	$2,288,100	$579,700	$5,110,600	$855,700
0342	R13	$241,000	$27,600	$745,000	$186,500	$2,194,900	$677,500	$3,353,100	$796,700

Table 10-5. Total and Average Compliance Costs for Non-small Facilities by Subcategory and Regulatory Option

Option	Total Costs (1000's, 2003 dollars)			Average Facility Costs (1000's, 2003 dollars)		
	Capital	Post-tax Annualized	Pre-tax Annualized	Capital	Post-tax Annualized	Pre-tax Annualized
Subcategory A-D						
Option 2	$27,165	$5,179	$8,051	$937	$179	$278
Option 2.5	$75,061	$12,395	$18,435	$2,588	$427	$636
Option 2.5+P	$97,662	$30,794	$47,412	$3,368	$1,062	$1,635
Option 4	$121,753	$37,382	$57,451	$4,198	$1,289	$1,981
Subcategory F-I[1]						
Option 2	$1,106	$294	$294	$276	$73	$73
Option 2.5	$1,124	$363	$363	$281	$91	$91
Option 2.5+P	$1,216	$396	$396	$304	$99	$99
Option 4	$2,350	$882	$882	$588	$220	$220
Subcategory J[1]						
Option 2	$1,429	$695	$695	$75	$37	$37
Option 2.5	$7,755	$3,123	$3,123	$408	$164	$164
Option 2.5+P	$9,978	$8,212	$8,212	$525	$432	$432
Option 4	$12,827	$11,237	$11,237	$675	$591	$591
Subcategory K						
Option 2	$70,650	$15,026	$19,598	$736	$157	$204
Option 2.5	$147,592	$28,067	$35,151	$1,537	$292	$366
Option 2.5+P	$177,432	$53,370	$70,027	$1,848	$556	$729
Option 4	$366,069	$93,408	$1,205,090	$3,813	$973	$1,255
Subcategory L[1, 2]						
Option 2	$1,495	$615	$615	$149	$62	$62
Option 2.5	$2,615	$1,086	$1,086	$262	$109	$109
Option 2.5+P	$4,207	$1,630	$1,630	$421	$163	$163
Option 4	$8,641	$3,612	$3,612	$864	$361	$361
Total						
Option 2	$101,845	$21,808	$29,253	$645	$138	$185
Option 2.5	$234,147	$45,033	$58,157	$1,482	$285	$368
Option 2.5+P	$290,495	$94,403	$127,677	$1,839	$597	$808
Option 4	$511,639	$146,521	$193,691	$3,238	$927	$1,226

[1] For non-small facilities in Subcategories F through I, J, and L, post-tax annualized costs are equal to pre-tax annualized costs because the analysis is based on model facilities, and EPA assumed a tax shield of $0 to avoid underestimating impacts.

[2] Subcategory includes seven mixed processor facilities with non-small levels of production in Subcategory L and small levels of production in Subcategory F through I; on average, 61 percent of their production falls into Subcategory L. Compliance costs for mixed processor facilities are distributed between subcategories based on their percentage of production in each.

Table 10-6. Total and Average Compliance Costs for Small Facilities by Subcategory and Regulatory Option

Option	Total Costs (1000's, 2003 dollars)			Average Costs (1000's, 2003 dollars)		
	Capital	Post-tax Annualized[1]	Pre-tax Annualized	Capital	Post-tax Annualized[1]	Pre-tax Annualized
Subcategory A-D[2]						
Option 1	$2,000 - $4,000	$1,000 - $2,500	$1,000 - $2,500	$150 - $175	$80 - $120	$80 - $120
Option 2[3]	NA	NA	NA	NA	NA	NA
Subcategory F-I[4]						
Option 1	$2,550	$1,224	$1,224	$121	$58	$58
Option 2	$2,550	$1,233	$1,233	$121	$59	$59
Subcategory K[2]						
Option 1	$7,500 - $10,000	$2,500 - $5,000	$2,500 - $5,000	$200 - $400	$75 - $100	$75 - $100
Option 2	$7,500 - $10,000	$2,500 - $5,000	$2,500 - $5,000	$200 - $400	$75 - $100	$75 - $100
Subcategory L[5]						
Option 1	$19	$15	$15	$6	$5	$5
Option 2	$19	$15	$15	$6	$5	$5

[1] For small facilities, post-tax annualized costs are equal to pre-tax annualized costs because (1) the facility is an S corporation or LLC (Subcategories A through D and K), so taxes are paid on the income of the owning partners or (2) the analysis is based on model facilities (Subcategories F through I and L), and EPA assumed a tax shield of $0 to avoid underestimating impacts.
[2] Estimated costs are presented as a range to prevent the disclosure of confidential business information.
[3] Option 2 was not costed for small facilities in this subcategory, because EPA did not propose further regulations.
[4] Subcategory includes 7 mixed processor facilities with small levels of production in Subcategory F-I and non-small levels of production in Subcategory L. This subcategory also includes 3 mixed processor facilities with small levels of production in Subcategory F-I and small levels of production in Subcategory L. Compliance costs for mixed processor facilities are distributed between subcategories based on their percentage of production in each.
[5] Subcategory includes 3 mixed processor facilities with small levels of production in Subcategory L and small levels of production in Subcategory F-I. Compliance costs for mixed processor facilities are distributed between subcategories based on their percentage of production in each.

10.8 SUPPLEMENTAL AND SENSITIVITY ANALYSES

As described previously in Section 10.2, EPA received a number of comments on the cost methodology and models used to estimate costs for the proposal and NODA. In particular, the Industry Coalition provided detailed comments on many aspects of the cost model. EPA specifically revised the cost methodology for the final rule to address many of the concerns raised

by the Industry Coalition about the methods used for the proposal and NODA. In fact, many of the constants used in the new cost models for the final rule (as described further in the Cost Report) are taken from those provided by the Industry Coalition (e.g., constants provided in Appendix G to the Industry Coalition comments on the proposed rule; see DCN 300004).

Although EPA accommodated the majority of comments received on the cost methodology and model, there were several issues for which EPA performed sensitivity analyses (one of which, Run #3, is identified as the supplemental analysis) to determine the potential impact on final rule decisions. These analyses performed by EPA and the results are presented in Table 10-7. As described further in Section 13, EPA selected technology Options 2 and 2.5 as the basis for the BPT and BAT final effluent limitations, and therefore, the supplemental/sensitivity analyses were all performed for technology Options 2 and 2.5. As shown in Table 10-7, based on the results of these analyses, EPA did not change its conclusions regarding economic achievability, cost-reasonableness, or cost-effectiveness of the final rule.

It should be noted that EPA received detailed information about improvements to the wastewater treatment systems for the Facilities 307 and 339 from the actual facilities. The upgrades to the treatment systems occurred after EPA's base year (1999) of the survey (which is the base year for EPA's estimates of incremental compliance costs and pollutant removals). In EPA's sensitivity cost analyses 3 and 4, EPA chose to incorporate this information into its databases. EPA decided that, where facilities had provided enough detailed information regarding treatment system upgrades, the costs and pollutant loadings should reflect the best data possible. Due to the incorporation of this information, EPA's facility-specific estimates of costs and pollutant reductions at each of these two facilities is reduced as compared to the estimates in the cost run for the final rule (as presented in Section 10.8.1 above). Facility 307 is one of the two model facilities whose data (from the years after the upgrade occurred) form the basis of the total nitrogen limitations. Therefore, EPA performed an analysis of costs and pollutant reductions that reflected that treatment in place during those years

As shown in Table 10-7, there were four issues that served as the basis for the four supplemental/sensitivity cost model runs performed by EPA.

- **Denitrification Rate** - As described further in the Cost Report, EPA used a denitrification rate of 0.171 mg nitrate/nitrite-N denitrified/mg MLVSS-day in its evaluation of different nutrient removal technologies. Using this nitrification rate in its cost model, EPA determined that achieving Option 2.5 nitrogen removals was economically achievable and cost-effective for MPP facilities. EPA recognizes, however, that the actual denitrification rate will vary among facilities and be dependent on a number of factors. In order to confirm its conclusion about the economic achievability of the final rule, EPA performed a sensitivity analysis to determine the potential impact of a lower denitrification rate on the costs of the rule.

- **Methanol Costs -** EPA received comments regarding the price volatility of methanol over the past 10 years, and the potential impact on the cost estimates. Further, comments were received regarding the fact that the unit cost estimates for methanol proposed for use in the cost model for the final rule ($0.60 per gallon as provided in the industry comments on the proposed rule) are too low. Based on research performed by EPA, EPA believes that the use of $0.60 per gallon (in 1999 year dollars which is equivalent to $0. 66 per gallon in year 2003 dollars) in the cost model was reasonable for 1999. However, EPA understands the potential varying prices for chemicals such as methanol, therefore, EPA used a methanol price of $1.05 per gallon (in 1999 year dollars which is equivalent to $1.16 per gallon in 2003 year dollars) in the supplemental analysis of costs for the final rule. EPA has concluded that increasing costs to $1.16/gal would not change EPA's decisions regarding the final rule.

- **Emergency Pond Size** - Concerns were raised that EPA did not account for the addition of safety measures such as emergency holding basins that are needed to ensure that periodic upsets at MPP wastewater treatment plants do not result in non-compliance with the final effluent limitations. Although EPA believes that including an emergency pond at a properly designed and operated wastewater treatment plant would be desirable but not necessary, EPA included an emergency/polishing pond with a 7-day detention time in the cost model in an effort to respond to the concerns raised. The revised cost model includes costs for additional ponds that may serve as a polishing pond and/or an emergency storage pond. The pond is designed with a 7-day detention time to be located at the end of the treatment plant and ensures compliance at all times. The pond may be used as a polishing pond to meet the effluent TSS and BOD limits. Since polishing requires 1 to 3 days of detention time, only a fraction of the pond volume is needed for polishing the effluent. The pond may also be used for emergency storage during plant upset. Depending on the duration of plant upset, the entire volume of pond may be used for emergency storage during upset. EPA also performed a supplemental analysis to determine the affect of installation of an emergency pond with a 15-day detention time. As part of this analysis, EPA incorporated data and information provided by the Industry Coalition related to the presence and type of holding or emergency ponds at MPP facilities (which was

not specifically gathered in EPA's detailed survey questionnaire). In this analysis, EPA included costs for additional ponds or for increased capacity of existing ponds. Results of this analysis indicate that the estimated costs for Option 2.5 are still economically achievable, cost reasonable, and cost-effective (for nitrogen removal). Additional information related to how costs were estimated for holding/emergency ponds, including the analysis of costs assuming a 15-day detention time, is provided in the Cost Report.

- **Pretreatment for Facilities with High TKN Influent Loads**–In its primary cost analysis, EPA identified 5 detailed survey respondents with high influent TKN concentrations (i.e., greater than 200 mg/L). In order for these facilities to achieve the targeted long-term average concentration for total nitrogen on Table 10-3 using the Option 2.5 cost model (which is limited to a maximum nitrate recycle rate of 5 times), EPA estimated costs for a two-stage denitrification system. Based on industry comments on EPA's use of two-state denitrification, EPA performed a supplemental analysis to cost the detailed survey facilities in that situation for additional pretreatment of their raw wastewater followed by single-stage denitrification. EPA costed the incorporation of DAF and chemical addition. The results of this supplemental would not change EPA's conclusions regarding the technology selection, economic achievability, or cost-effectiveness (for total nitrogen) for the final rule.

Table 10-7 provides a summary of the values used in the cost runs and their impact on the estimated costs for the final rule. A brief description of the cost runs follow.

Original Cost Run: The results of this cost run are used as the basis for the final rule and were presented in Section 10.8.1 above. This run was performed with the values of constants described in the Cost Report. The cost run included a 7-day holding pond which may be used by a facility both as a polishing pond and/or an emergency pond. Costs for the addition of a holding pond were not included for facilities that have a holding pond in place or a filtration system in place. The cost run was also based on a target LTA concentration of 34.2 mg/L for total nitrogen (see Table 10-3). The total pre-tax annualized costs (2003$) for non-small facilities based on Option 2.5 was estimated to be $58.2 million.

Sensitivity Cost Run 1: This cost run was performed on eight meat and 12 poultry facilities. Except for the denitrification rate, the values of all other constants used in the Original Cost Run were used. The results of this preliminary analysis indicate that reducing the

denitrification rate to 0.09 lbs nitrate-N/lb VSS-day would increase the cost of meat and poultry facilities by 16 percent and 7 percent, respectively.

Sensitivity Cost Run 2: Similar to Supplement Cost Run 1, this cost run was performed on eight meat and 12 poultry facilities. The values of constants used in the Original Cost Run remained the same except that the denitrification rate was further reduced to 0.05 lbs nitrate-N/lb VSS-day. The results of this preliminary analysis indicate that the cost of meat and poultry facilities would increase by 41 percent and 16 percent, respectively.

Sensitivity Cost Run 3 (Supplemental Analysis Run): In this cost run additional facility information received since the Original Cost Run was incorporated by EPA into its analysis of costs. Therefore, the items costed based on treatment in place for some facilities were not the same as those used for the Original Cost Run. For instance, many facilities were costed for a holding pond in the Original Cost Run. Several of those facilities were later found to have a holding pond in place. Consequently, those facilities were no longer costed for a holding pond in this run. In addition, this cost run was based on an increased target LTA concentration of 45.35 mg/L for total nitrogen, which is higher than the total nitrogen levels used for the Original Cost Run. Additional features of this cost run include a revised methanol cost of $1.05 per gallon and a holding pond with a 15-day detention time. Unlike the Original Cost Run, facilities with a filtration system were also costed for a holding pond. These costs provide a very conservative cost estimate for Option 2.5. The total pre-tax annualized costs (2003$) for non-small facilities based on Option 2.5 were estimated to be $52.8 million. The costs were reduced compared to the cost of the Original Cost Run because the target effluent LTA concentration for total nitrogen was increased by more than 10 mg/L to 45.35 mg/L. Moreover, incorporation of additional facility information contributed may have contributed to the decrease in costs.

Sensitivity Cost Run 4: This cost run is identical to the Supplemental Cost Run 3 except the denitrification rate is reduced to 0.05 lbs nitrate-N/lb VSS-day. All the features discussed in Supplemental Cost Run 3 are applicable to this cost run. However, it should be noted that the cost estimated by this cost run is extremely conservative and represent the high end of the Industry costs. The total pre-tax annualized costs (2003$) for the entire rule for Option 2.5 were

estimated to be $52.8 million. Even with this high end of the cost, the final rule was found to be cost effective.

Table 10-7. Summary of Supplemental Cost Analyses Performed for the MPP Final Rule

Cost Run	Description	Denitrification Rate (lbs Nitrate-N/lb VSS-day)	Methanol Costs ($/gallon)	Holding Pond Detention Time (Days)	Results (Annualized Costs)
Original	Effluent TN = 34 mg/L	0.17	0.60	7	$58.2 million
Sensitivity 1	Preliminary estimates Effluent TN = 34 mg/L	0.09	0.60	7	Increases cost for meat facilities by 16%; Increases cost for poultry facilities by 7%
Sensitivity 2	Preliminary estimates Effluent TN = 34 mg/L	0.05	0.60	7	Increases cost for meat facilities by 41%; Increases cost for poultry facilities by 16%
Sensitivity 3[a]	Effluent TN = 45 mg/L	0.17	1.05	15	$52.8 million
Sensitivity 4[a]	Effluent TN = 45 mg/L	0.05	1.05	15	$60.2 million

[a] These runs were based on higher target effluent nitrogen concentrations and also included updated facility data and information made available since the NODA. Run #3 was used as the supplemental analysis.

10.9 REFERENCES

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Industry Coalition. 2002. *Joint comments of the meat and poultry products industry coalition*. Meat and Poultry Products Industry Coalition. EPA Docket No. W-01-06.

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USEPA (U.S. Environmental Protection Agency). 2004. *Detailed Costing Document for the Final Effluent Limitations Guidelines and Standards for the Meat and Poultry Products Point Source Category*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.

SECTION 11

POLLUTANT LOADINGS

This section presents the methodology used to derive annual pollutant loading estimates for the meat and poultry products (MPP) industry. Pollutant loadings are estimated for the MPP industry to (1) evaluate the effectiveness of treatment technology options, (2) estimate the benefits gained from reducing the amount of pollutants discharged, and (3) evaluate the cost-effectiveness of the technology options in reducing the pollutant loadings. Baseline pollutant loadings and technology option loadings are defined as follows:

- *Baseline pollutant loadings.* The estimated amount of pollutants in MPP wastewaters currently being discharged to surface waters. For the purpose of this analysis, EPA considers the baseline pollutant loadings the amount that was discharged in the base year of the survey (1999).

- *Technology option loadings.* The estimated amount of pollutants in MPP wastewaters discharged to surface waters *after* the implementation of the limitations and guidelines, also referred to as post-compliance or treated pollutant loadings. In calculating these loadings, EPA assumed that all MPP facilities currently discharging pollutants at higher concentrations than the long-term average (LTA) concentrations of the selected technology option level would upgrade as necessary and operate their wastewater treatment systems to meet the target LTA concentration levels.

- *Pollutant removals.* The estimated amount of pollutants removed from wastewaters after the implementation of the limitations and guidelines. Pollutant removals are calculated by taking the difference between baseline pollutant loadings and technology option loadings.

As described in Section 10, in response to comments EPA substantially revised the method to estimate compliance costs by applying a facility-specific approach and using survey weights to develop national estimates. To remain consistent with the revised costing methodology, the assessment of pollutant loading reductions was developed on a facility level similar to the revised analysis of costs. In addition, as was done for compliance cost estimates,

facilities were grouped by regulatory subcategories (i.e., subcategories A through D, F through I, K, and L) in the development of national loading estimates.

For the proposed rule, EPA estimated pollutant loadings for all the pollutants of concern identified at proposal for the meat and poultry subcategories. These pollutants are listed in Section 7, Tables 7-2 and 7-3 (at proposal, carbaryl and *Salmonella* were also pollutants of concern for the meat subcategories and poultry subcategories, respectively). As described in Section 14, LTAs were developed for 11 pollutants of concern. These 11 pollutants of concern are comprised of the eight pollutants that were proposed for regulation (ammonia (as nitrogen), 5-day biochemical oxygen demand (BOD_5), chemical oxygen demand (COD), fecal coliforms, oil and grease (as hexane extractable material [HEM]), total nitrogen, total phosphorus, and total suspended solids (TSS)), with the addition of three other pollutants (5-day carbonaceous biological oxygen demand ($CBOD_5$), nitrate+nitrite as nitrogen, and total kjeldahl nitrogen (TKN)) that were also considered for regulation after the proposal. For the final rule, since pollutant removals can only be estimated for pollutants with a target LTA, EPA only estimated pollutant loadings for the 11 pollutants for which LTAs were established.

11.1 BASELINE POLLUTANT LOADINGS

11.1.1 Establishment of Facility Specific Baseline Pollutant Concentrations

To estimate the baseline pollutant *loadings*, baseline pollutant *concentrations* for the selected 11 pollutants of concern (POC) were first established for each facility in which loadings were estimated. Facility baseline concentrations are the estimated pollutant concentrations in the MPP wastewaters that a facility is currently discharging.

The following sections describes the methodology used to develop facility-specific baseline pollutant concentrations.

11.1.1.1 Pollutant Concentrations from Analytical Data

For each facility, extensive efforts were made to obtain analytical effluent wastewater concentration data representative of the treatment system in place at the facility. When available, and generally in order of preference, the following data sources were used to establish the baseline pollutant concentration for a specific facility:

- Data provided by the facility in their response to the detailed survey.
- Corrections to a "fact sheet" sent to each facility that summarized detailed survey information about the facility's effluent concentrations, wastewater flows, and wastewater treatment operations.
- Data provided by the facility through telephone communications.
- Data collected by EPA as part of the sampling episode performed for the rulemaking effort.
- Site visit data.
- Discharge monitoring report (DMR) data from the EPA Permit Compliance System (PCS), EPA Regional Office, or State regulatory agency.
- Effluent data provided in the facility's National Pollutant Discharge Elimination System (NPDES) permit application.

When effluent data were available from any of the sources described above, the annual average concentrations reported for 1999 were used for determining baseline loadings because 1999 was the year of the MPP detailed survey. Concentrations reported for years after 1999 were also used, but only when data from 1999 were unavailable and only if facility operations or treatment performance had not significantly changed since 1999. In instances where data from more than one source were available for a particular facility, the average that represented and encompassed the largest span of time was used. For example, if both detailed survey data and sampling episode data were available for a facility, the detailed survey data were used instead of

the sampling episode data. In this example the detailed survey data represented the average pollutant concentration over a year while the sampling episode data represented the average concentration over a period of 3 or 5 days.

11.1.1.2 Pollutant Concentrations Calculated Based on Associated Pollutant Parameters

When effluent data for a pollutant or pollutants could not be obtained from any of the above data sources, default concentrations were calculated. In particular, EPA calculated default concentrations for certain pollutants if data on an associated pollutant parameter were available. For example, based on the available data from the sampling episodes and detailed survey data, a strong relationship was found between BOD_5 and $CBOD_5$ concentrations in MPP wastewaters. Therefore, when a facility did not have data on effluent $CBOD_5$ concentrations, but did have effluent BOD_5 data, then the $CBOD_5$ concentration could be estimated based on the BOD_5 data (more detailed information on the calculations and formula development are available in Section 19.6.1, DCN 100784 of the rulemaking record).

The following methodologies were used to estimate baseline pollutant concentrations for certain pollutant parameters:

- **BOD_5:** If BOD_5 data were unavailable but $CBOD_5$ data were available, BOD_5 was calculated as:

  $$BOD_5 = (CBOD - 0.0302) / 0.8442.$$

  This formula was based on the relationship found from all paired effluent BOD_5 and $CBOD_5$ data available in the detailed surveys and sampling episodes.

- **$CBOD_5$:** If CBOD data were unavailable but BOD_5 data were available, $CBOD_5$ was calculated as:

  $$CBOD_5 = (0.8442 \times BOD_5) + 0.0302.$$

  This formula was based on the relationship found from all paired effluent BOD_5 and $CBOD_5$ data available in the detailed surveys and sampling episodes.

- **TKN:** If TKN data were unavailable but ammonia (as nitrogen) data were available, TKN was calculated as:

$$TKN = NH_3 + 1.98.$$

This formula was based on the average organic fraction from all detailed survey and sampling episode data with paired effluent ammonia (as nitrogen) and TKN data.

- **Nitrate+nitrite:** Effluent nitrate+nitrite concentrations were calculated in several ways, depending on the data available for a particular facility.

a. If nitrate+nitrite data were unavailable but total nitrogen data were available, nitrate+nitrite was calculated as

$$\text{nitrate+nitrite} = \text{total nitrogen} - \text{TKN}$$

b. If effluent data for only nitrate were available (i.e., no nitrite, or nitrate+nitrate data), then the nitrate+nitrite concentration was calculated as

$$\text{nitrate+nitrite} = \text{nitrate} + 0.62$$

This formula was based on the average nitrite concentration from all facilities with separate nitrate and nitrite data.

c. If nitrate+nitrite could not be calculated from the methods above, then nitrate+nitrite values were calculated based on influent and effluent total nitrogen balance equations as follows:

For facilities that do not engage denitrification in their wastewater treatment system (Option 2 variants or less, i.e., Option 1 and 2+P):

$$\text{Effluent nitrate+nitrite} = (\text{BNR influent total nitrogen}) - (\text{effluent TKN})$$

Where:

$$\text{Total nitrogen} = (\text{nitrate+nitrite}) + \text{TKN}$$

Based on the following relationship:

> BNR influent total nitrogen - nitrogen removed from sludge wasting = Effluent total nitrogen

Therefore:

> (BNR influent TKN) + (BNR influent nitrate+nitrite) - (nitrogen removed from sludge wasting) = (effluent TKN) + (effluent nitrate+nitrite)

"BNR influent" refers to the influent to the biological nutrient removal (BNR) treatment system. The beginning of the BNR system was considered to be where either nitrification or denitrification first occurred in the wastewater treatment system (for example, the activated sludge or anoxic basin).

For BNR influent total nitrogen, if BNR influent nitrate+nitrite data were not available for a facility, then it was assumed to be negligible and set equal to zero. The amount of nitrogen removed from sludge wasting was also assumed to be negligible and not incorporated in the calculations.

For partial denitrification facilities (all variants of Option 2.5, i.e., Option 2.5+F, Option 2.5+P, etc.):

> Effluent nitrate+nitrite = [(BNR influent total nitrogen) x (TN reduction factor)] - (effluent TKN)

Where:

TN reduction factor: This factor was based on the average total nitrogen reduction rate for partial denitrification facilities of the appropriate meat type.

For red meat facilities, the average total nitrogen reduction was 43% (based on data from six facilities). For poultry facilities, the average total nitrogen reduction was 56% (based on data from six facilities). For mixed meat further processors and independent renderers, the total nitrogen reduction was 49.5%, which was calculated

by taking the average of the reductions for red meat and for poultry (i.e., the average of 43% and 56%). The reduction factor was calculated by subtracting the percent reduction from one (i.e., for red meat, the reduction factor = 1 - 0.43 = 0.57).

- **Total nitrogen:** If total nitrogen data were unavailable, then total nitrogen was calculated as:

$$\text{total nitrogen} = (\text{nitrate+nitrite}) + \text{TKN}$$

- **Total phosphorus:** If total phosphorus data were unavailable, total phosphorus was calculated as follows:

a. The phosphorus concentration entering a treatment system's nitrification or denitrification stage was calculated based on the facility's manufacturing processes and wastewater pre-treatment units. See *Detailed Costing Document for the Final Effluent Limitations Guidelines and Standards for the Meat and Poultry Products Point Source Category* (DCN 300004) for detailed descriptions on the calculation of BNR influent concentrations.

b. Based on this concentration and the wastewater flow, the phosphorus mass (in pounds per day) entering the nitrification or denitrification stage could be calculated.

c. The amount of biosludge produced by nitrification systems was calculated using the influent/effluent BOD_5 and TKN concentrations and the respective yield coefficients. The amount of sludge produced from denitrification systems was determined by the calculated amount of nitrates removed in the anoxic reactor and the relevant yield coefficients. Based on data from technical literature, it was assumed that the biosludge contained 2 percent phosphorus[1]. From these calculations, the mass of phosphorus removed from biosludge wasting could be determined.

[1] WEF, 1998. *Biological and chemical systems for nutrient removal*. Water Environment Foundation, Alexandria, Virginia.

d. The final effluent phosphorus concentration was calculated by determining the remaining mass of phosphorus in the wastewater and using the following formula:

$$\text{Final effluent phosphorus (mg/L)} = \frac{\text{(phosphorus in lb/day)} \times 1{,}000{,}000}{\text{Flow (gallons/day)} \times 8.34}$$

11.1.1.3 Pollutant Concentrations Based on Default Values

Considerable effort was made to either obtain analytical effluent concentration data or to calculate pollutant concentrations based on another pollutant where a correlation was demonstrated. However, when analytical effluent data for a particular pollutant was unavailable and could not be calculated then a default value was used for the facility. Default concentrations were calculated for BOD_5, COD, fecal coliforms, ammonia (as nitrogen), oil and grease, and TSS. For each regulatory subcategory, all the available analytical data for a particular pollutant was averaged from all the facilities matching the subcategory and with treatment-in-place performance comparable to Option 2 and above, and this average was used as the default value. A summary of the default concentrations used for developing baseline pollutant concentrations are presented in Table 11-2.

Table 11-2. Default Concentrations for Facility Baseline Concentration Development (in mg/L)

Regulatory Subcategory	BOD_5	COD	Fecal Coliform	NH_3-N[a]	Oil and Grease	TSS
A–D	11.6	70	114	2.72	6.6	23
K	8.0	46	537	1.44	5.0	12
F–I and L	12.6	77	194	3.12	5.0	17
J	7.5	111	124	5.82	0.3	16

[a] NH_3-N=Ammonia (as nitrogen)

As an example, all the available TSS data from Subcategory K facilities with treatment-in-place levels of Option 2 and above were averaged. The resulting average TSS concentration was calculated to be 12 mg/L, and it would subsequently be used as the default concentration for any Subcategory K facility in which effluent data for TSS were unavailable.

A single default set to be used by all facilities of a particular regulatory subcategory was developed only using data from facilities with a treatment-in-place performance of Option 2 and above for the following reasons:

- Previous attempts at developing a unique default set for each treatment-in-place level that was based on all the data from facilities matching that particular treatment-in-place level (i.e., one default set for Option 2+P facilities based on all the data from Option 2+P facilities, another default set for Option 4 facilities based on all data from Option 4 facilities) failed because for many pollutant parameters, no data was available for certain treatment-in-place levels. Additionally, many of the indicated differences in default concentrations between the treatment-in-place levels for which data was available were found to be relatively small for most pollutants.

- Since all facilities with a treatment-in-place of Option 2 and above perform full nitrification, the inclusion of ammonia (as nitrogen) concentrations from facilities that did not perform full nitrification (i.e., those classified as Option 1) would have inappropriately raised the default value for ammonia (as nitrogen).

- Most of the facilities for which loading estimates were developed had treatment-in-place performance comparable to Option 2 and above, therefore the default value should be based on data from facilities with treatment-in-place performance comparable to Option 2 and above.

Because of the general lack of data for the pollutants of concern for stand-alone red meat or poultry further processors (Subcategories F through I and L, respectively), the baseline data from these two facility types were combined. The result was one set of default baseline concentrations that was applied to all further processors, regardless of whether it was a red meat or poultry further processor. The expectation is that the wastewater characteristics at further processors are more likely to be dependent on the processing operation (e.g., breading, frying) than on the type of meat.

For independent rendering facilities (Subcategory J), in addition to all the available analytical data, data provided by the MPP Industry Coalition for three independent rendering facilities, and data provided by the National Renderers Association for two independent rendering facilities were used in the development of default concentrations for these facilities (see DCN 100078 in Section 19.3.5 of the Docket).

11.1.1.4 Permit Limit Adjustments

After pollutant concentrations for each facility were determined from the previous steps, they were adjusted for applicable NPDES permit limits for the facility to more accurately estimate the effect of the new limitations and standards compared to current regulations. When permit limits were available for a facility (from a copy of the facility's NPDES permit or from PCS), the concentration was lowered to equal the facility's permit limit value if the average effluent concentration was greater than the limit specified in the permit [2]. Monthly average limitations contained in the permit were used when available; maximum daily limitations were used when monthly averages were not available. When seasonal limits were included in a permit, an average concentration for the permit was calculated using all seasonal limits. For example, if the permit BOD limit was 20 mg/L for 6 months and 10 mg/L for 6 months, the average value of 15 mg/L was used for the permit limitation.

The final baseline concentration for each pollutant at each facility was established after adjustments for permit limits.

11.1.2 Facility-Specific Baseline Pollutant Loading Estimates

Baseline pollutant loadings for 1999 for each facility and pollutant parameter were calculated as follows:

$$\text{Load} = (\text{concentration} \times \text{flow} \times \text{conversion factor}) / 1{,}000{,}000$$

[2] Permit limit adjustments could not be made when only mass based limits were specified in the permit. Concentration based permit limits applicable in 1999 were used when available. However, the most current permit requirements were used when the limits for 1999 were unknown for any particular facility.

where:

load = pollutant loadings, in pounds per year (lb/year) or million colony-forming units per year (million cfu/year)

concentration = pollutant concentration, in milligrams per liter (mg/L), or cfu/100 mL

flow = facility average annual effluent flow rate as reported in the MPP detailed survey, in gallons per year

conversion factor = the conversion factor used is dependent on the concentration units of the pollutant:

mg/L = 8.345, and
cfu/100 mL = 37.8.

Facility-specific baseline pollutant loading estimates for non-small slaughtering facilities are presented in Table 11-3. Facility-specific baseline pollutant loading estimates for non-small further processing and independent rendering facilities are available in the Confidential Business Rulemaking Record (DCN 300009). In addition, facility-specific baseline pollutant loading estimates for small facilities are available in the Confidential Business Rulemaking Record (DCN 300010).

Table 11-3. Facility-Specific Baseline Loading Estimates (in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DET ID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N[a]	Nitrate + Nitrite	O&G	TKN	Total N	Total P	TSS
0011	P1	NS	12,885	11,017	209,904	62,376	10,098	218,586	27,541	19,187	237,773	82,664	59,673
0012	M123 (R123/P2)	NS	18,129	15,533	525,021	3,898,704	2,870	665,980	28,025	17,827	683,807	398,031	59,525
0019	P13	NS	11,782	10,031	129,199	12,798	1,384	256,259	14,220	848	257,107	11,866	13,420
0020	P12	NS	31,248	26,550	258,872	625,681	10,869	270,647	26,607	22,078	292,725	87,489	49,364
0022	P123	NS	23,421	19,874	153,774	125,513	1,211	335,293	16,924	7,667	342,960	129,427	52,627
0026	P13	NS	12,594	10,795	246,814	2,273,690	5,397	273,215	21,590	16,084	289,300	229,161	75,563
0027	P12	NS	58,694	49,685	206,143	11,379,208	10,008	363,198	22,688	18,933	382,132	76,543	52,262
0029	P1	NS	48,982	41,425	111,429	154,526	31,799	19,636	12,264	36,624	56,261	19,494	46,298
0032	P1	NS	5,917	5,075	122,154	48,400	2,778	57,753	13,356	8,067	65,820	64,317	16,562
0039	P12	NS	23,011	19,557	198,540	1,868,315	2,605	351,475	14,328	11,202	362,676	37,373	26,050
0042	P12	NS	26,797	22,725	156,697	356,997	1,302	273,031	19,052	8,087	281,118	64,430	28,578
0044	P123	NS	26,300	22,321	178,704	3,540,310	8,285	101,723	2,462	16,022	117,746	131,664	42,596
0045	P12	NS	86,262	72,951	195,279	166,353	4,270	147,797	83,273	12,726	160,523	3,203	200,708
0046	R13	NS	12,420	10,546	140,358	557,992	990	176,788	10,441	4,988	181,776	1,616	30,776
0054	P12	NS	24,924	21,169	193,603	239,577,381	32,007	187,652	16,427	40,390	228,042	53,041	56,986
0256	R13	NS	151,078	127,683	552,851	168,944	5,665	774,274	28,642	15,013	789,287	147,962	198,290
0271	P12	NS	22,174	18,793	111,429	1,662,263	2,924	9,089	12,264	12,915	22,004	1,218	48,004
0272	P12	NS	26,420	22,331	41,660	1,650,673	3,098	38,539	4,585	4,901	43,440	911	28,242
0273	P1	NS	7,754	6,631	128,931	12,771	789	58,307	2,735	6,372	64,679	9,530	6,654
0274	P1	NS	7,484	6,376	35,308	189,488	1,036	14,181	10,586	4,164	18,345	211	2,840
0275	R13	NS	66,859	56,561	273,347	1,603,304	68,825	201,900	25,955	76,612	278,512	144,897	86,523
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	1,501,146	103,553	8,509	1,509,655	292,677	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	2,611	967,934	11,992	11,372	979,306	177,229	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	19,646	499,092	25,931	27,426	526,519	140,243	55,009
0287	M13 (R13/P3)	NS	18,794	12,739	121,850	359,596	16,616	272,008	9,046	23,927	295,935	43,017	37,293
0289	P12	NS	13,056	11,126	157,114	3,439,427	515	177,710	6,872	7,353	185,063	42,914	72,152
0290	P1	NS	9,064	7,728	69,488	35,695	2,518	35,802	59,376	7,503	43,304	662	7,427
0291	P12	NS	12,546	10,692	152,184	7,537,301	2,962	273,054	18,204	9,052	282,106	51,973	18,537
0292	P12	NS	18,468	14,603	144,857	36,590	1,394	143,379	15,943	7,666	151,045	0	27,243
0293	P123	NS	19,547	16,607	559,476	666,820	1,434	52,451	3,497	8,357	60,808	9,196	8,882
0297	P12	NS	10,023	8,586	187,850	111,645	2,876	84,578	20,675	11,009	95,587	67,004	6,039
0300	P123	NS	145,955	123,442	344,036	2,181,030	18,884	50,482	37,864	61,918	114,356	108,112	172,287
0304	P1	NS	11,498	9,776	105,161	2,083,347	1,150	72,946	1,380	5,703	78,649	27,826	18,466
0307	P123	NS	23,198	19,668	82,729	252,693	783	309,508	16,384	6,316	315,825	5,590	28,536
0308	P12	NS	20,583	17,446	105,876	39,748	7,039	44,497	6,830	11,623	56,119	45,863	22,597
0309	P1	NS	34,041	28,777	60,032	130,823	866	67,359	6,905	3,466	70,825	14,625	14,625
0310	P123	NS	8,862	7,611	215,007	2,286,147	5,246	60,202	21,642	13,760	73,962	4,300	24,124

Table 11-3. Facility-Specific Baseline Loading Estimates (in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DET ID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N[a]	Nitrate + Nitrite	O&G	TKN	Total N	Total P	TSS
0312	P12	NS	11,760	10,029	153,214	843,825	21,678	251,567	801	28,312	279,879	28,815	29,954
0314	P1	NS	11,066	9,407	98,893	234,611	1,016	22,967	6,812	5,298	28,265	7,979	17,885
0317	R13	NS	11,808	10,015	72,805	166,896	286	446,865	18,223	3,342	450,207	22,742	45,813
0318	R13	NS	26,160	20,346	505,050	1,978,192	7,267	1,345,039	47,956	13,806	1,358,846	257,086	101,005
0321	R13	NS	87,857	74,392	514,436	3,520,305	20,650	754,963	48,847	35,306	790,269	265,020	407,088
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	2,812,243	90,366	35,519	2,847,762	596,560	123,076
0325	R13	NS	79,194	67,095	550,425	1,865,354	15,047	1,203,750	52,265	15,839	1,219,588	281,350	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	286	254,566	9,428	429	254,994	33,999	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	2,231	465,826	10,060	11,244	477,070	52,305	29,089
0332	M123 (R123/P2)	NS	52,870	44,823	377,646	2,280,810	1,636	980,369	41,538	14,099	994,468	316,542	102,594
0333	R13	NS	411,641	347,792	655,000	1,130,793	1,909,021	51,549	62,194	1,927,681	1,979,230	317,064	895,469
0336	R13	NS	39,033	33,049	223,841	291,763	83,155	371,011	6,473	89,532	460,544	119,990	50,080
0339	P123	NS	29,698	25,347	417,857	525,666	1,645	349,246	45,989	19,738	368,983	4,843	56,289
0340	P13	NS	31,534	26,731	165,750	3,283,686	616	284,173	3,262	6,162	290,335	59,738	38,059
0342	R123	NS	15,869	13,447	115,251	135,200	829	134,878	10,943	4,112	138,990	84,440	24,143

[a] NH_3-N = Ammonia (as nitrogen).

11.2 TECHNOLOGY OPTIONS LOADINGS

This section presents the methods used to develop pollutant loading estimates after implementation of the limitations and guidelines for the MPP industry. Technology option loadings are defined as the estimated pollutant loadings in MPP wastewaters after implementation of the selected technology option; they are also referred to as post-compliance or treated pollutant loadings. To estimate the technology option *loadings* for each technology option being considered, post-compliance pollutant *concentrations* were derived for each facility for which baseline pollutant loadings were estimated. Detailed descriptions of each technology option considered by EPA are presented in Section 9.

11.2.1 Establishment of Facility-Specific Post-Compliance Pollutant Concentrations

Table 11-4 presents the long-term average (LTA) concentrations for the 11 POCs for each technology option considered by EPA. LTA concentrations are expected average pollutant levels to be achieved by a facility for the selected option level. Prior to accounting for the variability of the wastewater, these target LTAs would be used to design a wastewater treatment system to meet the limitations of the final MPP rule. EPA derived these LTAs based on data from the detailed surveys and the sampling episodes. A detailed description of the methodology for LTA development is presented in Section 14.

Post-compliance concentrations for each facility were determined by comparing the facility's baseline concentration with the technology option LTA concentration. When the technology option LTA concentration was lower than the facility's baseline concentration, the technology option LTA concentration was used to represent the facility's effluent pollutant concentration after implementation of the limitations and guidelines.

Table 11-4. Technology Option Long-Term Average Concentrations (in mg/L)

Regulatory Subcategory(ies)	Technology Option	BOD_5	$CBOD_5$	COD	Fecal Coliform[a]	NH_3-N[b]	Nitrate+ Nitrite	O&G	TKN	Total N	Total P	TSS
A–D and F–I	1[B]	7.0	6.0	125	400	6.11	N/A	14	8.1	N/A	N/A	25.1
	2	7.0	6.0	125	400	0.895	N/A	14	3.6	N/A	N/A	25.1
	2.5	7.0	6.0	125	400	0.895	30.6	14	3.6	34	N/A	25.1
	2.5+P	7.0	6.0	125	400	0.895	30.6	14	3.6	34	8.3	25.1
	4	6.4	6.0	125	400	0.185	10.3	14	3.2	13.5	5.1	18.6
K and L	1[B]	8.8	6.0	29.6	400	5.19	N/A	5.9	7.17	N/A	N/A	10.2
	2	8.8	6.0	29.6	400	1.0	N/A	5.9	4.97	N/A	N/A	10.2
	2.5	8.8	6.0	29.6	400	1.0	29.2	5.9	4.97	34	N/A	10.2
	2.5+P	8.8	6.0	29.6	400	1.0	29.2	5.9	4.97	34	4.2	10.2
	4	7.0	6.0	17.25	400	0.17	0.52	5.39	1.34	1.9	2.3	5.0
J	2	7.0	6.0	125	400	0.895	N/A	14	3.6	N/A	N/A	25.1
	2.5	7.0	6.0	125	400	0.895	30.6	14	3.6	34	N/A	25.1
	2.5+P	7.0	6.0	125	400	0.895	30.6	14	3.6	34	8.3	25.1
	4	6.4	6.0	125	400	0.185	10.3	14	3.2	13.5	5.1	18.6

N/A = not applicable for this option level.

[a] LTA concentration for Fecal Coliform is 400MPN/100ml for all options.

[b] NH_3-N = Ammonia (as nitrogen).

[c] Option1was only used for estimating loadings for small facilities in Subcategories A-D, F-I ,K, and L.

11.2.2 Facility-Specific Technology Option Loading Estimates

After post-compliance pollutant concentrations were determined, technology option loadings for each facility were calculated as follows:

Load = (concentration × flow × conversion factor)/1,000,000

where:

load = pollutant loadings, in pounds per year (lb/year), or million colony-forming units per year (million cfu/year).

concentration = pollutant concentration, in mg/L, or cfu/100mL.

flow = facility effluent flow rate as reported in the MPP detailed survey, in gallons per year.

conversion factor = the conversion factor used is dependent on the concentration units of the pollutant:

mg/L = 8.345, and
cfu/100mL = 37.8.

Facility-specific technology option loading estimates for non-small slaughtering facilities are presented in Tables 11-5 to 11-7. Facility-specific technology option loading estimates for non-small further processing and independent rendering facilities are available in the Confidential Business Rulemaking Record (DCN300009). In addition, facility-specific technology option loading estimates for small facilities are available in the Confidential Business Rulemaking Record (DCN300010).

Table 11-5. Technology Option Loading Estimates for Option 2
(in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DETID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N[a]	Nitrate + Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0011	P1	NS	12,885	11,017	135,870	62,376	4,590	N/A	27,082	19,187	N/A	N/A	46,866
0012	M123 (R123/P2)	NS	18129	15,533	525,021	3,898,704	2,870	N/A	28,025	17,827	N/A	N/A	59,525
0019	P13	NS	11,782	10,031	83,630	12,798	1,384	N/A	14,220	848	N/A	N/A	13,420
0020	P12	NS	31,248	26,550	167,567	625,681	5,661	N/A	26,607	22,078	N/A	N/A	49,364
0022	P123	NS	23,421	19,874	99,538	125,513	1,211	N/A	16,924	7,667	N/A	N/A	34,334
0026	P13	NS	12,594	10,795	159,762	2,273,690	5,397	N/A	21,590	16,084	N/A	N/A	55,107
0027	P12	NS	39,670	27,048	133,436	8,167,824	4,508	N/A	22,688	18,933	N/A	N/A	46,026
0029	P1	NS	21,443	14,620	72,128	154,526	2,437	N/A	12,264	12,111	N/A	N/A	24,879
0032	P1	NS	5,917	5,075	79,070	48,400	2,671	N/A	13,356	8,067	N/A	N/A	16,562
0039	P12	NS	23,011	19,557	128,515	1,868,315	2605	N/A	14,328	11,202	N/A	N/A	26,050
0042	P12	NS	26,797	20,560	101,429	356,997	1,302	N/A	19,052	8,087	N/A	N/A	28,578
0044	P123	NS	26,300	22,321	115,674	3,540,310	2,462	N/A	3,908	16,022	N/A	N/A	39,900
0045	P12	NS	37,579	25,622	126,403	166,353	4,270	N/A	25,195	12,726	N/A	N/A	43,601
0046	R13	NS	12,420	10,546	140,358	557,992	990	N/A	10,441	4,988	N/A	N/A	30,776
0054	P12	NS	24,924	21,169	125,319	7,670,950	4,234	N/A	16,427	21,042	N/A	N/A	43,226
0256	R13	NS	33,048	28,327	552,851	168,944	4,225	N/A	28,642	15,013	N/A	N/A	118,502
0271	P12	NS	21,443	14,620	72,128	1,662,263	2,437	N/A	12,264	12,111	N/A	N/A	24,879
0272	P12	NS	8,017	5,466	26,967	1,650,673	911	N/A	4,585	4,528	N/A	N/A	9,302
0273	P1	NS	7,754	6,631	83,457	12,771	789	N/A	2,735	6,372	N/A	N/A	6,654
0274	P1	NS	7,484	6,376	35,308	189,488	1,036	N/A	10,586	4,164	N/A	N/A	2,840
0275	R13	NS	27,530	23,597	273,347	1,603,304	3,520	N/A	25,955	14,217	N/A	N/A	86,523
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	N/A	103,553	8,509	N/A	N/A	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	2,611	N/A	11,992	11,372	N/A	N/A	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	3,517	N/A	25,931	14,204	N/A	N/A	55,009
0287	M13 (R13/P3)	NS	18,794	12,739	121,850	359,596	3,305	N/A	9,046	13,348	N/A	N/A	37,293
0289	P12	NS	13,056	11,126	101,700	3,439,427	515	N/A	6,872	7,353	N/A	N/A	35,080
0290	P1	NS	9,064	7,728	69,488	35,695	2,518	N/A	14,854	7,503	N/A	N/A	7,427
0291	P12	NS	12,546	10,692	98,508	6,029,841	2,962	N/A	18,204	9,052	N/A	N/A	18,537
0292	P12	NS	18,468	14,603	93,766	36,590	1,394	N/A	15,943	7,666	N/A	N/A	27,243
0293	P123	NS	19,547	16,607	103,503	666,820	1,434	N/A	3,497	8,357	N/A	N/A	8,882
0297	P12	NS	10,023	8,586	121,595	111,645	2,876	N/A	20,675	11,009	N/A	N/A	6,039
0300	P123	NS	66,206	45,141	222,694	2,181,030	7,523	N/A	37,864	37,391	N/A	N/A	76,814
0304	P1	NS	11,498	9,776	68,070	2,083,347	1,150	N/A	1,380	5,703	N/A	N/A	18,466
0307	P123	NS	23,198	16,769	82,729	252,693	783	N/A	16,384	6,316	N/A	N/A	28,536
0308	P12	NS	20,375	13,892	68,533	39,748	2,315	N/A	6,830	11,507	N/A	N/A	22,597
0309	P1	NS	11,553	7,877	38,859	130,823	866	N/A	6,905	3,466	N/A	N/A	13,404
0310	P123	NS	8,862	7,611	127,284	2,286,147	4,300	N/A	21,642	13,760	N/A	N/A	24,124
0312	P12	NS	11,760	10,029	99,175	843,825	3,351	N/A	801	16,652	N/A	N/A	29,954
0314	P1	NS	11,066	9,407	64,013	234,611	1,016	N/A	6,812	5,298	N/A	N/A	17,885
0317	R13	NS	10,805	9,261	72,805	166,896	286	N/A	18,223	3,342	N/A	N/A	38,744
0318	R13	NS	26,160	20,346	505,050	1,978,192	6,504	N/A	47,956	13,806	N/A	N/A	101,005

Table 11-5. Technology Option Loading Estimates for Option 2 (in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DETID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N[a]	Nitrate + Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0321	R13	NS	51,811	44,410	514,436	3,520,305	6,624	N/A	48,847	26,757	N/A	N/A	185,780
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	N/A	90,366	35,519	N/A	N/A	123,076
0325	R13	NS	55,436	47,516	550,425	1,865,354	7,088	N/A	52,265	15,839	N/A	N/A	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	286	N/A	9,428	429	N/A	N/A	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	2,231	N/A	10,060	11,244	N/A	N/A	29,089
0332	M123 (R123/P2)	NS	44,059	37,765	377,646	2,280,810	1,636	N/A	41,538	14,099	N/A	N/A	102,594
0333	R13	NS	65,968	56,544	655,000	1,130,793	8,434	N/A	62,194	34,068	N/A	N/A	236,543
0336	R13	NS	22,544	19,324	223,841	291,763	2,882	N/A	6,473	11,642	N/A	N/A	50,080
0339	P123	NS	29,698	25,347	270,478	525,666	1,645	N/A	45,989	19,738	N/A	N/A	56,289
0340	P13	NS	31,534	21,748	107,290	3,283,686	616	N/A	3,262	6,162	N/A	N/A	37,008
0342	R123		11,607	9,949	115,251	135,200	829	N/A	10,943	4,112	N/A	N/A	24,143

N/A = Not Applicable (not a pollutant of concern for this subcategory.

[a] NH_3-N = Ammonia (as nitrogen).

Table 11-6. Technology Option Loading Estimates for Option 2.5
(in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DETID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N	Nitrate + Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0011	P1	NS	12,885	11,017	135,870	62,376	4,590	134,218	27,082	19,187	156,985	N/A	46,866
0012	M123 (R123/P2)	NS	18,129	15,533	525,021	3,898,704	2,870	231,074	28,025	17,827	258,343	N/A	59,525
0019	P13	NS	11,782	10,031	83,630	12,798	1,384	82,613	14,220	848	96,627	N/A	13,420
0020	P12	NS	31,248	26,550	167,567	625,681	5,661	165,529	26,607	22,078	193,608	N/A	49,364
0022	P123	NS	23,421	19,874	99,538	125,513	1,211	98,327	16,924	7,667	115,006	N/A	34,334
0026	P13	NS	12,594	10,795	159,762	2,273,690	5,397	157,819	21,590	16,084	184,590	N/A	55,107
0027	P12	NS	39,670	27,048	133,436	8,167,824	4,508	131,813	22,688	18,933	154,173	N/A	46,026
0029	P1	NS	21,443	14,620	72,128	154,526	2,437	19,636	12,264	12,111	56,261	N/A	24,879
0032	P1	NS	5,917	5,075	79,070	48,400	2,671	57,753	13,356	8,067	65,820	N/A	16,562
0039	P12	NS	23,011	19,557	128,515	1,868,315	2,605	126,952	14,328	11,202	148,487	N/A	26,050
0042	P12	NS	26,797	20,560	101,429	356,997	1,302	100,196	19,052	8,087	117,192	N/A	28,578
0044	P123	NS	26,300	22,321	115,674	3,540,310	3,908	101,723	2,462	16,022	117,746	N/A	39,900
0045	P12	NS	37,579	25,622	126,403	166,353	4,270	124,866	25,195	12,726	146,047	N/A	43,601
0046	R13	NS	12,420	10,546	140,358	557,992	990	61,775	10,441	4,988	69,065	N/A	30,776
0054	P12	NS	24,924	21,169	125,319	7,670,950	4,234	123,794	16,427	21,042	144,794	N/A	43,226
0256	R13	NS	33,048	28,327	552,851	168,944	4,225	144,421	28,642	15,013	161,464	N/A	118,502
0271	P12	NS	21,443	14,620	72,128	1,662,263	2,437	9,089	12,264	12,111	22,004	N/A	24,879
0272	P12	NS	8,017	5,466	26,967	1,650,673	911	26,639	4,585	4,528	31,157	N/A	9,302
0273	P1	NS	7,754	6,631	83,457	12,771	789	58,307	2,735	6,372	64,679	N/A	6,654
0274	P1	NS	7,484	6,376	35,308	189,488	1,036	14,181	10,586	4,164	18,345	N/A	2,840
0275	R13	NS	27,530	23,597	273,347	1,603,304	3,520	120,306	25,955	14,217	134,504	N/A	86,523
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	271,139	103,553	8,509	303,137	N/A	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	2,611	135,360	11,992	11,372	151,334	N/A	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	3,517	120,196	25,931	14,204	134,380	N/A	55,009
0287	M13 (R13/P3)	NS	18,794	12,739	121,850	359,596	3,305	112,951	9,046	13,348	126,281	N/A	37,293
0289	P12	NS	13,056	11,126	101,700	3,439,427	515	100,463	6,872	7,353	117,504	N/A	35,080
0290	P1	NS	9,064	7,728	69,488	35,695	2,518	35,802	14,854	7,503	43,304	N/A	7,427
0291	P12	NS	12,546	10,692	98,508	6,029,841	2,962	97,310	18,204	9,052	113,817	N/A	18,537
0292	P12	NS	18,468	14,603	93,766	36,590	1,394	92,625	15,943	7,666	108,337	N/A	27,243
0293	P123	NS	19,547	16,607	103,503	666,820	1,434	52,451	3,497	8,357	60,808	N/A	8,882
0297	P12	NS	10,023	8,586	121,595	111,645	2,876	84,578	20,675	11,009	95,587	N/A	6,039
0300	P123	NS	66,206	45,141	222,694	2,181,030	7,523	50,482	37,864	37,391	114,356	N/A	76,814
0304	P1	NS	11,498	9,776	68,070	2,083,347	1,150	67,242	1,380	5,703	78,649	N/A	18,466
0307	P123	NS	23,198	16,769	82,729	252,693	783	81,723	16,384	6,316	95,586	N/A	28,536
0308	P12	NS	20,375	13,892	68,533	39,748	2,315	44,497	6,830	11,507	56,119	N/A	22,597

Table 11-6. Technology Option Loading Estimates for Option 2.5
(in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DETID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N[a]	Nitrate + Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0309	P1	NS	11,553	7,877	38,859	130,823	866	38,386	6,905	3,466	44,898	N/A	13,404
0310	P123	NS	8,862	7,611	127,284	2,286,147	4,300	60,202	21,642	13,760	73,962	N/A	24,124
0312	P12	NS	11,760	10,029	99,175	843,825	3,351	97,969	801	16,652	114,588	N/A	29,954
0314	P1	NS	11,066	9,407	64,013	234,611	1,016	22,967	6,812	5,298	28,265	N/A	17,885
0317	R13	NS	10,805	9,261	72,805	166,896	286	47,218	18,223	3,342	52,790	N/A	38,744
0318	R13	NS	26,160	20,346	505,050	1,978,192	6,504	222,284	47,956	13,806	248,516	N/A	101,005
0321	R13	NS	51,811	44,410	514,436	3,520,305	6,624	226,415	48,847	26,757	253,135	N/A	185,780
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	505,355	90,366	35,519	564,993	N/A	123,076
0325	R13	NS	55,436	47,516	550,425	1,865,354	7,088	242,255	52,265	15,839	270,844	N/A	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	286	43,699	9,428	429	48,856	N/A	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	2,231	139,252	10,060	11,244	155,685	N/A	29,089
0332	M123 (R123/P2)	NS	44,059	37,765	377,646	2,280,810	1,636	192,537	41,538	14,099	215,258	N/A	102,594
0333	R13	NS	65,968	56,544	655,000	1,130,793	8,434	51,549	62,194	34,068	322,301	N/A	236,543
0336	R13	NS	22,544	19,324	223,841	291,763	2,882	98,518	6,473	11,642	110,144	N/A	50,080
0339	P123	NS	29,698	25,347	270,478	525,666	1,645	267,189	45,989	19,738	312,512	N/A	56,289
0340	P13	NS	31,534	21,748	107,290	3,283,686	616	105,985	3,262	6,162	123,963	N/A	37,008
0342	R123	NS	11,607	9,949	115,251	135,200	829	50,724	10,943	4,112	56,710	N/A	24,143

N/A = Not Applicable (not a pollutant of concern for this subcategory).
[a] NH_3-N = Ammonia (as nitrogen).

Table 11-7. Technology Option Loading Estimates for Option 2.5+P
(in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DETID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N[a]	Nitrate + Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0011	P1	NS	12,885	11,017	135,870	62,376	4,590	134,218	27,082	19,187	156,985	19,279	46,866
0012	M123 (R123/P2)	NS	18,129	15,533	525,021	3,898,704	2,870	231,074	28,025	17,827	258,343	62,546	59,525
0019	P13	NS	11,782	10,031	83,630	12,798	1,384	82,613	14,220	848	96,627	11,866	13,420
0020	P12	NS	31,248	26,550	167,567	625,681	5,661	165,529	26,607	22,078	193,608	23,776	49,364
0022	P123	NS	23,421	19,874	99,538	125,513	1,211	98,327	16,924	7,667	115,006	14,124	34,334
0026	P13	NS	12,594	10,795	159,762	2,273,690	5,397	157,819	21,590	16,084	184,590	22,669	55,107
0027	P12	NS	39,670	27,048	133,436	8,167,824	4,508	131,813	22,688	18,933	154,173	18,933	46,026
0029	P1	NS	21,443	14,620	72,128	154,526	2,437	19,636	12,264	12,111	56,261	10,234	24,879
0032	P1	NS	5,917	5,075	79,070	48,400	2,671	57,753	13,356	8,067	65,820	11,219	16,562
0039	P12	NS	23,011	19,557	128,515	1,868,315	2,605	126,952	14,328	11,202	148,487	18,235	26,050
0042	P12	NS	26,797	20,560	101,429	356,997	1,302	100,196	19,052	8,087	117,192	14,392	28,578
0044	P123	NS	26,300	22,321	115,674	3,540,310	3,908	101,723	2,462	16,022	117,746	16,413	39,900
0045	P12	NS	37,579	25,622	126,403	166,353	4,270	124,866	25,195	12,726	146,047	3,203	43,601
0046	R13	NS	12,420	10,546	140,358	557,992	990	61,775	10,441	4,988	69,065	1,616	30,776
0054	P12	NS	24,924	21,169	125,319	7,670,950	4,234	123,794	16,427	21,042	144,794	17,782	43,226
0256	R13	NS	33,048	28,327	552,851	168,944	4,225	144,421	28,642	15,013	161,464	39,091	118,502
0271	P12	NS	21,443	14,620	72,128	1,662,263	2,437	9,089	12,264	12,111	22,004	1,218	24,879
0272	P12	NS	8,017	5,466	26,967	1,650,673	911	26,639	4,585	4,528	31,157	911	9,302
0273	P1	NS	7,754	6,631	83,457	12,771	789	58,307	2,735	6,372	64,679	9,530	6,654
0274	P1	NS	7,484	6,376	35,308	189,488	1,036	14,181	10,586	4,164	18,345	211	2,840
0275	R13	NS	27,530	23,597	273,347	1,603,304	3,520	120,306	25,955	14,217	134,504	32,564	86,523
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	271,139	103,553	8,509	303,137	73,391	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	2,611	135,360	11,992	11,372	151,334	36,639	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	3,517	120,196	25,931	14,204	134,380	32,534	55,009
0287	M13(R13/P3)	NS	18,794	12,739	121,850	359,596	3,305	112,951	9,046	13,348	126,281	30,573	37,293
0289	P12	NS	13,056	11,126	101,700	3,439,427	515	100,463	6,872	7,353	117,504	14,430	35,080
0290	P1	NS	9,064	7,728	69,488	35,695	2,518	35,802	14,854	7,503	43,304	662	7,427
0291	P12	NS	12,546	10,692	98,508	6,029,841	2,962	97,310	18,204	9,052	113,817	13,978	18,537
0292	P12	NS	18,468	14,603	93,766	36,590	1,394	92,625	15,943	7,666	108,337	0	27,243
0293	P123	NS	19,547	16,607	103,503	666,820	1,434	52,451	3,497	8,357	60,808	9,196	8,882
0297	P12	NS	10,023	8,586	121,595	111,645	2,876	84,578	20,675	11,009	95,587	17,253	6,039
0300	P123	NS	66,206	45,141	222,694	2,181,030	7,523	50,482	37,864	37,391	114,356	31,598	76,814
0304	P1	NS	11,498	9,776	68,070	2,083,347	1,150	67,242	1,380	5,703	78,649	9,659	18,466
0307	P123	NS	23,198	16,769	82,729	252,693	783	81,723	16,384	6,316	95,586	5,590	28,536
0308	P12	NS	20,375	13,892	68,533	39,748	2,315	44,497	6,830	11,507	56,119	9,724	22,597
0309	P1	NS	11,553	7,877	38,859	130,823	866	38,386	6,905	3,466	44,898	5,514	13,404
0310	P123	NS	8,862	7,611	127,284	2,286,147	4,300	60,202	21,642	13,760	73,962	4,300	24,124
0312	P12	NS	11,760	10,029	99,175	843,825	3,351	97,969	801	16,652	114,588	14,072	29,954
0314	P1	NS	11,066	9,407	64,013	234,611	1,016	22,967	6,812	5,298	28,265	7,979	17,885
0317	R13	NS	10,805	9,261	72,805	166,896	286	47,218	18,223	3,342	52,790	12,781	38,744
0318	R13	NS	26,160	20,346	505,050	1,978,192	6,504	222,284	47,956	13,806	248,516	60,167	101,005
0321	R13	NS	51,811	44,410	514,436	3,520,305	6,624	226,415	48,847	26,757	253,135	61,285	185,780

Table 11-7. Technology Option Loading Estimates for Option 2.5+P
(in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DETID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N[a]	Nitrate + Nitrite	Oil and Grease	TKN	Total N	Total P	TSS
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	505,355	90,366	35,519	564,993	136,788	123,076
325	R13	NS	55,436	47,516	550,425	1,865,354	7,088	242,255	52,265	15,839	270,844	65,573	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	286	43,699	9,428	429	48,856	11,828	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	2,231	139,252	10,060	11,244	155,685	37,692	29,089
0332	M123(R123/P2)	NS	44,059	37,765	377,646	2,280,810	1,636	192,537	41,538	14,099	215,258	52,115	102,594
0333	R13	NS	65,968	56,544	655,000	1,130,793	8,434	51,549	62,194	34,068	322,301	78,031	236,543
0336	R13	NS	22,544	19,324	223,841	291,763	2,882	98,518	6,473	11,642	110,144	26,666	50,080
0339	P123	NS	29,698	25,347	270,478	525,666	1,645	267,189	45,989	19,738	312,512	4,843	56,289
0340	P13	NS	31,534	21,748	107,290	3,283,686	616	105,985	3,262	6,162	123,963	15,224	37,008
0342	R123	NS	11,607	9,949	115,251	135,200	829	50,724	10,943	4,112	56,710	13,730	24,143

[a] NH_3-N = Ammonia (as nitrogen).

Table 11-8. Technology Option Loading Estimates for Option 4
(in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DETID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N[a]	Nitrate + Nitrite	Oil and Grease	TKN	Total N	Total P	TSS
0011	P1	NS	12,885	11,017	79,181	62,376	780	2,387	24,741	6,151	8,538	10,420	23,181
0012	M123 (R123/P2)	NS	18,129	15,533	525,021	3,898,704	1,397	78,107	28,025	17,827	102,053	38,676	59,525
0019	P13	NS	11,782	10,031	48,737	12,798	480	1,469	14,220	848	5,255	6,414	13,420
0020	P12	NS	31,248	26,550	97,653	625,681	962	2,944	26,607	7,586	10,530	12,851	28,588
0022	P123	NS	23,421	19,874	58,008	125,513	572	1,749	16,924	4,506	6,255	7,633	16,982
0026	P13	NS	12,594	10,795	93,105	2,273,690	918	2,807	21,590	7,232	10,039	12,252	27,257
0027	P12	NS	31,556	27,048	77,762	8,167,824	766	2,344	22,688	6,041	8,385	10,233	22,765
0029	P1	NS	17,057	14,620	42,034	154,526	414	1,267	12,264	3,265	4,532	5,531	12,306
0032	P1	NS	5,917	5,075	46,080	48,400	454	1,389	13,356	3,580	4,969	6,064	13,490
0039	P12	NS	23,011	19,557	74,895	1,868,315	738	2,258	14,328	5,818	8,076	9,856	21,926
0042	P12	NS	23,987	20,560	59,110	356,997	583	1,782	18,470	4,592	6,374	7,779	17,305
0044	P123	NS	26,300	22,321	67,412	3,540,310	664	2,032	2,462	5,237	7,269	8,871	19,735
0045	P12	NS	29,893	25,622	73,664	166,353	726	2,221	23,017	5,722	7,943	3,203	21,565
0046	R13	NS	12,420	10,546	140,358	557,992	374	20,881	10,441	4,988	27,283	1,616	30,776
0054	P12	NS	24,924	21,169	73,032	7,670,950	720	2,202	16,427	5,673	7,875	9,611	21,380
0256	R13	NS	30,452	28,327	552,851	168,944	873	48,817	28,642	14,966	63,783	24,172	88,050
0271	P12	NS	17,057	14,620	42,034	1,662,263	414	1,267	12,264	3,265	4,532	1,218	12,306
0272	P12	NS	6,377	5,466	15,715	1,650,673	155	474	4,585	1,221	1,695	911	4,601
0273	P1	NS	7,754	6,631	48,636	12,771	479	1,466	2,735	3,778	5,244	6,400	6,654
0274	P1	NS	7,484	6,376	33,102	189,488	326	998	10,343	2,571	3,569	211	2,840
0275	R13	NS	25,367	23,597	273,347	1,603,304	728	40,666	25,955	12,467	53,133	20,136	73,348
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	91,650	103,553	8,509	119,748	45,382	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	819	45,754	11,992	11,372	59,781	22,656	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	727	40,628	25,931	12,456	53,084	20,118	55,009
0287	M13 (R13/P3)	NS	18,794	12,739	121,850	359,596	683	38,180	9,046	11,705	49,885	18,905	37,293
0289	P12	NS	13,056	11,126	59,268	3,439,427	515	1,787	6,872	4,604	6,391	7,799	17,351
0290	P1	NS	9,064	7,728	43,430	35,695	428	1,309	13,570	3,374	4,683	662	7,427
0291	P12	NS	12,546	10,692	57,408	6,029,841	566	1,731	17,938	4,459	6,190	7,555	16,806
0292	P12	NS	18,468	14,603	54,644	36,590	539	1,647	15,943	4,245	5,892	0	15,997
0293	P123	NS	19,547	16,607	60,318	666,820	594	1,818	3,497	4,686	6,504	7,938	8,882
0297	P12	NS	10,023	8,586	70,862	111,645	698	2,136	20,675	5,505	7,641	9,325	6,039
0300	P123	NS	52,664	45,141	129,779	2,181,030	1,279	3,912	37,864	10,081	13,994	17,078	37,993
0304	P1	NS	11,498	9,776	39,669	2,083,347	391	1,196	1,380	3,082	4,277	5,220	11,613
0307	P123	NS	19,564	16,769	48,212	252,693	475	1,453	15,065	3,745	5,199	5,590	14,114
0308	P12	NS	16,207	13,892	39,939	39,748	394	1,204	6,830	3,103	4,306	5,256	11,692
0309	P1	NS	9,190	7,877	22,646	130,823	223	683	6,905	1,759	2,442	2,980	6,630
0310	P123	NS	8,862	7,611	74,177	2,286,147	731	2,236	21,642	5,762	7,998	4,300	21,716

Table 11-8. Technology Option Loading Estimates for Option 4
(in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DETID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N[a]	Nitrate + Nitrite	Oil and Grease	TKN	Total N	Total P	TSS
0312	P12	NS	11,760	10,029	57,796	843,825	570	570	1,742	4,49o	6,232	7,606	16,920
0314	P1	NS	11,066	9,407	37,305	234,611	368	1,125	6,812	2,898	4,022	4,909	10,921
0317	R13	NS	9,956	9,261	72,805	166,896	286	15,961	18,223	3,342	20,854	7,903	28,788
0318	R13	NS	26,160	20,346	505,050	1,978,192	1,344	75,136	47,956	13,806	98,171	37,205	101,005
0321	R13	NS	47,740	44,410	514,436	3,520,305	1,369	76,533	48,847	23,463	99,996	37,896	138,040
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	170,819	90,366	35,519	223,189	84,584	123,076
0325	R13	NS	51,080	47,516	550,425	1,865,354	1,465	81,887	52,265	15,839	106,991	40,547	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	264	14,771	9,428	429	19,300	7,314	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	842	47,070	10,060	11,244	61,500	23,307	29,089
0332	M123(R123/P2)	NS	40,597	37,765	377,646	2,280,810	1,164	65,081	41,538	14,099	85,033	32,226	102,594
0333	R13	NS	60,785	56,544	655,000	1,130,793	1,743	51,549	62,194	29,874	127,318	48,251	175,758
0336	R13	NS	20,773	19,324	223,841	291,763	596	33,301	6,473	10,209	43,510	16,489	50,080
0339	P123	NS	29,698	25,347	157,627	525,666	1,553	4,752	45,989	12,245	16,996	4,843	46,146
0340	P13	NS	25,373	21,748	62,525	3,283,686	616	1,885	3,262	4,857	6,742	8,228	18,304
0342	R123	NS	10,695	9,949	115,251	135,200	307	17,146	10,943	4,112	22,402	8,490	24,143

[a] NH_3-N = Ammonia (as nitrogen).

11.3 POLLUTANT REMOVALS

From baseline pollutant and technology option loadings, EPA estimated national pollutant removals after implementation of the limitations and guidelines. Pollutant removals were calculated by taking the difference between the baseline pollutant loadings and each technology option loadings. National pollutant removal estimates for non-small facilities for each technology option are presented in Table 11-9.

Table 11-9. Removal of Specified Pollutants by Subcategory and Option[1]-Non-small Facilities

		Removals (Pounds per Year)			
Subcategory	**Pollutant**	**Option 2**	**Option 2.5**	**Opt. 2.5+P**	**Option 4**
A through D	5-Day Biochemical Oxygen Demand	609,665	609,665	609,665	640,054
(non-small)	Total Suspended Solids	967,092	967,092	967,092	1,116,025
	Chemical Oxygen Demand	0	0	0	0
	Carbonaceous Biochemical Oxygen Demand	511,342	511,342	511,342	511,342
	Ammonia (as Nitrogen)	2,250,306	2,250,306	2,250,306	2,309,928
	Total Nitrogen	0	15,400,791	15,400,791	18,456,984
	Total Phosphorus	0	0	4,519,867	4,972,188
	Nitrate/Nitrite	0	13,574,558	13,574,558	16,374,921
	Total K jeldahl Nitrogen	2,212,522	2,212,522	2,212,522	2,228,721
	Oil&Grease	0	0	0	0
F through I	5-Day Biochemical Oxygen Demand	21,703	21,703	21,703	24,467
(non-small)	Total Suspended Solids	0	0	0	0
	Chemical Oxygen Demand	42,213	42,213	42,213	42,213
	Carbonaceous Biochemical. Oxygen Demand	18,395	18,395	18,395	18,395
	Ammonia (as Nitrogen)	10,575	10,575	10,575	13,804
	Total Nitrogen	0	0	0	79,677
	Total Phosphorus	0	0	0	0
	Nitrate/Nitrite	0	0	0	0
	Total Kjeldahl Nitrogen	12,945	12,945	12,945	15,677
	Oil&Grease	0	0	0	0
J	5-Day Biochemical Oxygen Demand	34,176	34,176	34,176	36,734
(non-small)	Total Suspended Solids	0	0	0	19,871
	Chemical Oxygen Demand	0	0	0	0
	Carbonaceous Biochemical. Oxygen Demand	28,570	28,570	28,570	28,570
	Ammonia (as Nitrogen)	48,965	48,965	48,965	56,388
	Total Nitrogen	0	1,469,407	1,469,407	1,652,506
	Total Phosphorus	0	0	590,434	622,583
	Nitrate/Nitrite	0	1,465,011	1,465,011	1,644,216
	Total Kjeldahl Nitrogen	51,819	51,819	51,819	54,788
	Oil & Grease	0	0	0	0
K	5-Day Biochemical Oxygen Demand	643,830	643,830	643,830	868,841
(non-small)	Total Suspended Solids	1,309,553	1,309,553	1,309,553	2,573,666
	Chemical Oxygen Demand	6,513,778	6,513,778	6,513,778	11,244,275
	Carbonaceous Biochemical Oxygen Demand	725,207	725,207	725,207	725,207
	Ammonia (as Nitrogen)	331,973	331,973	331,973	502,103
	Total Nitrogen	0	9,367,808	9,367,808	20,883,771
	Total Phosphorus	0	0	4,147,385	4,671,571
	Nitrate/Nitrite[2]	0	10,112,961	10,112,961	20,103,140

Table 11-9. Removal of Specified Pollutants by Subcategory and Option[1]-Non-small Facilities (Continued)

Subcategory	Pollutant	Removals (Pounds per Year)			
		Option 2	Option 2.5	Opt. 2.5+P	Option 4
	Total Kjeldahl Nitrogen	223,255	223,255	223,255	800,944
	Oil & Grease	313,477	313,477	313,477	329,373
L (non-small)	5-Day Biochemical Oxygen Demand	9,143	9,143	9,143	18,672
	Total Suspended Solids	135	135	135	3,923
	Chemical Oxygen Demand	43,609	43,609	43,609	59,123
	Carbonaceous Biochemical. Oxygen Demand	13,889	13,889	13,889	13,889
	Ammonia (as Nitrogen)	9,492	9,492	9,492	16,123
	Total Nitrogen	0	146,364	146,364	354,355
	Total Phosphorus	0	0	25,012	27,000
	Nitrate/Nitrite[2]	0	153,476	153,476	335,921
	Total Kjeldahl Nitrogen	5,685	5,685	5,685	19,039
	Oil & Grease	0	0	0	0

[1] Incremental to baseline of current performance. Current performance based on summarized 1999 DMR data provided in response to detailed surveys. Pollutant loading for various treatment options based on sampling data, survey information, and DMR data.

[2] EPA recognizes that total nitrogen should be more than nitrate/nitrite as nitrogen because total nitrogen is the sum of nitrate/nitrite as nitrogen and total Kjeldahl nitrogen. However, the target effluent concentrations were taken from different sets of facilities (i.e., those that provided total nitrogen data and those that provided nitrate/nitrite as nitrogen data). EPA is regulating total nitrogen, not nitrate/nitrite nitrogen for the final rule.

11.4 SUPPLEMENTAL ANALYSES

As described previously in Section 10.8, EPA performed four sensitivity cost runs to determine the impacts of various issues on final rule decisions. In order to evaluate the cost-effectiveness of cost runs 3 and 4, EPA developed parallel loadings estimates using the higher target effluent nitrogen concentrations and updated facility data.

As a result of incorporating updated facility data for the this analysis, default concentrations for developing baseline pollutant concentrations were slightly modified to incorporate the non-1999 data added for the analyses, as well as any updated data and information collected subsequent to the NODA. Table 11-10 summarizes the default concentrations used for developing baseline pollutant concentrations for the supplemental analyses.

Table 11-11 presents the facility-specific baseline loading estimates for the sensitivity runs. In addition, Table 11-12 summarizes technology option LTAs, and Tables 11-13 and 11-14

present the facility-specific technology option loading estimates (for Option 2 and Option 2.5, respectively) for the sensitivity runs 3 and 4.

Table 11-10. Default Concentrations for Facility Baseline Concentration Development (in mg/L)

Regulatory Subcategory	BOD_5	COD	Fecal Coliform	Ammonia (as nitrogen)	Oil and Grease	TSS
A–D	11.6	70	114	2.72	6.6	23
K	7.3	46	536	1.43	5.0	11
F-I and L	12.6	77	194	3.12	5.0	17
J	7.5	111	124	5.82	0.3	16

Table 11-11. Facility-Specific Baseline Loading Estimates for Sensitivity Runs 3 and 4
(in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DETID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N[a]	Nitrate + Nitrite	Oil and Grease	TKN	Total N	Total P	TSS
0011	P12	NS	12,885	11,017	209,904	62,376	10,098	218,586	27,541	19,187	237,773	82,664	59,673
0012	M123 (R123/P2)	NS	18,129	15,533	525,021	3,898,704	2,870	665,980	28,025	17,827	683,807	398,031	59,525
0019	P13	NS	11,782	10,031	129,199	12,798	1,384	256,259	14,220	848	257,107	11,866	13,420
0020	P12	NS	31,248	26,550	258,872	625,681	10,869	270,647	26,607	22,078	292,725	87,489	49,364
0022	P123	NS	21,382	21,382	55,832	50,221	415	1,666	21,052	5,900	7,566	16,080	17,819
0026	P123	NS	12,594	10,795	246,814	2,273,690	5,397	273,215	21,590	16,084	289,300	229,161	75,563
0027	P12	NS	58,694	49,685	206,143	11,379,208	10,008	348,187	22,688	33,945	382,132	70,863	51,782
0029	P1	NS	48,982	41,425	111,429	154,526	31,799	19,636	12,264	36,624	56,261	19,494	46,298
0032	P12	NS	5,917	5,075	122,154	48,400	2,778	57,753	13,356	8,067	65,820	64,317	16,562
0039	P12	NS	23,011	19,557	198,540	1,868,315	2,6053	51,475	14,328	11,2023	62,676	37,373	26,050
0042	P12	NS	26,797	22,725	156,697	356,997	1,302	273,031	19,052	8,087	281,118	59,907	28,578
0044	P123	NS	26,300	22,321	178,704	3,540,310	8,285	101,723	2,462	16,022	117,746	129,899	42,596
0045	P12	NS	86,262	72,951	195,279	166,353	4,270	145,657	83,273	12,726	158,383	3,203	200,708
0046	R13	NS	12,420	10,546	140,358	557,992	990	176,788	10,441	4,988	181,776	1,616	30,776
0054	P12	NS	24,924	21,169	193,603	239,577,381	32,007	187,652	16,427	40,390	228,042	53,041	56,986
0256	R13	NS	151,078	127,683	552,851	168,944	5,665	774,274	28,642	15,013	789,287	147,962	198,290
0271	P12	NS	22,174	18,793	111,429	1,662,263	2,924	9,089	12,264	12,915	22,004	1,218	48,004
0272	P12	NS	26,420	22,331	41,660	1,650,673	3,098	39,375	4,585	4,901	44,276	911	28,242
0273	P1	NS	7,754	6,631	128,931	12,771	789	58,307	2,735	6,372	64,679	9,530	6,654
0274	P1	NS	7,484	6,376	35,308	189,488	1,036	14,181	10,586	4,164	18,345	211	2,840
0275	R13	NS	66,859	56,561	273,347	1,603,304	68,825	216,559	25,955	76,612	293,171	142,013	86,523
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	1,501,146	103,553	8,509	1,509,655	292,677	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	2,611	967,934	11,992	11,372	979,306	177,229	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	19,646	499,092	25,931	27,426	526,519	140,243	55,009
0287	M13 (R13/P3)	NS	18,794	12,739	121,850	359,596	16,616	272,008	9,046	23,927	295,935	43,017	37,293
0289	P12	NS	13,056	11,126	157,114	3,439,427	515	177,710	6,872	7,353	185,063	42,914	72,152
0290	P1	NS	9,064	7,728	69,488	35,695	2,518	35,802	59,376	7,503	43,304	662	7,427
0291	P12	NS	12,546	10,692	152,184	7,537,301	2,962	273,054	18,204	9,052	282,106	51,973	18,537
0292	P12	NS	18,468	14,603	144,857	36,590	1,394	143,379	15,943	7,666	151,045	0	27,243
0293	P123	NS	19,547	16,607	559,476	666,820	1,434	52,451	3,497	8,357	60,808	9,196	8,882
0297	P12	NS	10,023	8,586	187,850	111,645	2,876	83,303	20,675	11,009	94,312	66,040	6,039
0300	P123	NS	145,955	123,442	344,036	2,181,030	18,884	50,482	37,864	61,918	114,356	108,112	172,287
0304	P1	NS	11,498	9,776	105,161	2,083,347	1,150	72,946	1,380	5,703	78,649	27,826	18,466
0307	P123	NS	22,506	19,128	126,223	33,803	879	191,242	24,998	2,718	193,960	8,529	25,386
0308	P12	NS	20,583	17,446	105,876	39,748	7,039	43,748	6,830	11,623	55,371	45,863	22,597
0309	P1	NS	9,465	8,030	60,032	130,823	866	67,359	6,905	3,466	70,825	14,625	14,625
0310	P12	NS	8,862	76,112	150,722	86,147	5,246	60,202	21,642	13,760	73,962	4,300	24,124

Table 11-11. Facility-Specific Baseline Loading Estimates for Sensitivity Runs 3 and 4 (in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DETID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N[a]	Nitrate + Nitrite	Oil and Grease	TKN	Total N	Total P	TSS
0312	P12	NS	11,760	10,029	153,214	843,825	21,678	251,567	801	28,312	279,879	28,815	29,954
0314	P1	NS	11,066	9,407	98,893	234,611	1,016	22,967	6,812	5,298	28,265	7,979	17,885
0317	R13	NS	11,808	10,015	72,805	166,896	286	446,865	18,223	3,342	450,207	22,742	45,813
0318	R13	NS	26,160	20,346	505,050	1,978,192	7,267	1,345,039	47,956	13,806	1,358,846	257,086	101,005
0321	R13	NS	87,857	74,392	514,436	3,520,305	20,650	754,963	48,847	35,306	790,269	265,415	407,088
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	2,812,243	90,366	35,519	2,847,762	596,560	123,076
0325	R13	NS	79,194	67,095	550,425	1,865,354	15,047	1,203,750	52,265	15,839	1,219,588	288,115	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	286	254,566	9,428	429	254,994	33,999	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	2,231	465,826	10,060	11,244	477,070	52,305	29,089
0332	M123(R123/P2)	NS	52,870	44,823	377,646	2,280,810	1,636	980,369	41,538	14,099	994,468	316,542	102,594
0333	R13	NS	411,641	347,792	655,000	1,130,793	1,909,021	51,549	62,194	1,927,681	1,979,230	360,430	895,469
0336	R13	NS	39,033	33,049	223,841	291,763	83,155	371,011	6,473	89,532	460,544	119,990	50,080
0339	P123	NS	29,698	25,347	417,857	525,666	1,645	349,246	45,989	19,738	368,983	4,843	56,289
0340	P13	NS	31,534	26,731	165,750	3,283,686	616	284,173	3,262	6,162	290,335	59,111	38,059
0342	R123	NS	15,869	13,447	115,251	135,200	829	134,878	10,943	4,112	138,990	84,440	24,143

[a] NH_3-N = Ammonia (as nitrogen).

Table 11-12. Technology Option Long-Term Average Concentrations for Sensitivity Runs 3 and 4 (in mg/L)

Regulatory Subcategory(ies)	Technology Option	BOD_5	$CBOD_5$	COD	Fecal Coliform[a]	NH_3-N[b]	Nitrate + Nitrite	Oil and Grease	TKN	Total Nitrogen	Total Phosphorus	TSS
A–D and F–I	2	7.0	6.0	125	400	0.895	N/A	14	3.6	N/A	N/A	25.1
	2.5	7.0	6.0	125	400	0.895	41.7	14	3.6	45.4	N/A	25.1
K and L	2	8.8	6.0	29.6	400	1.0	N/A	5.9	4.97	N/A	N/A	10.2
	2.5	8.8	6.0	29.6	400	1.0	40.4	5.9	4.97	45.4	N/A	10.2
J	2	7.0	6.0	125	400	0.895	N/A	14	3.6	N/A	N/A	25.1
	2.5	7.0	6.0	125	400	0.895	41.7	14	3.6	45.4	N/A	25.1

N/A = not applicable for this option level.

[a] LTA concentration for Fecal Coliform is 400MPN/100 ml for all options.

[b] NH_3-N = Ammonia (as nitrogen).

Table 11-13. Technology Option Loading Estimates for Option 2 for Sensitivity Runs 3 and 4 (in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DETID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N[a]	Nitrate+Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0011	P12	NS	12,885	11,017	135,870	62,376	4,590	N/A	27,082	19,187	N/A	N/A	46,866
0012	M123 (R123/P2)	NS	18,129	15,533	525,021	3,898,704	2,870	N/A	28,025	17,827	N/A	N/A	59,525
0019	P13	NS	11,782	10,031	83,630	12,798	1,384	N/A	14,220	848	N/A	N/A	13,420
0020	P12	NS	31,248	26,550	167,567	625,681	5,661	N/A	26,607	22,078	N/A	N/A	49,364
0022	P123	NS	21,382	21,382	55,832	50,221	415	N/A	21,052	5,900	N/A	N/A	17,819
0026	P123	NS	12,594	10,795	159,762	2,273,690	5,397	N/A	21,590	16,084	N/A	N/A	55,107
0027	P12	NS	39,670	27,048	133,436	8,167,824	4,508	N/A	22,688	22,405	N/A	N/A	46,026
0029	P1	NS	21,443	14,620	72,128	154,526	2,437	N/A	12,264	12,111	N/A	N/A	24,879
0032	P12	NS	5,917	5,075	79,070	48,400	2,671	N/A	13,356	8,067	N/A	N/A	16,562
0039	P12	NS	23,011	19,557	128,515	1,868,315	2,605	N/A	14,328	11,202	N/A	N/A	26,050
0042	P12	NS	26,797	20,560	101,429	356,997	1,302	N/A	19,052	8,087	N/A	N/A	28,578
0044	P123	NS	26,300	22,321	115,674	3,540,310	3,908	N/A	2,462	16,022	N/A	N/A	39,900
0045	P12	NS	37,579	25,622	126,403	166,353	4,270	N/A	25,195	12,726	N/A	N/A	43,601
0046	R13	NS	12,420	10,546	140,358	557,992	990	N/A	10,441	4,988	N/A	N/A	30,776
0054	P12	NS	24,924	21,169	125,319	7,670,950	4,234	N/A	16,427	21,042	N/A	N/A	43,226
0256	R13	NS	33,048	28,327	552,851	168,944	4,225	N/A	28,642	15,013	N/A	N/A	118,502
0271	P12	NS	21,443	14,620	72,128	1,662,263	2,437	N/A	12,264	12,111	N/A	N/A	24,879
0272	P12	NS	8,017	5,466	26,967	1,650,673	911	N/A	4,585	4,528	N/A	N/A	9,302
0273	P1	NS	7,754	6,631	83,457	12,771	789	N/A	2,735	6,372	N/A	N/A	6,654
0274	P1	NS	7,484	6,376	35,308	189,488	1,036	N/A	10,586	4,164	N/A	N/A	2,840
0275	R13	NS	27,530	23,597	273,347	1,603,304	3,520	N/A	25,955	14,217	N/A	N/A	86,523
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	N/A	103,553	8,509	N/A	N/A	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	2,611	N/A	11,992	11,372	N/A	N/A	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	3,517	N/A	25,931	14,204	N/A	N/A	55,009
0287	M13 (R13/P3)	NS	18,794	12,739	121,850	359,596	3,305	N/A	9,046	13,348	N/A	N/A	37,293
0289	P12	NS	13,056	11,126	101,700	3,439,427	515	N/A	6,872	7,353	N/A	N/A	35,080
0290	P1	NS	9,064	7,728	69,488	35,695	2,518	N/A	14,854	7,503	N/A	N/A	7,427
0291	P12	NS	12,546	10,692	98,508	6,029,841	2,962	N/A	18,204	9,052	N/A	N/A	18,537
0292	P12	NS	18,468	14,603	93,766	36,590	1,394	N/A	15,943	7,666	N/A	N/A	27,243
0293	P123	NS	19,547	16,607	103,503	666,820	1,434	N/A	3,497	8,357	N/A	N/A	8,882
0297	P12	NS	10,023	8,586	121,595	111,645	2,876	N/A	20,675	11,009	N/A	N/A	6,039
0300	P123	NS	66,206	45,141	222,694	2,181,030	7,523	N/A	37,864	37,391	N/A	N/A	76,814
0304	P1	NS	11,498	9,776	68,070	2,083,347	1,150	N/A	1,380	5,703	N/A	N/A	18,466
0307	P123	NS	22,506	19,128	126,223	33,803	879	N/A	24,998	2,718	N/A	N/A	25,386
0308	P12	NS	20,375	13,892	68,533	39,748	2,315	N/A	6,830	11,507	N/A	N/A	22,597
0309	P1	NS	9,465	7,877	38,859	130,823	866	N/A	6,905	53,466	N/A	N/A	13,404
0310	P123	NS	8,862	7,611	127,284	2,286,147	4,300	N/A	21,642	13,760	N/A	N/A	24,124
0312	P12	NS	11,760	10,029	99,175	843,825	3,351	N/A	801	16,652	N/A	N/A	29,954
0314	P1	NS	11,066	9,407	64,013	234,611	1,016	N/A	6,812	5,298	N/A	N/A	17,885
0317	R13	NS	10,805	9,261	72,805	166,896	286	N/A	18,223	3,342	N/A	N/A	38,744
0318	R13	NS	26,160	20,346	505,050	1,978,192	6,504	N/A	47,956	13,806	N/A	N/A	101,005

Table 11-13. Technology Option Loading Estimates for Option 2 for Sensitivity Runs 3 and 4 (in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DETID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N[a]	Nitrate+Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0321	R13	NS	51,811	44,410	514,436	3,520,305	6,624	N/A	48,847	26,757	N/A	N/A	185,780
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	N/A	90,366	35,519	N/A	N/A	123,076
0325	R13	NS	55,436	47,516	550,425	1,865,354	7,088	N/A	52,265	15,839	N/A	N/A	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	286	N/A	9,428	429	N/A	N/A	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	2,231	N/A	10,060	11,244	N/A	N/A	29,089
0332	M123 (R123/P2)	NS	44,059	37,765	377,646	2,280,810	1,636	N/A	41,538	14,099	N/A	N/A	102,594
0333	R13	NS	65,968	56,544	655,000	1,130,793	8,434	N/A	62,194	34,068	N/A	N/A	236,543
0336	R13	NS	22,544	19,324	223,841	291,763	2,882	N/A	6,473	11,642	N/A	N/A	50,080
0339	P123	NS	29,698	25,347	270,478	525,666	1,645	N/A	45,989	19,738	N/A	N/A	56,289
0340	P13	NS	31,534	21,748	107,290	3,283,686	616	N/A	3,262	6,162	N/A	N/A	37,008
0342	R123	NS	11,607	9,949	115,251	135,200	829	N/A	10,943	4,112	N/A	N/A	24,143

[a] NH_3-N = Ammonia (as nitrogen).

Table 11-14. Technology Option Loading Estimates for Option 2.5 for Supplemental Analyses 3 and 4 (in pounds per year, except for fecal coliforms which are in million colony forming units per year)

DETID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N[a]	Nitrate + Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0011	P12	NS	12,885	11,017	135,870	62,376	4,590	185,399	27,082	19,187	208,166	N/A	46,866
0012	M123 (R123/P2)	NS	18,129	15,533	525,021	3,898,704	2,870	315,300	28,025	17,827	342,569	N/A	59,525
0019	P13	NS	11,782	10,031	83,630	12,798	1,384	114,116	14,220	848	128,130	N/A	13,420
0020	P12	NS	31,248	26,550	167,567	625,681	5,661	228,650	26,607	22,078	256,729	N/A	49,364
0022	P123	NS	21,382	21,382	55,832	50,221	415	1,666	21,052	5,900	7,566	N/A	17,819
0026	P123	NS	12,594	10,795	159,762	2,273,690	5,397	218,000	21,590	16,084	244,771	N/A	55,107
0027	P12	NS	39,670	27,048	133,436	8,167,824	4,508	182,077	22,688	22,405	204,436	N/A	46,026
0029	P1	NS	21,443	14,620	72,128	154,526	2,437	19,636	12,264	12,111	56,261	N/A	24,879
0032	P12	NS	5,917	5,075	79,070	48,400	2,671	57,753	13,356	8,067	65,820	N/A	16,562
0039	P12	NS	23,011	19,557	128,515	1,868	2,605	175,362	14,328	11,202	196,897	N/A	26,050
0042	P12	NS	26,797	20,560	101,429	356,997	1,302	138,403	19,052	8,087	155,399	N/A	28,578
0044	P123	NS	26,300	22,321	115,674	3,540,310	3,908	101,723	2,462	16,022	117,746	N/A	39,900
0045	P12	NS	37,579	25,622	126,403	166,353	4,270	145,657	25,195	12,726	158,383	N/A	43,601
0046	R13	NS	12,420	10,546	140,358	557,992	990	84,292	10,441	4,988	91,582	N/A	30,776
0054	P12	NS	24,924	21,169	125,319	7,670,950	4,234	171,001	16,427	21,042	192,000	N/A	43,226
0256	R13	NS	33,048	28,327	552,851	168,944	4,225	197,062	28,642	15,013	214,106	N/A	118,502
0271	P12	NS	21,443	14,620	72,128	1,662,263	2,437	9,089	12,264	12,111	22,004	N/A	24,879
0272	P12	NS	8,017	5,466	26,967	1,650,673	911	36,797	4,585	4,528	41,315	N/A	9,302
0273	P1	NS	7,754	6,631	83,457	12,771	789	58,307	2,735	6,372	64,679	N/A	6,654
0274	P1	NS	7,484	6,376	35,308	189,488	1,036	14,181	10,586	4,164	18,345	N/A	2,840
0275	R13	NS	27,530	23,597	273,347	1,603,304	3,520	164,157	25,955	14,217	178,355	N/A	86,523
0277	R13	NS	40,179	25,864	448,146	304,331	1,595	369,968	103,553	8,509	401,966	N/A	97,500
0280	R13	NS	16,594	14,142	307,550	621,351	2,611	184,698	11,992	11,372	200,672	N/A	39,249
0283	R13	NS	23,575	20,021	273,096	2,420,546	3,517	164,007	25,931	14,204	178,191	N/A	55,009
0287	M13 (R13/P3)	NS	18,794	12,739	121,850	359,596	3,305	154,122	9,046	13,348	167,451	N/A	37,293
0289	P12	NS	13,056	11,126	101,700	3,439,427	515	138,772	6,872	7,353	155,814	N/A	35,080
0290	P1	NS	9,064	7,728	69,488	35,695	2,518	35,802	14,854	7,503	43,304	N/A	7,427
0291	P12	NS	12,546	10,692	98,508	6,029,841	2,962	134,417	18,204	9,052	150,924	N/A	18,537
0292	P12	NS	18,468	14,603	93,766	36,590	1,394	127,946	15,943	7,666	143,658	N/A	27,243
0293	P123	NS	19,547	16,607	103,503	666,820	1,434	52,451	3,497	8,357	60,808	N/A	8,882
0297	P12	NS	10,023	8,586	121,595	111,645	2,876	83,303	20,675	11,009	94,312	N/A	6,039
0300	P123	NS	66,206	45,141	222,694	2,181,030	7,523	50,482	37,864	37,391	114,356	N/A	76,814
0304	P1	NS	11,498	9,776	68,070	2,083,347	1,150	72,946	1,380	5,703	78,649	N/A	18,466
0307	P123	NS	22,506	19,128	126,223	33,803	879	172,235	24,998	2,718	193,386	N/A	25,386
0308	P12	NS	20,375	13,892	68,533	39,748	2,315	43,748	6,830	11,507	55,371	N/A	22,597
0309	P1NS	NS	9,462	7,877	38,859	130,823	866	53,024	6,905	3,466	59,535	N/A	13,404
0310	P123	NS	8,862	7,611	127,284	2,286,147	4,300	60,202	21,642	13,760	73,962	N/A	24,124
0312	P12	NS	11,760	10,029	99,175	843,825	3,351	135,327	801	16,652	151,946	N/A	29,954
0314	P1	NS	11,066	9,407	64,013	234,611	1,016	22,967	6,812	5,298	28,265	N/A	17,885
0317	R13	NS	10,805	9,261	72,805	166,896	286	64,429	18,223	3,342	70,001	N/A	38,744
0318	R13	NS	26,160	20,346	505,050	1,978,192	6,504	303,306	47,956	13,806	329,538	N/A	101,005

Table 11-14. Technology Option Loading Estimates for Option 2.5 for Supplemental Analyses 3 and 4 (in pounds per year, except for fecal coliforms which are in million colony forming units per year) (Continued)

DETID	Category	Size	BOD_5	$CBOD_5$	COD	Fecal Coliform	NH_3-N[a]	Nitrate + Nitrite	O&G (HEM)	TKN	Total N	Total P	TSS
0321	R13	NS	51,811	44,410	514,436	3,520,305	6,624	308,943	48,847	26,757	335,662	N/A	185,780
0322	R13	NS	62,116	52,937	1,148,213	2,867,529	2,808	689,556	90,366	35,519	749,194	N/A	123,076
0325	R13	NS	55,436	47,516	550,425	1,865,354	7,088	330,556	52,265	15,839	359,145	N/A	134,630
0326	R13	NS	3,286	2,817	99,288	6,471	286	59,627	9,428	429	64,784	N/A	12,285
0328	R13	NS	16,715	14,248	101,666	433,018	2,231	190,009	10,060	11,244	206,442	N/A	29,089
0332	M123 (R123/P2)	NS	44,059	37,765	377,646	2,280,810	1,636	262,716	41,538	14,099	285,437	N/A	102,594
0333	R13	NS	65,968	56,544	655,000	1,130,793	8,434	51,549	62,194	34,068	427,379	N/A	236,543
0336	R13	NS	22,544	19,324	223,841	291,763	2,882	134,427	6,473	11,642	146,054	N/A	50,080
0339	P123	NS	29,698	25,347	270,478	525,666	1,645	349,246	45,989	19,738	368,983	N/A	56,289
0340	P13	NS	31,534	21,748	107,290	3,283,686	616	146,400	3,262	6,162	164,378	N/A	37,008
0342	R123	NS	11,607	9,949	115,251	135,200	829	69,213	10,943	4,112	75,199	N/A	24,143

[a] NH_3-N = Ammonia (as nitrogen).

SECTION 12

NON-WATER QUALITY ENVIRONMENTAL IMPACTS

Sections 304(b) and 306(b) of the Clean Water Act require EPA to consider non-water quality environmental impacts (including energy requirements) associated with effluent limitations guidelines and standards. To comply with these requirements, EPA considered the potential impact of the final meat and poultry products (MPP) rule on energy consumption, air emissions, and solid waste generation. A discussion of the selected technology options is given in Section 13 of this Development Document. Considering energy use and environmental impacts across all media, EPA has determined that the impacts identified in this section are justified by the benefits associated with compliance with the final rule. Because the final rule only affects non-small facilities who directly discharge their wastewaters, impacts for those facilities are the only ones discussed here. Section 12.1 discusses the energy requirements for implementing wastewater treatment technologies at MPP facilities. Section 12.2 presents the impact of the technologies on air emissions, and Section 12.3 discusses the impact on wastewater treatment sludge generation.

12.1 ENERGY REQUIREMENTS

EPA estimates that compliance with this rule (Option 2.5) will result in a small net increase in nationwide energy consumption for all subcategories subject to changes resulting from this rule, except Subcategory J, which is projected to have decreased energy requirements. This estimated decrease for Subcategory J is because the facilities will all have decreased aeration requirements due to biochemical oxygen demand (BOD) removal during anoxic processes (before the aeration tank); because the BOD is removed beforehand, less aeration is needed for BOD removal during the aeration process. Although other subcategories may also decrease their aeration requirements, that decrease may be offset by the addition of supplementary BOD to achieve the desired nitrate reduction. For non-small direct discharging facilities nationwide, EPA estimates that there will be a 7.3 percent increase in total annual energy consumption for biological processes. This represents a net increase of approximately

17,700 megawatt-hours per year. This is a relatively small net increase compared with the current total annual amount of energy consumption by non-small direct facilities for wastewater treatment (approximately 243,500 megawatt-hours per year).

Table 12-1 presents the estimates of energy use expected to be needed as a result of this regulation, organized by subcategory. These estimates were developed using the cost models and the information available in the MPP screener and detailed surveys.

Table 12-1. Incremental Energy Use for Existing Non-Small Direct Discharging MPP Facilities

40 CFR 432 Subcategory [a]	Baseline Energy Use for MPP WWTP (KWH/yr)	Incremental Energy Use for MPP WWTP (KWH/yr) [% Increase]
A, B, C, D	62,381,835	8,100,573 [11.5%]
F, G, H, I	1,711,465	51,931 [2.9%]
J	10,440,620	-611,232 [-6.2%]
K	162,511,445	9,891,034 [5.7%]
L	6,470,812	346,789 [5.1%]

It should be noted that these are aggregate national estimates. Individual facilities may have a decrease in energy consumption if they use the anaerobic lagoon effluent as the only source of organic carbon for denitrification while other facilities will see increased energy use due to additional pumping and other requirements. Reductions in aerobic reactor oxygen transfer requirements have been reported in some studies, due to the removal of BOD during anaerobic and anoxic treatment (Randall et. al. 1999).

Under Options 2 and 2+P, a slight increase in energy consumption is expected as additional oxygen is required for removing BOD and ammonia (as nitrogen) using nitrification. However this increase is not significant as most MPP facilities are currently nitrifying, and therefore, will require a limited amount of additional oxygen. Under Option 2.5+P, the energy requirement will be approximately the same as that of Option 2.5. Under Options 2+P and 2.5+P, however, additional energy may be required for a few facilities that require sludge dewatering. In

Option 4, which includes several aeration and anoxic tanks, EPA expects a significant increase in energy requirement because aeration and mixing are required for the tanks. Pumps and sludge dewatering systems also contribute to additional energy requirement under Option 4.

12.2 AIR EMISSIONS IMPACTS

The Agency believes that the wastewater treatment processes included in the technology options for this rule (Option 2.5) will not generate significant air emissions above the current emissions, either directly from the facility or indirectly through an increased air emissions impact from the electric power generation facilities providing the additional energy.

Possible non-odorous gases might be emitted from these processes, including nitrogen and carbon dioxide. Nitrogen gas will be formed during the denitrification process, and will escape to the atmosphere. Since nitrogen comprises over 78% of the Earth's atmosphere and is not considered a greenhouse gas, it's generation is not considered to pose an environmental impact. Carbon dioxide will be released when BOD is oxidized by oxygen-containing compounds. However, the BOD being treated will generally not increase for most facilities, and therefore, there will generally be no incremental increase in carbon dioxide. Carbon dioxide emissions might increase incrementally only for facilities requiring additional BOD for denitrification, which constitutes approximately 20% of the MPP facilities.

Odors are the only significant air pollution problem associated with the treatment of MPP wastewaters, and generally are associated with anaerobic conditions. Thus, flow equalization basins, dissolved air flotation (DAF) units, anaerobic lagoons, and other wastewater treatment unit processes are possible sources of malodors. Potential odorous substances associated with MPP wastewater include ammonia, hydrogen sulfide, and organic compounds. Ammonia in MPP wastewaters is typically formed by the breakdown of more complex substances, and can be released under certain circumstances. However, aerobic nitrifying conditions will cause ammonia to remain in a solution as it is converted to nitrate, meaning that odors will generally be suppressed. In addition, maintenance of pH around neutral conditions will disfavor stripping ammonia, leaving it in the wastewater to be oxidized or assimilated. Thus, the incremental ammonia generation will most likely be minimal.

Hydrogen sulfide is primarily formed by the reduction of sulfates in wastewater. Such generation requires the presence of sulfate in the wastewater, which is typically low in MPP wastes (USEPA, 1974). In most cases the source of sulfates in MPP wastewater is the source water supply (Sneed, 2001). Hydrogen sulfide is mainly generated under anaerobic conditions, which most facilities currently have in place. The rule does not require such lagoons, therefore, additional generation of hydrogen sulfide will be minimal. Hydrogen sulfide may also be formed under anoxic conditions such as in the denitrification reactors. However, the formation of sulfide in an anoxic environment is less favored than the reduction of nitrate to nitrogen. This implies that if the wastewater contains nitrates, then, under anoxic conditions, sulfides will not be formed to a greater degree. Eighty percent of the non-small direct discharging facilities that EPA analyzed for the final rule presently employ anaerobic treatment and/or anoxic treatment (denitrification). Therefore, the sulfates present in the wastewater of those facilities are currently being reduced to hydrogen sulfide and are emitted. For these facilities, promulgation of Option 2.5 would result in practically no additional emissions of hydrogen sulfide. However, for the remaining 20 percent of the facilities that do not presently employ anaerobic treatment and/or anoxic treatment, EPA believes there is at least the potential for increased hydrogen sulfide generation (assuming high levels of sulfate are also present). Thus, EPA does not expect that the technology option selected for the final rule (Option 2.5) should result in a significant increase in emissions of odorous compounds.

Odorous volatile organic compounds can be generated in anaerobic lagoons. However, most facilities currently have such lagoons in place, meaning that incremental additional generation of such substances will be minimal. If specific facilities have odor difficulties, covers over lagoons can be used to capture odorous substances that are subsequently destroyed by some oxidation or combustion process. Such oxidation and combustion processes will potentially result in additional carbon dioxide generation; however, that generation constitutes minimal incremental generation, since the organic substances involved would have gone through oxidation naturally. Typically, odorous organic compounds are well-destroyed in aerobic systems. Overall, the incremental odor problems associated with this regulation are small. However, odor problems are usually significant only when the sulfur content of MPP

wastewaters is high, especially when treatment facilities are not well managed. Generally, MPP wastewater treatment facilities using anaerobic processes for treating wastewater with a low sulfur concentration have few odor problems. At such facilities, maintaining a naturally occurring layer of floating solids in anaerobic contact basins and lagoons generally minimizes odors. Since Option 2.5 does not require anaerobic treatment, the final rule should not increase emissions of odorous compounds from well-managed MPP wastewater treatment facilities. EPA visited several MPP facilities, and none had odor control problems.

Most MPP facilities are currently nitrifying, therefore EPA expects no significant increase in air emission under Options 2 and 2+P. Like Option 2.5, air emissions under Option 2.5+P will also be minimal. However, in Option 4, which requires full denitrification with 2-stage denitrification process, the post-aeration anoxic environment is likely to produce odors due to the low level of nitrate nitrogen present. It should be noted that if a facility has upstream anaerobic treatment, there is less potential for hydrogen sulfide production in the post-aeration anoxic environment as most hydrogen sulfide emissions already occur in the upstream anaerobic treatment process. Because Option 4 involves complete denitrification with supplemental carbon source, EPA expects facilities with Option 4 technology to have higher nitrogen and carbon dioxide emissions than those facilities with Option 2.5 technology.

12.3 SOLID WASTE GENERATION

The most significant non-water quality impact for this rule is the generation of solid wastes from MPP wastewater treatment. EPA estimates that compliance with the final rule will slightly increase the amount of sludge generated during MPP wastewater treatment for meat first and further processors and will decrease the amount for renderers and poultry first and further processors. For non-small direct discharging facilities nationwide, EPA estimates that there will be a 2.3 percent reduction in total annual sludge production (a net reduction of approximately 3,200 tons per year). This is a relatively small net reduction in comparison with the current total annual amount of sludge production by non-small direct facilities (approximately 138,000 tons/yr). The reduction in sludge generation for renderers and poultry processes is because of the increased use of anaerobic and anoxic processes, which inherently tend to generate less sludge

than aerobic processes, while not having increased sludge generation from total suspended solids (TSS) removal. Table 12-2 presents the amount of wastewater treatment sludge expected to be generated at non-small direct discharging facilities as a result of this regulation. Actual sludge generation at individual facilities will vary from the percentages shown in the table. Depending on the treatment processes currently in place, a facility's sludge generation may increase even though the total amount for the subcategory decreases.

Table 12-2. Incremental Sludge Generation for Non-Small Direct Discharging MPP Facilities

40 CFR 432 Subcategory [a]	Baseline Sludge Generation for MPP WWTP (tons/yr)	Incremental Sludge Generation for MPP WWTP (tons/yr) [% Increase]
A, B, C, D	25,503	675 [2.6%]
F, G, H, I	1,586	0.64 [0.04%]
J	6,514	-568 [-9.5%]
K	96,846	-3,203 [-3.4%]
L	7,606	-126 [-1.7%]

[a] Facilities in Subcategory E are not affected by today's rule, therefore, there is no net incremental sludge generation.

The estimates of sludge production in Table 12.2 are based on the concentrations of BOD entering the biological part of the treatment system after pretreatment (e.g., DAF or anaerobic lagoon), and include sludge generation by facilities that may require a supplemental carbon source for denitrification. In a nitrification/denitrification process, a significant portion of the influent BOD is removed by the denitrification process, which results in a low amount of BOD available for removal by aerobic process. Because the sludge yield coefficient of denitrification process is lower than that of aerobic process, the overall sludge generation of a nitrification/ denitrification process is usually lower than that of a nitrification process. Since, the majority of MPP facilities are currently performing nitrification and have an aeration basin in-place, installing a denitrification unit ahead of the existing aerobic process will result in lower sludge yields for most facilities. Some facilities that require supplemental carbon source for denitrification, however, might observe an increase in sludge generation.

Under Option 2, a slight increase in sludge generation might result from additional nitrification, though this increase is not significant because most MPP facilities are currently nitrifying. Under Option 2+P and 2.5+P, in addition to the incremental sludge generated under Option 2 and 2.5, respectively, a significant amount of sludge may be generated by the phosphorus removal process. In Option 4, which involves both phosphorus removal and complete denitrfication with methanol use, very high volumes of sludge may be generated.

EPA also expects that a greater emphasis on pollution prevention could further reduce sludge generations, although these potential reductions were not calculated. Emphasis may be given to increasing segregation of waste materials that have value as raw materials for the production of rendered products from wastewater flows. For example, using alternatives to fluming to remove viscera from processing areas and initially "dry cleaning" facilities as the initial step in the daily cleaning of processing equipment and facilities may reduce sludge generation. Such practices were noted for some facilities in the industry surveys. If contact with water is prevented, fats and proteins that would otherwise dissolve and pass through screening and dissolved air flotation do not become sources of BOD and ammonia nitrogen, and consequently, sources of additional sludge.

12.4 REFERENCES

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SECTION 13

SELECTED TECHNOLOGY OPTIONS

As discussed in Section 2, EPA must promulgate six types of effluent limitations guidelines (ELGs) and standards for each major industrial category, as appropriate:

- Best Practicable Control Technology Currently Available (BPT)
- Best Control Technology for Conventional Pollutants (BCT)
- Best Available Technology Economically Achievable (BAT)
- New Source Performance Standards (NSPS)
- Pretreatment Standards for Existing Sources (PSES)
- Pretreatment Standards for New Sources (PSNS).

This section describes the rationale for selecting technology options that serve as the basis for the effluent limitations guidelines and standards for the MPP point source category.

13.1 EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS

13.1.1 Best Practicable Control Technology Currently Available (BPT)

In general, the BPT technology level represents the average of the best existing performances of plants of various processes, ages, sizes, or other common characteristics. Where existing performance is considered uniformly inadequate, BPT may be transferred from a different subcategory or industry. Limitations based on transfer of technology must be supported by a conclusion that the technology is indeed transferable and a reasonable prediction that it will be capable of meeting the prescribed effluent limits. (See *Tanners' Council of America* v. *Train*, 540 F.2nd 1188 (4th Cir. 1976).) BPT focuses on end-of-pipe treatment rather than process changes or internal controls, except where the process changes or internal controls are common industry practice.

The cost-benefit inquiry for BPT is a limited balancing, committed to EPA's discretion, that does not require the Agency to quantify the benefits in monetary terms. In balancing costs in relation to effluent reduction benefits, EPA considers the volume and nature of existing

discharges expected after the application of BPT, the general environmental effects of the pollutants, and the cost and economic impact of the required pollution controls. When setting BPT limitations, EPA is required under Section 304(b) to perform a limited cost-benefit balancing to ensure the costs are not wholly out of proportion to the benefits achieved. (See EPA's revised BPT limitations for subcategories A through D, F through I, J, and K based on Option 2.5.)

13.1.2 Best Control Technology for Conventional Pollutants (BCT)

The BCT methodology, promulgated in 1986 (51 FR 24974), discusses the Agency's consideration of costs in establishing BCT ELGs. EPA evaluates the reasonableness of BCT candidate technologies (those which are technologically feasible) by applying a two-part cost test:

1. The POTW test

2. The industry cost-effectiveness test

In the POTW test, EPA calculates the cost per pound of conventional pollutant removed by industrial dischargers in upgrading from BPT to a BCT candidate technology and then compares this cost to the cost per pound of conventional pollutant removed in upgrading POTWs from secondary treatment. The upgrade cost to industry must be less than the POTW benchmark of $0.25/lb (in 1976 dollars).

In the industry cost-effectiveness test, the ratio of the incremental BPT to BCT cost divided by the BPT cost for the industry must be less than 1.29 (i.e., the cost increase must be less than 29 percent). The *Economic and Environmental Benefits Analysis of the Final Meat and Poultry Products Rule* (EPA-821-R-04-010) for the final rule provides more details on the calculations of the BCT cost tests.

In developing BCT limits, EPA considered whether there are technologies that achieve greater removals of conventional pollutants than those established for BPT, and whether those technologies are cost-reasonable according to the prescribed BCT tests. For subcategories A

through D, E through I, K, and L, EPA identified no technologies that can achieve greater removals of conventional pollutants than the BPT standards that also pass the BCT cost test. Accordingly, EPA established BCT effluent limitations equal to the current BPT limitations for these subcategories. In the Rendering subcategory (Subcategory J), EPA found that Option 2.5 would achieve greater removal of conventional pollutants and was cost-reasonable under the BCT cost tests and therefore selected this technology as the basis for BCT.

13.1.3 Best Available Technology Economically Achievable (BAT)

In general, BAT ELGs represent the best economically achievable performance of facilities in the industrial subcategory or category. The Clean Water Act (CWA) establishes BAT as a principal national means of controlling the direct discharge of toxic and nonconventional pollutants. The factors considered in assessing BAT include the cost of achieving BAT effluent reductions; the age of equipment and facilities involved; the process(es) employed; potential process changes; non-water quality environmental impacts, including energy requirements; and such other factors as the EPA Administrator deems appropriate. The Agency retains considerable discretion in assigning the weight to be accorded these factors. An additional statutory factor considered in setting BAT is economic achievability. Generally, EPA determines economic achievability on the basis of total costs to the industry and the effect of compliance with BAT limitations on overall industry and subcategory financial conditions.

For purposes of the final rule, EPA has determined that each technology option considered is technically available. EPA has also determined that at least one option is economically achievable for the segment to which it applies. Furthermore, EPA has determined, for the reasons given in Section 12, that none of the technology options has unacceptable, adverse non-water quality environmental impacts. EPA also considered the age, size, processes, and other engineering factors pertinent to facilities in the segments for the purpose of evaluating the technology options. EPA established separate limits for facilities on the basis of size. As discussed in more detail in Section 5, EPA is not establishing more stringent limitations for small meat slaughterers, nor is the Agency revising the limitations for the small meat processors subcategory (Subpart E). EPA survey data indicate that approximately 107 small meat processing

facilities would have been subject to any new limitations. EPA estimated that the additional pollutant reductions achieved by establishing more stringent limitations for those small facilities would be minimal.

13.1.4 New Source Performance Standards (NSPS)

New Source Performance Standards reflect effluent reductions that are achievable based on the best available demonstrated control technology. New facilities have the opportunity to install the best and most efficient production processes and wastewater treatment technologies. As a result, NSPS should represent the most stringent controls attainable through the application of the best available demonstrated control technology for all pollutants (that is, conventional, nonconventional, and priority pollutants). In establishing NSPS, EPA is directed to take into consideration the cost of achieving the effluent reduction and any non-water quality environmental impacts and energy requirements.

In selecting its NSPS technology for these segments and subcategories, EPA considered all the factors specified in CWA section 306, including the costs of achieving effluent reductions and the effect of costs on new projects (barrier to entry). The Agency also considered energy requirements and other non-water quality environmental impacts for the NSPS options and concluded that these impacts were no greater than those for the BAT technology options and are acceptable. EPA therefore concluded that the NSPS technology basis promulgated constitutes the best available demonstrated control technology for those segments.

13.1.5 Pretreatment Standards for Existing Sources (PSES) and New Sources (PSNS)

National pretreatment standards are established for those pollutants in wastewater from indirect dischargers that might pass through, interfere with, or otherwise be incompatible with publicly owned treatment works (POTW) operations. Currently, there are no categorical pretreatment standards for the meat and poultry products (MPP) point source category. EPA is not promulgating ELGs for indirect dischargers; therefore, EPA is not promulgating new pretreatment standards for existing or new MPP indirect dischargers.

13.2 SELECTED TECHNOLOGY OPTIONS FOR EACH SUBCATEGORY

The technology options selected for each of the ELGs and standards (BPT, BCT, BAT, NSPS, and PSNS) are described for each subcategory in sections 13.2.1 through 13.2.6. More detailed information related to the methodologies and results related to estimating the cost-effectiveness and economic achievability of the final rule is provided in the *Economic and Environmental Benefits Analysis of the Final Meat and Poultry Products Rule* (EPA-821-R-04-010).

13.2.1 Subcategories A Through D (Meat Slaughtering Facilities)

13.2.1.1 Small Facilities in Subcategories A through D (meat first processors that slaughter less than or equal to 50 million pounds per year)

EPA did not revise limitations or standards for small facilities in Subcategories A through D. Such facilities continue to be subject to the current limitations in MPP ELGs (40 CFR part 432), as applicable. The current regulations include production-based limitations for these facilities for BOD, TSS, oil & grease, pH, and fecal coliforms for existing sources, and standards for these same pollutants plus the addition of standards for ammonia (as nitrogen) for new sources. The following sections describe EPA's decision to retain the current BPT, BCT, and BAT limitations and NSPS for small direct discharge facilities in Subcategories A through D.

BPT, BCT, and BAT Requirements

EPA proposed not to revise the current BPT, BCT, or BAT limitations for existing small direct dischargers in Subcategories A through D (meat first processors). For the final rule, for these facilities EPA evaluated the cost of achieving pollutant reductions and the economic achievability of compliance with BPT limitations based on the Option 1 technology and the level of the pollutant reductions resulting from compliance with such limitations. Option 1 includes biological treatment, partial nitrification, and disinfection.

EPA estimated that the cost of achieving the effluent reductions for these facilities at Option 1 would be $198/lb of pollutant removed (1999 dollars).[1] EPA has promulgated ELGs in the past with costs per pound of pollutant removed as high as $37/lb (1999 dollars) although in general ELGs have had much lower costs per pound. Therefore, EPA evaluated the cost of the treatment technology options to small facilities using $37/lb removed as guidance for assessing BPT cost-reasonableness.

Consequently, following this approach, EPA determined that the total costs of effluent reductions using the Option 1 technology are not reasonable in relation to the effluent reduction benefits for the following reasons. First, although EPA estimated that implementing the Option 1 technology would result in zero closures, EPA estimated the cost of effluent reductions using the Option 1 technology is $198/lb removed. Moreover, Option 1 does not remove any additional nutrients and consequently is not "nutrient cost-effective." For the reasons discussed in this section, EPA concluded that for existing small direct dischargers in Subcategories A through D, Option 1 is not the best practicable control technology, best conventional pollutant control technology, or best available technology economically achievable. Because the other options being considered would require more equipment and therefore higher costs than Option 1, the Agency assumed they would not be considered cost-reasonable. Therefore, EPA determined that it should not promulgate revisions to the current BPT, BCT, or BAT limitations for existing small direct dischargers. These facilities will continue to be subject to the applicable portions of sections 432.10 through 432.40.

NSPS Requirements

When establishing NSPS based on best available demonstrated technology, EPA considers how the cost of complying with any more stringent effluent limitations will affect new facilities trying to enter the industry. The Agency employs a barrier to entry analysis that evaluates the barrier posed to new entrants by the cost of complying with the regulation.

[1]In estimating the pounds of pollutants removed by implementing Option 1 technology for these facilities, EPA used the sum of 5-day biochemical oxygen demand (BOD_5) and ammonia (as nitrogen) removed. EPA did not include removals of other pollutants, including chemical oxygen demand (COD), in this analysis because, for example, BOD and COD address many of the same pollutants and including both could result in double counting.

Although, as explained previously, the cost of effluent reductions for existing small facilities in Subcategories A through D might not be cost-reasonable, it is not necessarily the case that the costs for new facilities are as great. Generally, the cost for a new facility to incorporate waste treatment technologies during construction is less than that to retrofit existing facilities.

EPA's barrier to entry analysis compares estimated average incremental capital costs a facility or company incurs to meet the effluent guidelines to average total assets of existing facilities or companies. EPA considered establishing NSPS for small facilities in Subcategories A through D based on Option 1 technology. EPA evaluated the barrier to entry based on a ratio of costs for Option 1 to assets of existing facilities. The Agency estimated a cost-to-assets ratio of 16.7 percent, which the Agency concludes will present a barrier to entry to new facilities. Because the costs for other options would be greater than those for Option 1, these would pose an even greater barrier to entry. For these reasons, EPA did not revise the NSPS limitations for new small direct dischargers in these subcategories. New facilities would continue to be subject to the current NSPS limitations in sections 432.15, 432.25, 432.35, and 432.45.

13.2.1.2 Non-Small Facilities in Subcategories A through D (meat first processors that slaughter more than 50 million pounds per year)

For non-small facilities in Subcategories A through D, EPA revised limitations and standards for some pollutants and established total nitrogen limitations and standards for the first time. EPA did not revise the current limitations (BPT/BCT) or NSPS for conventional pollutants for these facilities The current regulations include production-based limitations and standards for these facilities for BOD, TSS, oil and grease, pH, and fecal coliforms. EPA revised BPT to include limitations for ammonia (as nitrogen), establishing a BAT limitation for ammonia (as nitrogen) equivalent to the BPT limitation, and establishing BAT/NSPS limitations for total nitrogen. The NSPS for ammonia (as nitrogen) is not being changed. As discussed in Section 15, the revised and new limitations and standards are concentration-based. The following sections discuss the technology bases EPA selected for the final rule for the non-small direct discharge facilities in Subcategories A through D.

BPT Requirements

In 1974 EPA established BPT for the meat subcategories A through D based on biological treatment (e.g., aerobic and anaerobic treatment) to control five conventional pollutants or pollutant parameters (BOD_5, TSS, oil and grease, fecal coliforms, and pH). The BPT limitations did not include limits for ammonia (as nitrogen) because nitrification was not a widely used technology and therefore not the BPT at the time. EPA notes, however, that the BPT that was the basis for the 1974 limitations provided some incidental ammonia removal through nitrification during extended aeration, which resulted in some reduction in ammonia (as nitrogen). EPA did attempt to establish ammonia limitations under BAT based on a technology other than nitrification (which was more advanced than the 1974 BPT). Those limitations were the subject of judicial challenge and were remanded to EPA for further consideration (*American Meat Institute* v. *Environmental Protection Agency*, 526 F.2d 442 (7th Cir. 1975)). In 2002 EPA proposed new BPT limitations for ammonia (as nitrogen) based on Option 2 for non-small facilities in Subcategories A through D (facilities with production rates greater than 50 million pounds live weight killed (LWK) per year). As described in Section 9, Option 2 consists of biological treatment followed by more complete nitrification than Option 1 to further reduce ammonia levels and disinfection.

EPA established BPT limitations for ammonia (as nitrogen) for non-small direct dischargers in Subcategories A through D based on the proposed technology option (Option 2). EPA concluded that "more complete" nitrification is now a widely available pollution control technology that should be the basis for the BPT ammonia limitation. For these guidelines, EPA is not revising BPT limitations for the conventional pollutants.

EPA concluded that the Option 2 treatment technology represents the BPT for control of ammonia (as nitrogen) while providing incidental removals of additional conventional pollutants, particularly BOD_5 and TSS, and is the basis for the BPT limitations for these facilities for the following reasons.

First, this technology is available and readily applicable to all non-small facilities in Subcategories A through D. Approximately 97 percent of the non-small direct discharging

facilities in these subcategories currently use the Option 2 technology or better. Although most facilities have the components of Option 2 technology in place (e.g., nitrification basin/aerobic reactor), some facilities are not achieving the Option 2 long-term average (LTA) concentration for ammonia or the additional removals of the conventional pollutants. EPA attributes this to their failure to operate or maintain the Option 2 technology adequately. Consequently, when estimating the costs of compliance with Option 2 for purposes of evaluating its reasonableness and for estimating economic impacts, EPA included costs for treatment optimization that a number of facilities would need to achieve the Option 2 LTAs. For example, EPA included costs for increased aeration, detention time (capacity), chemical addition, sludge handling, process controls, and additional in-process sampling and analytical testing. (See Sections 10 and 11 for additional discussion of the cost and loading methodologies.)

Second, the cost of compliance with these limitations relative to the effluent reduction benefits is not disproportionate. Based on EPA's economic analysis, EPA concluded that compliance with BPT limitations based on Option 2 technology should not result in closures of any existing non-small direct dischargers in these subcategories. Moreover, adopting this level of control will reduce the quantity of ammonia (as nitrogen) and other pollutants currently being discharged into the environment.

For meat first processor facilities that produce more than 50 million pounds LWK per year, EPA estimated an annual compliance cost for Option 2 of $7.29 million (pre-tax, 1999 dollars). It also estimated 3.8 million pounds of BOD_5 and ammonia (as nitrogen) removed from current discharges into the Nation's waters (for $2.55/lb pollutant removed (1999 dollars)). In estimating the pounds of pollutant removed by implementing Option 2 technology for these facilities, EPA used the sum of BOD_5 and ammonia (as nitrogen) removed. EPA tried to avoid "double-counting" pollutant reductions that would occur if, for example, the Agency summed removals of COD and BOD. As previously explained, EPA evaluated BPT costs and removals using, as guidance, $37/lb removed in 1999 dollars as a point of comparison. EPA, therefore, determined that the total cost of effluent reductions due to the Option 2 technology ($2.55/lb pound removed) is reasonable in view of the effluent reduction benefits.

EPA found that 32 percent of the non-small facilities in these subcategories use Option 2.5 (which includes partial denitrification). Although the Option 2.5 technology is demonstrated, it is not as widely available as the Option 2 technology. Moreover, the pollutant loading reduction for ammonia (as nitrogen) for Option 2.5 is the same as the reduction estimated for Option 2 but costs $9 million more every year. Therefore, EPA did not select Option 2 it as the basis of BPT limitations.

EPA did not select Option 2.5+P or Option 4 as the basis for BPT limitations because as they do not achieve additional pollutant reductions at a cost EPA considers reasonable. For example, Option 2.5+P does not achieve additional removals of ammonia (as nitrogen) but would cost an additional $36 million annually. Option 4 would remove an additional 59,000 pounds of ammonia (as nitrogen) at an additional cost of $45 million annually. Moreover, EPA notes that Option 2.5+P represents control technology not closely related to the technology basis for the earlier BPT regulations. Chemical phosphorus removal is not closely connected to the nitrification and disinfection technology that was the basis of the 1974 BPT limitations for Subcategories A through D. The Agency did not select other options considered for BPT because they were not readily available and/or produced an unfavorable total BPT cost and removal comparison. Detailed discussions explaining why EPA rejected setting BPT limitations based on these other technology options are contained in the proposal and the Notice of Data Availability (NODA; see 67 FR 8637, February 25, 2002, and 68 FR 48499, August 13, 2003).

Although EPA did not change the technology basis from that proposed, the Agency promulgated BPT limitations for non-small facilities in Subcategories A through D that are slightly different from those proposed. First, where EPA promulgated BPT limitations for pollutants like ammonia (as nitrogen) for which EPA had not previously set BPT limits for these subcategories, the final limitations are based on revised and additional data reflecting the types of changes described in the NODA (see 68 FR 48495). In addition, where EPA is adopting new or revised BPT limitations, it has expressed them in a concentration-based form, whereas the unchanged limitations will continue to be expressed as production-based limits. (See Section 15 for guidance on how both types of limits can be implemented together in permits.)

BCT Requirements

For both the proposed and final rules, in deciding whether to adopt more stringent limitations for BCT than for BPT, EPA considered technologies that might achieve greater removals of conventional pollutants than those adopted for BPT. It also looked at whether those technologies are cost-reasonable under the standards established by the CWA. EPA refers to the decision criteria as the "BCT cost test."

EPA did not revise the current BPT effluent limitations for conventional parameters (pH, BOD_5, TSS, oil and grease, and fecal coliforms) for non-small meat first processors (Subcategories A through D). Therefore, when considering a technology that would achieve greater removals of conventional pollutants than that adopted for BPT, EPA compared the removals achievable through implementation of the Option 2 technology (which EPA considered as the possible technology basis for BCT) to current BPT limitations. EPA estimated that Option 2 removed about an additional 610,000 pounds per year of BOD_5 and 970,000 pounds per year of TSS compared to pollutant reductions by facilities meeting or exceeding current BPT limitations. There are no additional removals of oil and grease or fecal coliforms.

EPA evaluated Option 2 under the BCT cost test and it failed (see the *Economic and Environmental Benefits Analysis of the Final Meat and Poultry Products Rule* (EPA-821-R-04-010). EPA did not evaluate technology options, such as Option 2+F (Option 2 plus the addition of a filter) because they are more costly and would not remove significantly more conventional pollutants than Option 2. Therefore, if Option 2 did not pass the BCT cost test, those options would not pass. The Agency did not identify any technologies that pass the BCT cost test and achieve greater removals of conventional pollutants than the current BPT technology. Thus, EPA did not revise the BCT limitations for these facilities. Non-small facilities in Subcategories A through D will continue to be regulated by the current BCT limitations (which are equivalent to the current BPT limitations) in sections 432.17, 432.27, 432.37, and 432.47.

BAT Requirements

EPA proposed to establish the BAT level of regulatory control for non-small facilities in Subcategories A through D based on Option 3 (biological treatment, more complete nitrification, more complete denitrification and disinfection). As discussed in the NODA, after review and evaluation of the revised and new data, EPA reconsidered its assessment of Option 3 as BAT. EPA determined that Option 3 did not meet all the statutory criteria for BAT. Therefore, the Agency refocused its evaluation for the technology basis for BAT on Option 2.5, Option 2.5+P, and Option 4 for nutrient removal. For the final rule, EPA based the BAT limitations for non-small facilities in Subcategories A through D on Option 2.5 technology and is promulgating a limitation for total nitrogen on this basis. EPA did, however, set a limitation for ammonia (as nitrogen) that is equal to BPT.

This section describes EPA's rationale for selecting Option 2.5 technology and rejecting Option 2.5+P and Option 4 for the basis of the total nitrogen limitation and for selecting to set BAT equal to BPT (based on Option 2) for ammonia (as nitrogen). Both the proposal and the NODA contain detailed discussions explaining why EPA rejected setting BAT limitations based on other more stringent technology options (see 67 FR 8629, February 25, 2002, and 68 FR 48499, August 13, 2003).

EPA selected Option 2.5 technology as the basis of BAT for non-small facilities in Subcategories A through D for the following reasons. First, Option 2.5 technology has been demonstrated as available because 32 percent of the non-small facilities in Subcategories A through D use the components of Option 2.5 technology (e.g., facility has in place a denitrification basin, nitrification basin and disinfection) or more advanced technology. EPA, however, determined that facilities in Subcategories A through D with the components of Option 2.5 technology in place are not operating their systems optimally based on review of the BOD:TKN ratios (68 FR 48500, August 13, 2003). EPA concluded that for effective denitrification to occur, facilities must be achieving a minimum BOD:TKN ratio of 3. In addition, these facilities were not achieving at least a 60 mg/L total nitrogen concentration in the effluent. (EPA used 60 mg/L as a minimum standard for facilities it considered in developing the

BAT LTA limitation for total nitrogen.) EPA did have data from poultry first processing facilities with Option 2.5 technology that met all BAT selection criteria, indicating that the poultry facilities' treatment systems were well operated. For this reason, when estimating costs and pollutant reductions and developing limitations associated with Option 2.5, EPA used the LTA concentration for total nitrogen from well-operated Option 2.5 poultry first processing facilities (see Section 14). EPA included costs (such as costs for lagoon bypass, additional carbon source, or two-stage denitrification) for the meat first processing facilities to achieve the poultry Option 2.5 LTA for total nitrogen.

Second, Option 2.5 is economically achievable. EPA estimated the pretax annualized compliance costs (in 1999 dollars) for Option 2.5 to be $16.7 million. Using the facility and company closure methodologies described in the *Economic and Environmental Benefits Analysis of the Final Meat and Poultry Products Rule* (EPA-821-R-04-010), EPA estimated that no facilities or companies will close. EPA performed an alternative analysis by estimating closures using more conservative assumptions; that is, EPA predicted a closure would occur if the facility failed under one of three forecast methodologies, rather than under at least two out of three. Using the alternative analysis, EPA estimated two facility closures under Option 2.5. Because not all facilities are covered by the closure analysis, it might understate the number of facility closures nationally.

As discussed in the NODA (68 FR 48489, August 13, 2003), EPA tried to determine whether additional companies own direct discharging MPP facilities. The Agency identified, based on the screener survey results, three additional companies across all subcategories that might own direct discharging MPP facilities. Therefore, the company-level analysis might underestimate the number of company closures nationally but to a lesser degree than the facility-level analysis.

EPA also considered the cost-effectiveness of nutrient removal as one aspect of its evaluation of BAT options for this industry as a whole. As discussed in the proposed rule and the NODA, EPA established a benchmark for nitrogen removal of $4/lb, based on studies of nitrogen removal by publically owned treatment works (POTWs) with biological nutrient removal, and a

benchmark for phosphorus removal of $10/lb, based on studies of agricultural best management practices that reduce phosphorus discharges. EPA used these benchmarks for nutrients in connection with the effluent guidelines for concentrated animal feeding operations (CAFOs). Under the CAFO effluent guidelines, EPA promulgated regulations for industry sectors (e.g., the dairy sector) where the nutrient cost-effectiveness exceeded these values for the individual sectors but maintained a nutrient cost-effectiveness that was under these values for the rule as a whole. Therefore, EPA evaluated each segment or subcategory in the MPP category in comparison to the $4/lb for nitrogen and $10/lb for phosphorus values, but ultimately evaluated whether poor nutrient cost-effectiveness of an individual segment/subcategory would change the nutrient cost-effectiveness for the rule as a whole.

For Option 2.5 for subcategories A through D, EPA estimated 15.4 million pounds removed per year of total nitrogen and nutrient cost-effectiveness of $1.08/lb of total nitrogen removed. Because Option 2.5 does not include phosphorus removal, EPA did not calculate nutrient cost-effectiveness for phosphorus for Option 2.5. EPA concluded that Option 2.5 is nutrient cost-effective for total nitrogen.

EPA considered Option 2.5+P as the basis of BAT but rejected it for the following reasons. First, no facilities in EPA's database for Subcategories A through D use Option 2.5+P technology. Second, EPA estimated the pretax annualized cost of Option 2.5+P to be $42.9 million. EPA believed these costs might be underestimated. Based on information provided in comments on the NODA and further analysis, EPA concluded that the average annual cost of increased alum addition and the resulting increased sludge generation and disposal might range from $108,000 to $378,000 more per facility than previously estimated for this subcategory. Option 2.5+P removes an estimated 4.5 million pounds per year of total phosphorus and achieves the same level of nitrogen and conventional pollutant reduction as Option 2.5. Although the cost per pound of phosphorus removed using the estimated cost of $42.9 million is $9.49/lb, EPA believes that the actual cost per pound would be greater than $10 because of the additional costs noted above. Although EPA selected options where the nutrient cost-effectiveness is greater then the reference values ($4/lb nitrogen removed and $10/lb phosphorus removed) for an individual subcategory or segment, EPA has not done so in cases where selecting such an option would

raise the nutrient cost-effectiveness of the rule, as a whole, over these values. With a phosphorus cost-effectiveness over $10/lb for non-small facilities in Subcategory A through D, the phosphorus cost-effectiveness for the rule, as a whole, would be greater than $10/lb total phosphorus removed. Therefore, considering the lack of availability of the technology and the unfavorable nutrient cost-effectiveness for phosphorus, EPA rejected Option 2.5+P as the basis of BAT limitations.

EPA considered Option 4 (which includes more complete denitrification and chemical phosphorus removal) as the basis of BAT but did not select it because of the high increase in cost compared to Option 2.5 and the poor incremental nutrient cost-effectiveness (the high cost to remove additional nutrients compared to Option 2.5+P).

EPA estimated that there are no direct discharging facilities in these subcategories currently operating Option 4 technology. EPA estimated the pretax annualized compliance costs for Option 4 to be $52.0 million (1999 dollars), which is $9.1 million more than Option 2.5+P and $35.3 million more than Option 2.5. EPA estimated that Option 4 removes 18.5 million pounds per year of nitrogen (3.1 million more pounds per year than Option 2.5 or Option 2.5+P) and 5.0 million pounds per year of phosphorus (approximately 500,000 more pounds per year than Option 2.5+P). EPA estimated no facility or company closures for Option 4. Finally, EPA estimated the incremental nitrogen cost-effectiveness (as compared to Option 2.5) to be $11.56/lb of total nitrogen removed and the incremental phosphorus cost-effectiveness (as compared to Option 2.5+P) to be $20.09/lb of total phosphorus removed. The incremental nutrient cost-effectiveness of Option 4 is above the benchmark values; therefore, EPA did not consider Option 4 cost-effective.

EPA established BAT limitations for ammonia (as nitrogen) that are equivalent to the limitations promulgated in the final rule under BPT. EPA considered setting more stringent limitations for ammonia (as nitrogen) under BAT; however, the selected BAT technology option (Option 2.5) does not remove any additional quantity of ammonia (as nitrogen). Although Option 4 does remove some additional pounds of ammonia (as nitrogen) as compared to Option 2, EPA did not select Option 4 for BAT for the reasons discussed earlier in this section.

NSPS Requirements

As previously discussed, when establishing NSPS, EPA considers whether increased compliance costs related to the effluent guidelines regulation might create a barrier for a new facility to enter the industry and whether there are any new source standards currently in place for the subcategory. The barrier to entry analysis compares the estimated average increase in facility or company capital costs to meet the effluent guidelines to the average total assets of existing facilities or companies. EPA did not have data on the assets of new entrants because, in general, they cannot be identified before they are established. Therefore, EPA used data on the assets of existing facilities. The extent to which potential new entrants have total assets similar to those of existing industry participants provides a proxy for potential barriers to entry that new facility compliance costs may represent.

EPA performed an analysis to evaluate the effect of the rule on the costs to new entrants into the meat and poultry products industry by calculating the ratio of average capital costs to average total assets as a measure of the potential for barriers to entry that the MPP rule could create for these facilities. If the barrier to entry ratio is large, there is a possibility that the rule will discourage entry into the MPP market.

EPA estimated the ratio of costs to assets for Options 2.5, 2.5+P, and 4. The ratios are 1.6 percent for Option 2.5, 2.6 percent for Option 2.5+P, and 3.3 percent for Option 4. The estimates for Options 2.5+P and 4, however, do not reflect EPA's additional evaluation of the costs for chemical phosphorus based on comments received (see DCN 300,025). From this additional evaluation, EPA concluded that the average annualized costs for chemical phosphorus removal might be $108,000 to $378,000 per facility more than the costs used in EPA's barrier to entry analysis. With these additional costs, the ratio might rise to a level that the Agency would consider a barrier to entry for Options 2.5+P and 4.

EPA decided to revise the standards for new sources for ammonia (as nitrogen) to be equivalent to the BPT limitations being established in the final rule based on Option 2 and to establish standards for total nitrogen equivalent to the BAT limitations being established based on Option 2.5. These standards do not present a barrier to entry. Although there are existing

NSPS for these facilities, they do not include standards for total nitrogen. In addition, the revised NSPS for ammonia (as nitrogen) is based on the best demonstrated technology (i.e., more complete nitrification) whereas the current NSPS for ammonia (as nitrogen) is based on the current BAT limitations set in 1974 and achieves a lower level of nitrification (or may include ammonia stripping) (See p. 150, *Development Document for Effluent Limitations Guidelines and New Source Standards for the Red Meat Processing Segment of the Meat Product and Rendering Processing Point Source Category*, February 1974). Moreover, at the time the current NSPS were promulgated, nitrification technology was not well established and, in many cases, was available in only pilot plant or laboratory settings. Page 155 of the technical development document for the 1974 rule states: "Each of the identified BAT technologies, except ammonia removal, is currently being practiced in one or more packing plants."

13.2.2 Subcategory E (Small Processors)

Subcategory E includes the smallest meat further processing facilities (meat further processing facilities that produce 6,000 pounds or less per day). In 2002 EPA proposed not to revise the regulations for existing or new direct dischargers in Subcategory E. EPA did not propose to revise the existing limitations applicable to smaller MPP facilities (including all facilities in Subcategory E) because EPA determined that "small" MPP facilities discharge a very small proportion of the total industry discharge and that improved treatment would produce only a limited amount of loadings removal (67 FR 8623, February 25, 2002). EPA did not receive comment or additional information to persuade it to revise the existing ELGs and standards for this subcategory. Therefore, the current part 432 regulations continue to apply to those facilities (section 432.50).

13.2.3 Subcategories F through I (Meat Further Processing Facilities)

To allow for different limitations for small and non-small meat further processing facilities, EPA's 2002 proposal called for a production threshold of 50 million pounds (finished product) for facilities in Subcategories F through I. EPA is retaining that production threshold for the final rule. Therefore, EPA addresses small facilities and non-small facilities separately. Note the meat processors that process 6,000 pounds or less per day (1.56 million pounds per year) are

not included in Subcategories F through I, but are covered under Subcategory E. Costs in this section are presented in 1999 dollars because 1999 is the base year of the survey.

13.2.3.1 Small Facilities in Subcategories F through I (meat further processors that process more than 6,000 pounds per day but less than or equal to 50 million pounds per year)

EPA did not revise limitations or standards for small facilities in Subcategories F through I. Meat further processing facilities that produce greater than 6,000 pounds per day but less than or equal to 50 million pounds per year of finished produc\t will continue to be subject to the current limitations in the meat and poultry products effluent limitations guidelines (part 432), as applicable. The following sections discuss EPA's decision to retain the current BPT, BCT, and BAT limitations and NSPS for small direct discharge facilities in Subcategories F through I.

BPT, BCT, and BAT Requirements

EPA proposed not to revise the BPT, BCT or BAT limitations for existing small meat further processors in Subcategories F through I. In part 432, small facilities in Subcategories F through I currently have BPT limitations for the five conventional pollutants and BAT limitations for ammonia. EPA did not propose to revise BPT limitations for conventional pollutants for small facilities in these subcategories. EPA evaluated the cost of additional technology (e.g., filtration) under the BCT cost test and it failed. Therefore, EPA did not revise the conventional pollutant limitations under BCT for small facilities in Subcategories F through I.

For the final rule, EPA considered revising the ammonia (as nitrogen) limitations under BAT. EPA evaluated the cost of achieving pollutant reductions and the economic achievability of compliance with limitations based on Option 1 and Option 2 technology. Option 1 includes biological treatment, partial nitrification, and disinfection, and Option 2 accomplishes more complete nitrification (i.e., ammonia removal) than Option 1 technology. When evaluating BAT technology, EPA must determine whether the technology is available and economically achievable. EPA must also determine whether the identified technology is best. EPA typically evaluates a technology's cost-effectiveness as a factor in its decision. When considering cost-effectiveness (except for nutrients), EPA typically evaluates additional pollutant reductions in

toxic pound-equivalents. EPA estimated that the annualized cost of Option 1 and Option 2 are about $1.10 and $1.11 million (pre-tax, 1999 dollars), respectively, which represents approximately 9.4 percent of net income. Using the closure methodology described in the *Economic and Environmental Benefits Analysis of the Final Meat and Poultry Products Rule* (EPA-821-R-04-010), there is a very small probability that there could be one facility closure out of sixteen facilities under either option: the probability of closure is 1.49 percent and 1.51 percent, respectively. EPA estimated that Option 1 achieves a reduction of 5 toxic pound-equivalents per year, and Option 2 achieves a reduction of 15.2 toxic pound-equivalents per year, resulting in a toxic cost-effectiveness of $129,000 per toxic pound-equivalent (in 1981 dollars) for Option 1 and $42,900 per toxic pound equivalent (1981 dollars) for Option 2. Historically, EPA evaluated BAT technology using a toxic cost-effectiveness value of $200/toxic pound-equivalents (1981 dollars). Therefore, EPA determined that Options 1 and 2 are not cost-effective and are not economically achievable best available technology.

For existing small direct dischargers in the Subcategories F through I, the Agency found neither Option 1 nor Option 2 is the best practicable control technology, best conventional pollutant control technology, or best available technology economically achievable. Therefore, EPA did not revise BPT, BCT, or BAT limitations for existing small meat further processors. These facilities will remain subject to sections 432.60 through 432.90, as applicable.

NSPS Requirements

In 2002, EPA proposed not to revise the current new source performance standards for small facilities in Subcategories F through I (meat further processors). For the final rule, EPA concluded that the data on these facilities is insufficient to determine if Option 1 or Option 2 technology would present a barrier to entry. In addition, the analysis of barrier to entry data for these subcategories was complicated by the fact that some facilities performing operations fitting within the scope of Subcategories F through I also perform operations that are regulated under Subcategory L (poultry further processors). EPA notes that its analysis of Options 1 and 2 as candidate BAT technologies for ammonia removal in these subcategories showed insignificant additional removals above its cost-effectiveness benchmark. While new facilities may be able to

install technology at lower cost than existing facilities, it is unlikely that the costs would be low enough for the cost-effectiveness to approach a reasonable value. Finally, EPA also considered whether or not there were any new source performance standards currently in place when deciding whether to revise new source performance standards. There are current new source performance standards for these facilities which appear to be adequate. Therefore, EPA did not revise NSPS for new small meat further processors. New sources are subject to the current NSPS limitations in sections 432.65, 432.75, 432.85, and 432.95.

13.2.3.2 Non-Small Facilities in Subcategories F through I (meat further processors that process more than 50 million pounds per year)

For non-small facilities in Subcategories F through I, EPA established limitations and standards for total nitrogen for existing and new sources and establishing ammonia (as nitrogen) standards for new sources. EPA did not revise the current limitations (BPT/BCT) or new source performance standards (NSPS) for conventional pollutants and did not revise the current BAT limitations for ammonia (as nitrogen). The current regulations include production-based limitations and standards for these facilities for BOD, TSS, oil and grease, pH, and fecal coliforms for existing and new sources and a concentration-based limitation for ammonia (as nitrogen) for existing sources. As discussed in Section 14, the new limitations and standards are concentration-based. The following sections discuss the technology bases EPA selected for the final rule for the non-small direct discharge facilities in Subcategories F through I.

BPT Requirements

EPA established BPT for the meat further processors (Subcategories F through I) in 1975, based on biological treatment (e.g., aerobic and anaerobic treatment) to control five conventional pollutants or pollutant parameters (BOD_5, TSS, oil & grease, fecal coliforms, and pH). The current limitations for ammonia (as nitrogen) for non-small meat further processors are contained in BAT and not BPT. Therefore, this section does not discuss BPT limitations for ammonia (as nitrogen). In February 2002, EPA proposed new BPT limitations for chemical oxygen demand (COD) based on Option 2 in an effort to better reflect current BPT treatment technology for non-

small meat further processing facilities (67 FR 8630, February 25, 2002). See Section 7.3.2 for a discussion on why EPA is not establishing BPT limitations for COD in the final rule.

EPA did not revise the conventional pollutant limitations for non-small meat further processing facilities (Subcategories F through I) in the final rule and such facilities will remain subject to the BPT limitations in sections 432.62, 432.72, 432.82, and 432.92.

BCT Requirements

When deciding whether to adopt more stringent limitations for BCT than BPT, EPA considers technologies that might achieve greater removals of conventional pollutants than those adopted for BPT.

EPA did not promulgate new BPT effluent limitations for conventional parameters (i.e., pH, BOD_5, TSS, oil and grease, and fecal coliforms) for non-small meat further processors (Subcategories F through I). When considering a technology that would achieve greater removals of conventional pollutants than adopted for BPT, EPA compared the removals achievable through implementation of the Option 2 technology (which EPA considered as the possible technology basis for BCT) to current BPT limitations. EPA estimated that Option 2 removes approximately 21,700 pounds more per year of BOD_5 compared to conventional pollutant reductions by facilities meeting or exceeding current BPT limitations. There are no additional removals of TSS, oil and grease, or fecal coliforms.

EPA evaluated Option 2 under the BCT cost test and it failed (see the *Economic and Environmental Benefits Analysis of the Final Meat and Poultry Products Rule* EPA-821-R-04-010). EPA did not evaluate other technology options, such as Option 2 + F (Option 2 plus the addition of a filter), because they are more costly and do not remove significantly more conventional pollutants than Option 2. If Option 2 did not pass the cost test, these more expensive options would not pass. The Agency did not identify any technologies that pass the BCT cost test and achieve greater removals of conventional pollutants than the current BPT technology. Thus, EPA did not revise the BCT limitations for these facilities. Non-small meat further processing facilities in Subcategories F through I will remain subject to the current

BCT limitations (which are equivalent to the current BPT limitations for conventional pollutants) in sections 432.67, 432.77, 432.87, and 432.97.

BAT Requirements

EPA proposed to establish the BAT level of regulatory control for non-small meat further processors (Subcategories F through I) based on Option 3 (i.e., biological treatment, more complete denitrification, more complete nitrification, and disinfection). As discussed in the NODA, after review and evaluation of the revised and new data, EPA reconsidered its assessment of Option 3 as BAT technology. EPA determined that Option 3 did not meet all the statutory criteria for BAT. The Agency refocused its evaluation for the technology basis for BAT on Option 2.5, Option 2.5+P, or Option 4 for nutrient removal (see Section 9 for a description of the technology options). For the final rule, EPA based the BAT limitations for total nitrogen for these facilities on Option 2.5 technology and promulgated a limitation for total nitrogen on this basis. EPA did not revise the current BAT limitation for ammonia (as nitrogen).

EPA evaluated whether revising the current BAT limitation for ammonia (as nitrogen) based on Options 2, 2.5, 2.5+P, or 4 treatment technologies could be supported. When evaluating revision of BAT for non-conventional pollutants that are not nutrients, EPA considers not only whether the technology option is available and economically achievable, but also whether it is best. EPA typically evaluates a technology's cost-effectiveness as a factor in its decision. When considering cost-effectiveness (except for nutrients), EPA typically looks at the costs of the additional pollutant reductions (in toxic pound-equivalents).

EPA estimated the annualized cost of each technology option under review. The approximate annualized cost of the technology options ranged from $266,000 for Option 2 to $798,000 for Option 4 (pretax, 1999 dollars). Using the closure methodology, EPA projected that there would be a slight probability (0.5 percent) that at most one facility would close under any of the technology options. However, the average toxic cost-effectiveness numbers range from $8,000 per toxic pound-equivalent (1981 dollars) for Option 2 to $18,400 per toxic pound-equivalent (1981 dollars) for Option 4. These high values are due to the very minimal incremental reduction in toxic pound-equivalents: 19.4 toxic pound-equivalents/year for Options

2, 2.5, or 2.5+P and 25.3 toxic pound-equivalents/year for Option 4. EPA typically uses $200 per toxic pound-equivalents (in 1981 dollars) as an indication of cost-effectiveness for toxic pollutants. Therefore, EPA determined that Options 2, 2.5, 2.5+P, and 4 are a not cost-effective basis for revising current ammonia (as nitrogen) limitations for non-small facilities in these subcategories when compared with those currently being achieved.

The following section describes EPA's rationale for selecting Option 2.5 technology and rejecting Options 2.5+P and 4 as the basis of BAT limitations for nutrients. EPA did not consider Option 2 for control of nutrients as it is not designed to reduce total nitrogen or total phosphorus. Both the proposal and the NODA contain detailed discussions explaining why EPA rejected setting BAT limitations based on other technology options (see 67 FR 8629, February 2002 and 68 FR 48499, August 13, 2003).

EPA selected Option 2.5 technology as the basis of BAT control for total nitrogen for non-small meat further processing facilities (Subcategories F through I) because it is demonstrated as available and is economically achievable. First, although no facilities in these subcategories use Option 2.5 technology, this technology has been demonstrated as available in all other subcategories of the MPP industry. EPA notes that it did not have any detailed survey respondents that are within the scope of Subcategories F through I and that based on its screener questionnaire database, EPA estimated only four non-small facilities in these subcategories. Based upon information collected from facilities in this subcategory who received screener surveys, all of the facilities are estimated to be currently achieving the LTA of Option 2.5 for total nitrogen.

Second, Option 2.5 is economically achievable. EPA estimated the pretax annualized compliance costs (in 1999 dollars) for Option 2.5 to be $329,000. These costs are conservative and may be overstated as they include costs for the components of Option 2.5 technology even at facilities where the effluent concentrations are below the LTA for Option 2.5. EPA chose to possibly overestimate costs in this subcategory because of the uncertainty regarding the numbers of facilities in these subcategories and lack of detailed information on their operations. This is due to the small number of screener survey respondents and the fact that EPA does not have any

detailed survey respondents from these subcategories. In addition, EPA's finding of economic achievability in the final rule is based on the estimated costs of implementing the components of the model technology, not on achieving the resulting limitations. Using the facility and company closure methodologies, EPA estimated a 0.2 percent probability of facility-level closure (i.e., at most one facility closure).

EPA also considered the cost-effectiveness of nutrient removal when evaluating BAT options for this industry segment. However, as previously noted, all non-small meat further processing facilities (Subcategories F through I) in EPA's database are already achieving the Option 2.5 LTAs. Therefore, EPA estimated zero additional pounds removed per year of total nitrogen and could not calculate a nutrient cost-effectiveness for nitrogen.

Furthermore, there is the possibility that facilities in subcategories A through D that perform further processing may be at a competitive disadvantage if facilities in subcategories F through I do not have equivalent limits. In addition, EPA does not want to encourage companies to split their operations in order to be subject to lower limits.

EPA considered Option 2.5+P as the basis of BAT, but rejected it for the following reasons. First, no non-small meat further processing facilities in EPA's database use Option 2.5+P technology. Second, Option 2.5+P costs an additional $30,000 annually for no additional pollutant reductions when compared to Option 2.5. Therefore, this technology was not considered to be cost-effective.

EPA considered Option 4 as the basis of BAT but did not select it due to the lack of availability of the technology option, the high increase in cost compared to Option 2.5, and the poor incremental nutrient cost-effectiveness (i.e., the high cost to remove additional nutrients compared to Option 2.5+P).

EPA estimated that there are no facilities in these subcategories currently operating Option 4 technology. In addition, EPA estimated the pre-tax annualized compliance costs for Option 4 to be $798,000 (1999 dollars), which is $469,000 more than Option 2.5. EPA estimated that Option 4 removes approximately 80,000 pounds per year of nitrogen and zero pounds per

year of phosphorus. Using the facility and company closure methodologies, EPA estimated a 0.5 percent probability of facility-level closure (i.e., at most one facility closure). Finally, EPA estimated the average nutrient cost-effectiveness for nitrogen to be $10.02/lb of total nitrogen removed, while the incremental nitrogen cost-effectiveness relative to Option 2.5 is $5.89/lb. Both of the figures are above the $4/lb benchmark for nitrogen removal. Therefore, EPA did not consider Option 4 to be cost-effective.

NSPS Requirements

In 2002 EPA proposed to revise the current new source performance standards for non-small facilities in Subcategories F through I (meat further processors) based on Option 3 technology. EPA estimated only four non-small direct discharge meat further processing facilities, and therefore, has insufficient data on these facilities to determine if Options 2.5, 2.5+P, or 4 would present a barrier to entry. When deciding whether to promulgate revised new source performance standards, EPA considered whether or not there are any new source performance standards currently in place. EPA revised existing source BAT limitations for non-small meat further processors based on Option 2.5 technology for total nitrogen and did not revise BAT limitations for ammonia (as nitrogen). Although there currently are new source performance standards for these facilities, they do not include limitations for total nitrogen or ammonia (as nitrogen). Therefore, for non-small meat further processors, EPA set NSPS for total nitrogen equivalent to the BAT limitations based on Option 2.5 and for ammonia (as nitrogen) based on Option 2 (because Option 2.5 does not provide any additional ammonia removal). EPA did not revise the current NSPS for conventional pollutants.

13.2.4 Subcategory K (Poultry First Processing Facilities)

In 2002, EPA proposed a production threshold of 10 million pounds (live weight killed) per year for facilities in Subcategory K. EPA proposed this threshold to allow for different limitations for small and non-small poultry first processing facilities. EPA raised the production threshold for the final rule from 10 to 100 million pounds per year. Therefore, this section discusses small and non-small facilities separately. Costs presented in this section are presented in 1999 year dollars which is the base year of the survey.

13.2.4.1 Small Facilities in Subcategory K (Poultry first processors that slaughter less than or equal to 100 million pounds per year)

For the final rule, small poultry first processing facilities include facilities with production rates less than or equal to 100 million pounds per year (live weight killed). EPA is not establishing limitations for any existing small poultry first processing facilities in Subcategory K. However, EPA established new source performance standards for new facilities. The following sections discuss EPA's decision not to establish BPT, BCT, or BAT limitations and to establish NSPS for small direct discharge facilities in Subcategory K.

BPT/BCT/BAT Requirements

In 2002 EPA proposed new BPT/BCT/BAT for the small poultry first processors based on Option 1. EPA also evaluated Option 2 for small facilities in this subcategory. Based on comments on the proposal and the incorporation of data from the detailed surveys, EPA did not establish BPT/BCT/BAT limitations for small facilities in Subcategory K (poultry first processors) for the final rule.

First, even though Options 1 and 2 are available technologies (i.e., partial and more complete nitrification, respectively) readily applicable to all small facilities in Subcategory K, the cost of compliance with these limitations in relation to the effluent reduction benefits is disproportionate. For poultry first processor facilities with production rates less than or equal to 100 million pounds of live weight killed (LWK) per year EPA estimated it will cost $1,487/lb of pollutant removed (1999 dollars) for Option 1 and $501/lb (1999 dollars) for Option 2. These values significantly exceed the $37/lb removed benchmark that EPA used, as guidance, to assess BPT cost reasonableness.

Consequently, EPA determined the total cost of effluent reductions using the Options 1 and 2 technologies are not reasonable in relation to the effluent reduction benefits. The Agency tried to avoid "double-counting" pollutant reductions that would occur if, for example, EPA summed removals of COD and BOD. Therefore, EPA used the sum of BOD_5 and ammonia (as nitrogen) removed to estimate the pounds of pollutant removed under the technology options for these facilities. As noted previously, EPA estimated this cost as $1,487/lb removed for Option 1

and $501/lb removed for Option 2. Second, EPA found that compliance with limitations based on Option 1 or Option 2 technology will result in at least 36 closures for the existing small direct dischargers for which facility-level financial data exists. EPA only had sufficient financial data for 9 out of an estimated 37 small facilities in this subcategory. Therefore, there may be more closures than we are able to project.

Existing small direct discharge facilities in Subcategory K will remain subject to permit limits based on the best professional judgment of the permit writer.

NSPS Requirements

For the 2002 proposal, EPA proposed new NSPS based on Option 1. In the NODA (68 FR 48500, August 13, 2003), EPA gave notice that it was considering the modified options (Option 2.5, Option 2.5+P, and no revision/no regulation) in addition to the proposed options (Options 1 and 2) for small slaughtering facilities. Based on comments received on the proposal and the completion of the review and incorporation of data from the detailed surveys, EPA established NSPS standards for small facilities in Subcategory K based on Option 2. There are no current new source performance standards for small poultry first processors and 75 percent of small facilities in EPA's database currently use Option 2 technology (or more advanced technology); therefore, Option 2 is demonstrated technology for this segment of facilities. However, EPA determined that the ratio of capital costs to total assets for the facilities in this subcategory to be 13 percent for both Option 1 and Option 2 technology levels. While 13 percent of average total assets is a significant level, EPA concluded that the limited amount of data for these facilities limited the analysis and the actual ratio of capital costs to total assets for new facilities may be much lower. For example, the analysis includes one facility whose ratio is greater than 30 percent, while another facility has a ratio of approximately 4 percent. Thus, since the barrier to entry test results are identical for Options 1 and 2, and 75 percent of existing facilities use Option 2 technology, EPA selected the more stringent Option 2 as the level of control for new sources for ammonia (as nitrogen) and the five conventional pollutants.

13.2.4.2 Non-small Facilities in Subcategory K (Poultry first processing facilities that slaughter more than 100 million pounds per year)

For non-small facilities in Subcategory K, EPA, for the first time, established limitations and standards for BOD_5, TSS, oil & grease, pH, fecal coliforms, ammonia (as nitrogen), and total nitrogen for existing and new sources. As discussed in Section 14, the new limitations and standards are concentration-based. The following sections discuss the technology bases EPA selected for the final rule for the direct discharge non-small facilities in Subcategory K.

BPT Requirements

In 2002 EPA proposed new BPT for the non-small poultry first processors (Subcategory K) based on Option 3 to control five conventional pollutants or pollutant parameters (BOD_5, TSS, oil & grease, fecal coliforms, and pH) and also control ammonia (as nitrogen), total nitrogen and total phosphorus. As discussed in the NODA, after review and evaluation of the revised and new data, EPA reconsidered its assessment of Option 3 technology.

EPA established BPT limitations for BOD_5, TSS, oil & grease, fecal coliforms, pH and ammonia (as nitrogen) for non-small direct dischargers in Subcategory K based on technology Option 2 (see Section 9 for additional details on the Option 2 technology).

The Agency concluded that the Option 2 treatment technology represents the best practicable control technology currently available and is the basis for the BPT limitations for these facilities for the following reasons.

First, this technology is available technology and is readily applicable to all non-small facilities in Subcategory K. More than 92 percent of the non-small direct discharging facilities in these subcategories are using Option 2 technology, or more advanced technology. Although most facilities have the components of Option 2 technology in place (e.g., nitrification basin/aerobic reactor), some facilities are not achieving the projected Option 2 long-term average concentrations (LTAs). EPA attributes this to their failure to operate or maintain the Option 2 technology adequately. (See Sections 10 and 11 for additional discussion of the cost and loading methodologies.) Consequently, when estimating the costs of compliance with Option 2, EPA

included costs for treatment optimization for a number of facilities to achieve the Option 2 LTA. For example, EPA included costs for increased aeration, chemical addition, sludge handling, process controls, in-process sampling, analytical testing, and capacity.

Second, the cost of compliance with these limitations in relation to the effluent reduction benefits is not disproportionate. EPA projected that compliance with BPT limitations based on Option 2 technology will not result in closures of existing non-small direct dischargers in these subcategories. Moreover, adopting this level of control will create a significant reduction in pollutants discharged into the environment. For poultry first processor facilities with production rates greater than 100 million pounds LWK per year using Option 2, EPA estimated an annual compliance cost of $17.7 million (pretax, 1999 dollars) and removal of 980,000 pounds of BOD_5 and ammonia (as nitrogen) from current discharges into the Nation's waters at a cost of $18.18/lb of pollutant removed (1999 dollars). This cost per pound of pollutant removed is below the $37/lb benchmark that EPA is using, as guidance, to evaluate cost-reasonableness.

EPA considered Option 2.5 (which also includes partial denitrification) as the basis for BPT limitations. However, Option 2.5 does not remove any additional pounds of conventional pollutants or ammonia (as nitrogen) and costs $9.4 million more annually than Option 2. In addition, EPA found that 45 percent of non-small facilities in this subcategory in EPA's database are using the components of Option 2.5 technology (e.g., facility has in place a denitrification basin, nitrification basin and disinfection) or more advanced technology. Because Option 2.5 costs more, does not remove additional pollutants, and is not as widely available as Option 2 technology, EPA did not select it as the basis of BPT limitations.

Furthermore, EPA did not select Option 2.5+P or Option 4 as the basis for BPT limitations, as they do not achieve adequate additional pollutant reductions as compared to their additional compliance costs. Specifically, Option 2.5+P does not achieve any additional removals of conventional pollutants or ammonia (as nitrogen) as compared to Option 2, but it would cost an additional $45.7 million (in 1999 dollars) annually. Option 4 would remove an additional 170,000 pounds of ammonia (as nitrogen) for an additional $91.4 million (in 1999 dollars) annually. Other options the Agency considered for BPT were not selected due to lack of

availability and/or poor BPT cost and removal comparison. Both the proposal and the NODA contain detailed discussions explaining why EPA rejected setting BPT limitations based on other technology (see 67 FR 8629, February 25, 2002 and 68 FR 48499, August 13, 2003).

BCT Requirements

In deciding whether to adopt more stringent limitations for BCT than BPT, EPA considered whether technologies other than those adopted for BPT will achieve greater removal of conventional pollutants and whether the costs of those technologies are reasonable under the standards established by the CWA. EPA generally refers to the decision criteria as the "BCT cost test." EPA is promulgating BCT effluent limitations for conventional parameters (e.g., pH, TSS, O&G) equivalent to BPT for this subcategory because the Agency did not identify technologies that can achieve greater removals of conventional pollutants that also pass the BCT cost test. EPA evaluated adding a filter to the BPT technology (i.e., Option 2 + F) in order to get further conventional pollutant reductions. However, this technology option failed the BCT cost test. (For a more detailed description of the BCT cost test and details on EPA's analysis, see the *Economic and Environmental Benefits Analysis of the Final Meat and Poultry Products Rule* [EPA-821-R-04-010]).

BAT Requirements

EPA proposed to establish the BAT level of regulatory control for non-small facilities in Subcategory K based on Option 3 (i.e., biological treatment, more complete nitrification, more complete denitrification and disinfection). As discussed in the NODA, after review and evaluation of the revised and new data, EPA reconsidered its assessment of Option 3 as BAT technology. EPA determined that Option 3 did not meet all the statutory criteria for BAT. The Agency refocused its evaluation for the technology basis for BAT on Option 2.5, Option 2.5+P or Option 4 for nutrient removal (see Section 9 for a description of the technology options). For the final rule, EPA based the BAT limitations for these facilities on Option 2.5 technology and promulgated a limitation for total nitrogen on this basis. However, EPA is setting a limitation for ammonia (as nitrogen) that is equal to BPT, because using Option 2.5 technology or higher does

not result in any additional ammonia removal than the technology used to establish BPT (Option 2).

The following section describes EPA's rationale for selecting Option 2.5 technology and rejecting Option 2.5+P and Option 4. The proposal and the NODA (see 67 FR 8629 and 68 FR 48499) contain detailed explanations why EPA rejected setting BAT limitations based on other technology options, and the Administrative Record for the final rule provides does not support EPA changing these conclusions.

EPA determined that Option 2.5 technology is available in Subcategory K, as 45 percent of the non-small facilities in this subcategory in EPA's database use the components of Option 2.5 (or more advanced technology) and is economically achievable. EPA estimated the compliance costs for Option 2.5 to be $31.8 million (in 1999 dollars). Using the facility and company closure methodologies, EPA believes that no facilities or companies will close. For a sensitivity analysis, EPA also estimated closures using a less stringent decision rule (closure under one of three forecast methodologies rather than at least two of three). Using the alternate analysis, EPA estimated no facilities will close under Option 2.5.

EPA also considered nutrient removal cost-effectiveness when evaluating BAT options for this industry. For Option 2.5, EPA estimated 9.4 million pounds removed per year of total nitrogen and a nutrient cost-effectiveness of $3.40/lb of total nitrogen removed. Because Option 2.5 does not include phosphorus removal, EPA did not calculate nutrient cost-effectiveness for phosphorus for Option 2.5. EPA concludes that Option 2.5 is nutrient cost-effective for total nitrogen.

EPA considered Option 2.5+P as the basis of BAT, but rejected it. Fourteen percent of non-small facilities in Subcategory K in EPA's database use Option 2.5+P technology (or more advanced technology). EPA estimated the pre-tax annualized cost of Option 2.5+P is $63.4 million (1999 dollars), which is $31.6 million more than Option 2.5. EPA estimated no facility closures and one company closure for Option 2.5+P (Note: Facilities that are owned by the company that is projected to close did not provide facility-level financial information; therefore, those facilities are not part of the facility-level analysis). Option 2.5+P removes 4.1 million

pounds per year of total phosphorus and achieves the same level of nitrogen and conventional pollutant reduction as Option 2.5. Therefore, EPA estimated the average nutrient cost-effectiveness to be $6.77/lb/lb total nitrogen removed and $15.28/lb total phosphorus removed. These values exceed the benchmark that EPA is using, as guidance, for cost-effectiveness. Therefore, EPA did not select Option 2.5+P due to the poor cost-effectiveness for nutrients.

EPA also considered, but did not select, Option 4 as the basis of BAT limitations due to the high increase in cost as compared to Option 2.5, the poor incremental nutrient cost-effectiveness (i.e., the high cost to remove additional nutrients as compared to Option 2.5+P), and high number of closures.

EPA estimated that almost 3 percent of direct discharge non-small facilities in this subcategory currently operate Option 4 technology (or more advanced technology).EPA estimated the pre-tax annualized compliance costs for Option 4 to be $109.1 million (1999 dollars), which is $45.7 million more than Option 2.5+P and $77.3 million more than Option 2.5. EPA also estimated that Option 4 removes 20.9 million pounds per year of nitrogen (11.5 million more than Option 2.5 or Option 2.5+P) and 4.7 million pounds per year of phosphorus (about 520,000 pounds per year more than Option 2.5+P). However, EPA projects 22 facility closures and one company closure under Option 4 and estimated the average nutrient cost-effectiveness to be $5.22/lb total nitrogen removed and $23.35/lb total phosphorus removed. The incremental nutrient cost-effectiveness is $6.71/lb of nitrogen removed (relative to Option 2.5) and $87.17 /lb of phosphorus removed (relative to Option 2.5+P). Option 4 exceeds the $4 /lb removed benchmark value for nitrogen and the $10/lb removed benchmark value for phosphorus. Therefore, EPA finds that Option 4 is not cost-effective for total nitrogen or phosphorus removal and is not economically achievable technology.

EPA established BAT limitations for ammonia (as nitrogen) that are equivalent to the limitations it promulgated under BPT. EPA considered setting more stringent limitations for ammonia (as nitrogen) under BAT; however, the selected BAT technology option (Option 2.5) does not remove any additional quantity of ammonia (as nitrogen). Although Option 4 does

remove some additional pounds of ammonia (as nitrogen) as compared to Option 2, EPA did not select Option 4 for BAT for the reasons discussed earlier in this section.

NSPS Requirements

EPA considers the barrier to entry into the industry for a new facility that results from the compliance costs of the regulation and whether or not there are new source standards in place for the facilities. For this rule, EPA used the ratio of average capital costs to average total assets to measure the potential for barrier to entry due to the MPP rule. EPA estimated the ratio of costs to assets for Option 2.5, 2.5+P, and Option 4: they range from 4.0 percent for Option 2.5 to 4.2 percent for Option 2.5+P to 12.3 percent for Option 4. The estimates for Option 2.5+P and Option 4, however, do not reflect EPA's additional evaluation of the costs for chemical phosphorus based on comments EPA received (see DCN 300015). From this additional evaluation, EPA concludes that for non-small poultry first processors costs may be $25,000 to $106,000 more per facility for chemical phosphorus removal (including costs for additional sludge disposal) than those used in EPA's barrier to entry analysis, as discussed here. EPA was concerned that, with these additional costs, the ratio may rise to a level that the Agency would consider to be a barrier to entry for Option 2.5+P and Option 4. Therefore, EPA set standards for new sources equivalent to the BAT limitations established by the final rule (based on Option 2.5 technology) for total nitrogen and equivalent to BPT (based on Option 2 technology) for ammonia (as nitrogen) and the five conventional pollutants.

13.2.5 Subcategory L (Poultry Further Processing Facilities)

In 2002 EPA proposed a production threshold of 7 million pounds (finished product) per year for facilities in Subcategory L. EPA proposed this threshold to allow for different limitations for small and non-small poultry further processing facilities. EPA is retaining the proposed threshold for the final rule. Therefore, this section discusses small and non-small facilities separately. Costs presented in this section are presented in 1999 year dollars which is the base year of the survey.

13.2.5.1 Small Facilities in Subcategory L (poultry further processing facilities that produce less than or equal to 7 million pounds per year)

For the final rule, small poultry first processing facilities include facilities with production rates less than or equal to 7 million pounds (finished product) per year. EPA did not establish limitations for any existing small poultry further processing facilities in Subcategory L. However, EPA established new source performance standards for new facilities. The following sections discuss EPA's decision not to establish BPT, BCT, or BAT limitations and to establish NSPS for small direct discharge facilities in Subcategory L.

BPT/BCT/BAT Requirements

In 2002, EPA proposed new BPT/BCT/BAT for the small poultry further processors based on Option 1. EPA also evaluated Option 2 for small facilities in this subcategory. Based on incorporation of data from the detailed surveys, EPA did not establish BPT/BCT/BAT limitations for small facilities in Subcategory K (poultry first processors) for the final rule for the following reasons.

First, even though Option 1 and Option 2 are available technologies (i.e., partial and more complete nitrification, respectively) readily applicable to all small facilities in Subcategory L, the cost of compliance with these limitations in relation to the effluent reduction benefits is disproportionate. For poultry further processor facilities with production rates less than or equal to 7 million pounds of live weight killed (LWK) per year EPA estimated it will cost approximately $74/lb of pollutant removed (1999 dollars) for Option 1 or Option 2, which exceed the $37/lb removed benchmark that EPA is using, as guidance, to evaluate BPT cost-reasonableness.

Consequently, EPA determined the total cost of effluent reductions using the Option 1 or Option 2 technology is not reasonable in relation to the effluent reduction benefits. Second, due to lack of facility-level financial data, EPA could not estimate closures that would result with BPT limitations based on Option 1 or Option 2 technology. In addition, the analysis of financial data for small facilities in Subcategory L was complicated by the fact that some facilities performing operations fitting within the scope of Subcategory L also perform operations that are

regulated under Subcategories F through I (meat further processors). (See the *Economic and Environmental Benefits Analysis of the Final Meat and Poultry Products Rule* [EPA-821-R-04-010] for a discussion of how "mixed processors" were addressed.) Existing small direct discharge facilities in Subcategory L will remain subject to permit limits based on the best professional judgment of the permit writer.

NSPS Requirements

In 2002, EPA proposed new NSPS for small poultry further processors (Subcategory L) based on Option 1. In the NODA (68 FR 48500, August 13, 2003), EPA gave notice that it was considering the modified options (Option 2.5, Option 2.5+P, and no revision/no regulation) in addition to the proposed options (Option 1 and Option 2) for these facilities. After considering comments and the data from the detailed surveys, EPA established NSPS standards for small poultry further processing facilities based on Option 2. EPA determined that all existing small poultry further processors in EPA's database currently use the components of Option 2 technology, although, as noted above, they would incur additional costs to meet the Option 2 LTAs. In addition, EPA determined that there is no barrier to entry for either Option 1 or Option 2 as the ratio of capital costs to total assets for the facilities in this subcategory is 0.4 percent for both Option 1 and Option 2 technology levels. Finally, there are no current new source performance standards in place for small facilities in Subcategory L. Since the barrier to entry test results are identical for Options 1 and 2, and all existing facilities have the components in place for Option 2 technology, EPA selected the more stringent Option 2 as the level of control for new sources for ammonia (as nitrogen) and the five conventional pollutants.

13.2.5.2 Non-small Facilities in Subcategory L (Poultry further processing facilities that produce more than 7 million pounds per year)

For non-small facilities in Subcategory L, EPA, for the first time, established limitations and standards for BOD_5, TSS, oil & grease, pH, fecal coliforms, ammonia (as nitrogen), and total nitrogen for existing and new sources. As discussed in Section 14, the new limitations and standards are concentration-based. The following sections discuss the technology bases EPA

selected for the final rule for the direct discharge non-small facilities in Subcategory L (poultry further processors).

BPT Requirements

In 2002 EPA based its proposal for new BPT for the poultry further processors (Subcategory L) on Option 3 to control five conventional pollutants or pollutant parameters (BOD_5, TSS, oil and grease, fecal coliforms, and pH) and also control ammonia (as nitrogen), total nitrogen and total phosphorus. As discussed in the NODA, after review and evaluation of the revised and new data, EPA reconsidered its assessment of Option 3 technology.

EPA decided to establish BPT limitations for BOD_5, TSS, oil & grease (as HEM), fecal coliforms, pH and ammonia (as nitrogen) for non-small direct dischargers in Subcategory L based on technology Option 2 (see Section 9 for additional details on the Option 2 technology).

The Agency concluded that the Option 2 treatment technology is the best practicable control technology currently available, and it should be the basis for the BPT limitations for these facilities. First, this technology is available and readily applicable to all non-small facilities in Subcategory L. EPA estimated that all non-small direct discharge facilities in this subcategory currently operate Option 2 technology (or more advanced technology).

Second, the cost of compliance with these limitations in relation to the effluent reduction benefits is not disproportionate. For poultry further processing facilities with production rates greater than 7 million pounds finished product per year, EPA estimated an annual compliance cost under Option 2 of $557,000 (pretax 1999 dollars) and 18,600 pounds of BOD_5 and ammonia (as nitrogen) removed from current discharges at a cost of $29.88/lb (1999 dollars) of pollutant removed. In estimating the pounds of pollutant removed based on Option 2 technology for these facilities, EPA used the sum of BOD_5 and ammonia (as nitrogen) removed. The cost per pound removed approaches, but is still below, the $37 /lb value that EPA uses as guidance in evaluating BPT cost-reasonableness.

EPA considered Option 2.5 (which also includes partial denitrification) as the basis for BPT limitations. However, Option 2.5 does not remove any additional pounds of conventional

pollutants or ammonia (as nitrogen) compared to Option 2 but costs almost $426,000 more annually. In addition, EPA found that Option 2.5 technology is not as widely available as Option 2 technology. That is, 37 percent of non-small poultry further processors in EPA's database use Option 2.5 (or more advanced) technology, while 100 percent use Option 2 (or more advanced) technology. Thus, EPA did not select Option 2.5 as the basis of BPT limitations.

Furthermore, EPA did not select either Option 2.5+P or Option 4 as the basis for BPT limitations because they do not achieve adequate pollutant reductions relative to additional compliance costs. Specifically, Option 2.5+P does not achieve any additional removals of conventional pollutants or ammonia (as nitrogen) but would cost $918,000 more each year than Option 2. Option 4 would remove an insignificant amount of ammonia (as nitrogen) for an additional $2.7 million annually. EPA did not select other options it considered for BPT due to lack of availability and poor BPT cost and removal comparison. The 2002 proposal and the NODA (see 66 FR 457 and 68 FR 48499) contain detailed explanations of why EPA rejected BPT limitations based on other BPT technology options.

BCT Requirements

In deciding whether to adopt more stringent limitations for BCT than BPT, EPA considered whether there are technologies other than those adopted for BPT that achieve greater removals of conventional pollutants and whether those technologies are cost-reasonable under CWA standards. EPA generally refers to the decision criteria as the "BCT cost test." EPA promulgated effluent limitations for conventional parameters (e.g., pH, TSS, O&G) equivalent to BPT for this subcategory because it identified no technologies achieving greater removals of conventional pollutants that also pass the BCT cost test. EPA considered adding a filter to the BPT technology (i.e., Option 2 + F) to get further conventional pollutant reductions; however, this technology option failed the BCT cost test. For a more detailed description of the BCT cost test and details on EPA's analysis, see the *Economic and Environmental Benefits Analysis for the Final Meat and Poultry Products Rule* (EPA-821-R-04-010).

BAT Requirements

EPA proposed to establish the BAT level of regulatory control for non-small facilities in Subcategory L based on Option 3 (biological treatment, more complete denitrification, more complete nitrification, and disinfection). As discussed in the NODA, after review and evaluation of the revised and new data, EPA reconsidered its assessment of Option 3 as BAT technology. EPA determined that Option 3 did not meet all the statutory criteria for BAT. The Agency refocused its evaluation for the technology basis for BAT on Option 2.5, Option 2.5+P or Option 4 for nutrient removal (see Section 9 for a description of the technology options). For the final rule, EPA bases the BAT limitations for these facilities on Option 2.5 technology and promulgated a limitation for total nitrogen on this basis. EPA is, however, setting a limitation for ammonia (as nitrogen) that is equal to BPT.

The following section describes EPA's rationale for selecting Option 2.5 technology and rejecting Options 2.5+P and 4. The proposal and the NODA (see 67 FR 8629 and 68 FR 48499) contain detailed explanations why EPA rejected setting BAT limitations based on other technology options, and the Administrative Record for the final rule does not support EPA changing these conclusions.

EPA selected Option 2.5 technology as the basis of BAT for non-small facilities in Subcategory L for two reasons. First, Option 2.5 technology has been demonstrated as available in Subcategory L. EPA estimated that 37 percent of non-small direct discharge facilities in this subcategory in EPA's database currently operate at or above the Option 2.5 technology level. Second, Option 2.5 is economically achievable. EPA estimated the compliance costs (pre-tax, 1999 dollars) for Option 2.5 to be $983,000 per year. Using the closure methodology, there is a slight probability (0.9 percent) that there could be one facility closure under Option 2.5.

EPA also considered nutrient removal cost-effectiveness when evaluating BAT options for this industry. For Option 2.5, EPA estimated 146,000 pounds removed per year of total nitrogen and a nutrient cost-effectiveness of $6.71/lb total nitrogen removed. Option 2.5 does not include phosphorus removal; therefore, EPA did not calculate nutrient cost-effectiveness for phosphorus for Option 2.5. For the subcategory, Option 2.5 exceeds the $4/lb removed value

EPA uses as guidance for nitrogen cost-effectiveness, but the cost-effectiveness for the rule as a whole does not exceed the $4 /lb value. Therefore, Option 2.5 is cost-effective for total nitrogen.

EPA considered Option 2.5+P as the basis of BAT but rejected it. EPA estimated that 9 percent of the non-small poultry further processors use Option 2.5 (or more advanced) technology with phosphorus removal. The pre-tax annualized cost of Option 2.5+P is $1.5 million (1999 dollars) and the probability of a facility level closure is less than 1.4 percent (i.e., at most one facility closure). Option 2.5+P removes 25,000 pounds per year of total phosphorus and achieves the same level of nitrogen and conventional pollutant reduction as Option 2.5. Therefore, EPA estimated the average nutrient cost-effectiveness to be $10.08 /lb total nitrogen and $58.98 /lb total phosphorus removed. Therefore, EPA did not select Option 2.5+P due to the poor cost-effectiveness for both total nitrogen and total phosphorus.

EPA also considered Option 4 as the basis of BAT but did not select it due to the high increase in cost compared to Option 2.5 and the poor nutrient cost-effectiveness (i.e., the high cost to remove additional nutrients compared to Option 2.5+P).

Nine percent of non-small direct discharge facilities in this subcategory operate Option 4 technology (or more advanced technology). Therefore, EPA considers the technology to be available. EPA estimated the pre-tax annualized compliance costs for Option 4 to be $3.3 million (1999 dollars), which is $1.8 million more than Option 2.5+P and $2.3 million more than Option 2.5. Option 4 removes 354,000 pounds per year of nitrogen (208,000 more than Options 2.5 or 2.5+P) and 27,000 pounds per year of phosphorus (approximately 2,000 more pounds per year than Option 2.5+P). There is a 3 percent probability of a facility-level closure for Option 4 (at most one facility closure) and a ratio of 16.8 percent when comparing annualized compliance costs to net income. EPA considers this cost to revenue ratio high and an indication that Option 4 is not economically achievable for non-small facilities in Subcategory L. Finally, the incremental nutrient cost-effectiveness for nitrogen (as compared to Option 2.5) is $11 /lb total nitrogen removed and for phosphorus (as compared to Option 2.5+P) is $902 /lb total phosphorus removed. Therefore, EPA finds that Option 4 is not nutrient cost-effective for total nitrogen or total phosphorus removal and is not economically achievable.

EPA established BAT limitations for ammonia (as nitrogen) that are equivalent to the limitations it promulgated under BPT. EPA considered setting more stringent limitations for ammonia (as nitrogen) under BAT; however, the selected BAT option (Option 2.5) does not remove any additional quantity of ammonia (as nitrogen). Although Option 4 does remove some additional pounds of ammonia (as nitrogen) as compared to Option 2, EPA did not select Option 4 for BAT for the reasons discussed earlier in this section.

NSPS Requirements

For this rule, EPA used the ratio of average capital costs to average total assets to measure the potential barrier to entry due to the MPP rule. However, several non-small facilities in Subcategory L also perform operations that fall under the scope of Subcategories F through I. This complicates the analysis of the barrier to entry data. EPA estimated the ratio of costs to assets for Option 2.5, Option 2.5+P, and Option 4 for non-small poultry further processing facilities (Subcategory L). The ratios range from 0.1 percent for Option 2.5 and Option 2.5+P to 0.6 percent for Option 4. The estimates for Option 2.5+P and Option 4, however, do not reflect EPA's additional evaluation of the costs for chemical phosphorus based on comments EPA received (see DCN 300015). EPA performed an analysis using increased quantities of alum for chemical phosphorus removal for the detailed survey respondents (i.e., non-small meat and poultry slaughterers). From this additional evaluation, EPA concludes that costs for poultry slaughterers may be between 2 percent and 43 percent more per facility for chemical phosphorus removal (including increased sludge disposal) than those used in EPA's barrier to entry analysis, as discussed here. EPA was concerned that, with similar additional costs, the ratio for further processors may rise to a level that the Agency would consider to be a barrier to entry for Option 2.5+P and Option 4. Based on these results, EPA decided to establish standards for new sources equivalent to the BAT limitations based on Option 2.5 technology for total nitrogen and equivalent to BPT (based on Option 2) for ammonia (as nitrogen) and the five conventional pollutants.

13.2.6 Subcategory J (Independent Renderers)

Currently section 432.101(b) defines a renderer subject to the guidelines limitations as "an independent or off-site rendering operation ...which manufactures at rates greater than 75,000 pounds of raw material per day [or 19.5 million pounds per year based on 260 work days]." In 2002 EPA proposed to lower the production threshold to 10 million pounds per year based on a review of the available data at that time (i.e., screener survey data). EPA selected the threshold to design model facilities for use in estimating costs, pollutant loadings, non-water quality impacts, and economic impacts for the proposed rule. EPA promulgated this production threshold of 10 million pounds per year. There were no comments opposing this change in the threshold. Facilities that manufacture at rates less than or equal to 10 million pounds per year will remain out of the scope of 40 CFR part 432, while facilities above the threshold will be covered by the final regulation. EPA has not identified any additional direct discharging rendering facilities producing at rates between 10 million and 19.5 million pounds per year in its database.

For facilities in Subcategory J, EPA established limitations and standards for total nitrogen for existing and new sources. EPA did not revise the current limitations (BPT/BCT) or new source performance standards (NSPS) for conventional pollutants and did not revise the current BAT limitations or NSPS for ammonia (as nitrogen). The current regulations include production-based limitations and standards for these facilities for BOD_5, TSS, oil & grease, pH, fecal coliforms and ammonia (as nitrogen). As discussed in Section 14, the new limitations and standards are concentration-based. The following sections discuss the technology bases EPA selected for the final rule for the direct discharge facilities in Subcategory J.

BPT Requirements

EPA established BPT for Subcategory J (Renderers) in 1975, based on biological treatment (e.g., aerobic and anaerobic treatment) to control five conventional pollutants or pollutant parameters (BOD_5, TSS, oil and grease, fecal coliforms, and pH). The current limitations for ammonia (as nitrogen) for non-small meat further processors are contained in BAT and not BPT. Therefore, this section does not discuss BPT limitations for ammonia (as nitrogen). In February 2002 EPA proposed new BPT limitations for COD based on Option 2 in

an effort to better reflect current BPT treatment technology for renderers (67 FR 8630, February 25, 2002). See Section 7.3.2 for a discussion on why EPA is not establishing BPT limitations for COD in the final rule.

EPA did not propose revising BPT limitations for conventional pollutants. Therefore, EPA did not revise the conventional pollutant limitations for independent rendering facilities (Subcategory J) in the final rule and such facilities will remain subject to the BPT limitations in section 432.102.

BCT Requirements

In deciding whether to adopt more stringent limitations for BCT than BPT, EPA considered technologies that might achieve greater removals of conventional pollutants than those adopted for BPT. EPA also looked at whether those technologies are cost-reasonable under the standards established by the CWA. EPA generally refers to the decision criteria as the "BCT cost test."

EPA did not promulgate new BPT effluent limitations for conventional parameters (*i.e.*, pH, BOD_5, TSS, oil and grease, and fecal coliforms) for independent rendering facilities (Subcategory J). Therefore, when considering a technology that would achieve greater removals of conventional pollutants than adopted for BPT, EPA compared the removals achievable through implementation of the Option 2 technology (which EPA considered as the possible technology basis for BCT) to current BPT limitations. EPA estimated that Option 2 removes approximately 34,000 pounds more per year of BOD_5 compared to conventional pollutant reductions by facilities meeting or exceeding current BPT limitations. There are no additional removals of TSS, O&G, or fecal coliforms.

EPA evaluated Option 2 under the BCT cost test and it failed (see the *Economic and Environmental Benefits Analysis of the Final Meat and Poultry Products Rule* (EPA 821-R-04-010). For the final rule, EPA did not evaluate other technology options, such as Option 2 + F (Option 2 plus the addition of a filter), because they are more costly and do not remove significantly more conventional pollutants than Option 2. Therefore, if Option 2 did not pass,

these more expensive options would not pass the BCT cost test. The Agency did not identify any technologies that pass the BCT cost test and achieve greater removals of conventional pollutants than the current BPT technology. Thus, EPA did not revise the BCT limitations for these facilities. Independent rendering facilities in Subcategory J will remain subject to the current BCT limitations (which are equivalent to the current BPT limitations for conventional pollutants) in section 432.107.

BAT Requirements

EPA proposed to establish the BAT level of regulatory control for independent renderers (Subcategory J) based on Option 2 and took comment on other options in the NODA. For the final rule, EPA is basing the BAT limitations for these facilities on Option 2.5 technology and promulgated a limitation for total nitrogen on this basis. EPA did not revise the current BAT limitation for ammonia (as nitrogen).

EPA evaluated whether revising the current BAT limitation for ammonia (as nitrogen) based on Option 2, Option 2.5, Option 2.5+P, or Option 4 treatment technologies could be supported. When evaluating revision of BAT for non-conventional pollutants that are not nutrients, EPA not only considers whether the technology option is available and economically achievable, but also whether it is best. EPA typically evaluates a technology's cost-effectiveness as a factor in its decision. When considering cost-effectiveness (except for nutrients), EPA typically evaluates the additional pollutant reductions (in toxic pound-equivalents).

EPA estimated the annualized cost of each technology option under review. The approximate annualized cost of the technology options ranged from $628,000 for Option 2 to $10.2 million for Option 4 (pre-tax, 1999 dollars). Using the closure methodology, there is a slight probability (no more than 3.3 percent) that there could be one facility closure under Options 2, 2.5, and 2.5+P and one closure under Option 4. However, the average toxic cost-effectiveness numbers range from $4,100 per toxic pound-equivalent ($1981) for Option 2 to $29,000 per toxic pound-equivalent ($1981) for Option 4. These high values are due to the very minimal incremental reduction in toxic pound-equivalents (i.e., 90 toxic pound-equivalents/year for Option 2, 2.5, or 2.5+P and 205 toxic pound-equivalents/year for Option 4) and the high

incremental cost. EPA typically uses $200 per toxic pound-equivalents (in 1981 dollars) as an indication of cost-effectiveness for toxic pollutants. Therefore, EPA determined that Options 2, 2.5, 2.5+P, and 4 are a not cost-effective basis for revising current ammonia (as nitrogen) limitations for independent renderers in Subcategory J when compared with those currently being achieved.

The following section describes EPA's rationale for selecting Option 2.5 technology and rejecting Option 2.5+P and Option 4 as the basis of BAT limitations for nutrients. EPA did not consider Option 2 for control of nutrients as it is not designed to reduce total nitrogen or total phosphorus. Both the proposal and the NODA contain detailed discussions explaining why EPA rejected setting BAT limitations based on other technology (see 67 FR 8629; February 25, 2002 and 68 FR 48499; August 13, 2003). EPA did not propose Option 3 for facilities in Subcategory J based on concerns over the economic impact and nitrogen cost-effectiveness estimated for the proposed rule. However, as discussed in Section 3 of this document and the NODA (68 FR 48476; August 13, 2003), EPA incorporated a significant amount of information into its analyses since proposal. This includes surveys from independent rendering facilities and comments from a trade association representing independent rendering facilities. In light of that data and information, EPA now finds a technology option that includes some denitrification (Option 2.5) is economically achievable and nutrient cost-effective for total nitrogen for independent rendering facilities.

EPA selected Option 2.5 technology as the basis of BAT limitations for total nitrogen for total nitrogen for independent rendering facilities because it is demonstrated as available and is economically achievable. First, Option 2.5 technology has been demonstrated as available in Subcategory J as 38 percent of facilities in EPA's database use components of Option 2.5 technology (or more advanced technology).

Second, Option 2.5 is economically achievable. EPA estimated the pre-tax annualized compliance costs (in 1999 dollars) for Option 2.5 to be $2.8 million. Using the facility and company closure methodologies, EPA estimated a 1.3 percent probability of facility-level closure (i.e., at most one facility closure).

EPA also considered the cost-effectiveness of nutrient removal when evaluating BAT options for this industry segment. For Option 2.5, EPA estimated 1.5 million pounds removed per year of total nitrogen and the nutrient cost-effectiveness to be $1.92/lb of total nitrogen removed. Because Option 2.5 does not include phosphorus removal, EPA did not calculate nutrient cost-effectiveness for phosphorus for Option 2.5. EPA concludes that Option 2.5 is nutrient cost-effective for total nitrogen.

EPA considered Option 2.5+P as the basis of BAT, but rejected it for the following reasons. Option 2.5+P costs $7.4 million annually for 1.5 million pounds of total nitrogen reduction per year (i.e., the same reduction of total nitrogen as Option 2.5) and 590,000 pounds of total phosphorus reduction per year. Therefore, the average nitrogen cost-effectiveness for Option 2.5+P is $5.06/lb of total nitrogen removed and the average phosphorus cost-effectiveness is $12.59/lb of total phosphorus removed. The nutrient cost-effectiveness values for nitrogen and phosphorus exceed the benchmarks that EPA uses; therefore, EPA did not select Option 2.5+P.

EPA considered Option 4 as the basis of BAT but did not select it due to the lack of availability of the technology option, the high increase in cost compared to Option 2.5, and the poor incremental nutrient cost-effectiveness (i.e., the high cost to remove additional nutrients compared to Option 2.5+P).

Based on its database, EPA estimated that there are no facilities in this subcategory currently operating Option 4 technology. In addition, EPA estimated the pre-tax annualized compliance costs for Option 4 to be $10.2 million (1999 dollars), which is $7.4 million more than Option 2.5. EPA estimated that Option 4 removes approximately 1.7 million pounds per year of total nitrogen (200,000 more than Option 2.5) and 620,000 pounds per year of total phosphorus (30,000 more than Option 2.5+P). Using the facility and company closure methodologies, EPA estimated a 4.8 percent probability of facility-level closure (i.e., 1 facility closure). Finally, EPA estimated the incremental nutrient cost-effectiveness to be $40/lb of total nitrogen removed (compared to Option 2.5) and $85/lb of total phosphorus removed (compared to Option 2.5+P). The nutrient cost-effectiveness of Option 4 is well above the $4/lb total

nitrogen removed and $10/lb total phosphorus removed benchmarks and therefore, EPA does not consider Option 4 to be cost-effective.

NSPS Requirements

In 2002, EPA proposed to revise the current new source performance standards for independent rendering facilities in Subcategory J based on Option 2 technology. As discussed in the NODA, with the development of Option 2.5, EPA reconsidered technology basis for all subcategories (68 FR 48500; August 13, 2003). EPA selected Option 2.5 technology as the basis for BAT limitations; therefore, EPA did not consider Option 2 technology (a less stringent technology) as the basis for NSPS for the final rule. EPA estimated the ratio of costs to assets for Options 2.5, 2.5+P and Option 4. The ratios are: 0.3 percent for Option 2.5, 0.4 percent for Option 2.5+P, 0.5 percent for Option 4. The estimates for Option 2.5+P and Option 4, however, do not reflect EPA's additional evaluation of the costs for chemical phosphorus based on comments EPA received (see DCN 300,025). EPA performed an analysis using increased quantities of alum for chemical phosphorus removal for the detailed survey respondents (i.e., non-small meat and poultry slaughterers). From this additional evaluation, EPA concludes that the average costs for meat and poultry slaughterers may be between 4 and 26 percent more per facility for chemical phosphorus removal (including increased sludge disposal) than those used in EPA's barrier to entry analysis, as discussed here. EPA is concerned that, with similar additional costs, the ratio for independent renderers may rise to a level that the Agency would consider to be a barrier to entry for Option 2.5+P and Option 4.

Although this subcategory does have current NSPS, they do not include limitations for total nitrogen. Therefore, EPA established NSPS for total nitrogen based on Option 2.5 technology. EPA did not revise NSPS for ammonia (as nitrogen) or for the conventional pollutants.

SECTION 14

LIMITATIONS AND STANDARDS: DATA SELECTION AND CALCULATION

This section describes the data sources, data selection, data conventions, and statistical methodology used by EPA in calculating the long-term averages, variability factors, and limitations. The effluent limitations and standards[1] for meat and poultry subcategories and options are based on long-term average effluent values and variability factors that account for variation in treatment performance within a particular treatment technology over time.

This section only provides information for pollutants for which EPA ultimately promulgated limitations. For the Poultry Subcategories, EPA promulgated limitations for ammonia (as nitrogen (N)), biochemical oxygen demand (BOD_5), total suspended solids (TSS), oil and grease measured as hexane extractable materials (O&G (as HEM)), fecal coliforms and total nitrogen. For the Meat Subcategories, EPA promulgated limitations for ammonia (as N) and total nitrogen.

Section 14.1 gives a brief overview of data sources (a more detailed discussion is provided in Section 3) and describes EPA's evaluation and selection of facility data sets that are the basis of the final limitations. Section 14.2 provides a more detailed discussion of the selection of the data sets used as the basis for the limitations. Section 14.3 describes censoring types associated with the data. Section 14.4 describes data substitutions and exclusions. Section 14.5 presents the procedures for data aggregation. Section 14.6 provides an overview of the limitations. Sections 14.7 and 14.8 describe procedures for estimation of long-term averages, variability factors, and concentration-based limitations. Final limitations are listed in Section 14.9. The attachments for Section 14 are provided in Appendix F.

[1]In the remainder of this chapter, references to 'limitations' includes 'standards.'

14.1 OVERVIEW OF DATA SELECTION

To develop the long-term averages, variability factors, and limitations, EPA used wastewater data from facilities with components of the model technology for each subcategory and option. These data were collected from two sources: EPA's sampling episodes, herein referred to as "sampling episodes;" and industry's self-monitoring data, herein referred to as "self-monitoring episodes." EPA qualitatively reviewed the data from the sampling and self-monitoring episodes and selected episodes to represent each option based on a review of the production processes and treatment technologies in place at each facility. EPA only used data from facilities that had some or all components of the model technologies for the option (model technologies for each option are described in Section 9 of TDD).

For some facilities, EPA had data from one or more sampling episodes and/or one or more self-monitoring episodes. In general, EPA analyzed the data from each episode separately in calculating the limitations. If EPA received individual measurements (i.e., not averaged data) from a facility with a sizeable gap (e.g., one year) or data that represented a different treatment train, then each self-monitoring episode was considered separately. As an example, Episode 307 utilized the Option 2 treatment technology during 1999 while this facility used the Option 2.5 technologies beginning in 2001.[2] This approach to multiple periods data from a single facility is consistent with EPA's practice for other industrial categories. Data from different sources generally characterize different time periods, different treatment technologies, and/or different chemical analytical methods.

[2]In this section and the record, EPA has referred to the 1999 data as Episode 307a; the 2001 data as Episode 307b; the 2002-2003 data as Episode 307c; and the 2001-2003 data as Episode 307e. Similarly, for Facility 340, EPA refers to the 1999 data as Episode 340a; and the 2001-2002 data as Episode 340b. Where facilities provided daily data and monthly averages, the monthly averages are presented as the episode number followed by 'm.' For example, Episode 307m and 290m.

In developing the promulgated limitations, EPA generally used the self-monitoring data when they were measured by analytical methods specified in or approved under 40 CFR Part 136 that facilities are required to use for compliance monitoring. One exception was EPA's exclusion of some industry self-monitoring data for oil and grease. Consistent with other recently promulgated or amended effluent guidelines limitations for other point source categories,[3] EPA excluded all self-monitoring oil and grease data analyzed with methods that require freon, an ozone-depleting agent, as an extraction solvent. EPA is phasing out these freon-based methods and has approved a replacement method, Method 1664, which measures hexane extractable materials (HEM). Consequently, EPA developed the O&G (as HEM) limitations solely on the measurements from Method 1664. For TSS, EPA excluded data from one facility (290) that reported using Method 2540B, because this method measures total solids rather than TSS.

In evaluating the fecal coliforms data, EPA excluded data where the reported methods might have been measuring total rather than fecal coliforms (facilities 11, 26, 32, 290, 308, 326). EPA also excluded data from episodes where the laboratories measured fecal coliforms after the 8-hour holding times consistent with 40 CFR 136. These data were from sampling episodes at poultry facilities (6443, 6445, 6448, 6493).

First, EPA evaluated each data set to determine what technology or series of technologies the data represented. In this manner, EPA eliminated many data sets because they did not represent a technology basis considered during development of this rule. In a few instances, EPA included data from facilities that employ technologies in addition to the technology bases being considered. In these cases, EPA had data from intermediate sampling points representing the model technologies; in other words, the data EPA employed reflected application of only the technologies under consideration. Next, EPA reviewed the remaining data sets to ensure that each facility was effectively operating its technologies particularly in regards to partial denitrification. EPA also excluded treatment data from indirect discharging facilities because, in

[3]CFR Parts 420, 437, and 438

general, they are not required to treat their effluent discharges to the same levels as directly discharging facilities - particularly for conventional parameters and nutrients.

Second, EPA reviewed the remaining data on a pollutant-by-pollutant basis to determine if any data values appeared to be unreasonable and suitable for possible exclusions. For example, EPA eliminated data for a particular pollutant that were collected while a facility was experiencing exceptional incidents or upsets or pollutant data for time periods that indicate the facility was in violation of its permit. These exclusions, along with justifications, are described in detail in the next section.

14.2 EPISODE SELECTION FOR EACH SUBCATEGORY

This section describes the data selected to calculate the final limitations for each pollutant in each subcategory. Part 1 of Appendix D lists the daily data and sampling points corresponding to the episodes that represent the final technology options considered for which EPA had long-term monitoring or EPA sampling data. Attachment 14-1 in Appendix F provides summary statistics for these same episodes, sorted by subcategory and option.

14.2.1 Poultry Subcategories

For the Poultry Subcategories, EPA is promulgating conventional pollutant and ammonia (as N) limitations based on Option 2. EPA is promulgating total nitrogen limitations based on Option 2.5.

14.2.1.1 Exclusions of All Data from Episodes

For Episode 339, EPA excluded the data for all pollutants from one week (7/17-7/23/2000), because all of the effluent was directed to the recycle pond rather than being discharged. The facility indicated there was some type of plant upset that caused it not to meet their limits. Because this was not the facility's normal practice, EPA excluded the data from that time period.

For Episode 304, EPA excluded all data for all pollutants from January 1, 1999 through July 31, 1999. These data were collected during the start-up period of the treatment system and do not represent well-operated conditions.

14.2.1.2 Pollutant Specific Exclusions

The following describes data that EPA excluded for specific parameters. Unless indicated otherwise, these data were ultimately not used to determine the final limitations. Consequently, these exclusions had no effect on the final limitations. They are presented here because they are included in statistical analyses provided in record section 32 for the final rule.

Ammonia (as N)

For Episode 339, EPA excluded all ammonia (as N) data for the months of July through September of 2002 because the ammonia (as N) effluent discharges during this period at this facility were associated with enforcement period for ammonia (as N) discharges. EPA further reviewed the ammonia (as N) data from this facility and similarly excluded ammonia (as N) data that were greater than permit limit of 2.9 mg/L (May 1 to October 31) and 3.9 mg/L (November 1 to April 30).

In addition, for Episode 277, EPA excluded the ammonia (as N) value of 9.0 mg/L collected on 7/7/1999 because the value is extreme in comparison with other data from that facility (DCN333091).

BOD_5

For Episode 273, EPA excluded a BOD_5 value of 47.63 mg/L for 3/19/1999 because the value appears to be an extreme value.

Total Nitrogen

For Episode 304, EPA excluded a total nitrogen data value of 832.92 mg/L for 5/5/2003 because the value is inconsistent with other results for that facility (See DCN 333090). EPA also excluded a data value of 36.51 mg/L for 8/11/1999 because the value is smaller than the corresponding sum of the values of nitrite/nitrate and total kjeldahl nitrogen (TKN).

For Episode 307, EPA excluded the total nitrogen data value of 2934 mg/L in March of 2002 because the value was an order of magnitude greater than any other reported value, and thus, likely to be a typographic error.

14.2.2 Meat Subcategories

For the meat subcategories, EPA considered promulgating total nitrogen limitations based on Option 2.5 and ammonia (as N) limitations based on Option 2. EPA ultimately transferred limitations for these pollutants from Poultry Subcategory K (See discussion in Section 14.8.3). This section discusses the data exclusions that EPA used in evaluating the data from the meat subcategories. However, because these data were ultimately not used to determine the final limitations, these exclusions had no effect on the final limitations.

14.2.2.1 Exclusions of All Data from Episodes

There are two facilities in EPA's database for which EPA performed two separate sampling activities (i.e., once prior to proposal and once after proposal). Based on an assessment of the sampling data collected during the two different sampling episodes for both facilities, EPA concluded that the post-proposal sampling episode at each facility provides a better demonstration of the model technology, and has included only the post-proposal Episodes, 6485 and 6486, in its final database. The excluded Episodes are 6335 and 6446.

14.2.2.2 Pollutant Specific Exclusions

Ammonia (as N)

For Episode 287, EPA excluded the ammonia (as N) data from the first half of January in 1999 (1/1/1999 to 1/17/1999). Time plots of the ammonia (as N) data for this facility (DCN 333070) showed increased values during this time period and much lower values for the remainder of the year.

Similarly, for Episode 277, EPA excluded data value from 7/7/1999 because the value appears to be extreme (DCN 333091).

BOD_5

For Episode 287, EPA excluded the BOD_5 data from the first half of January in 1999 (1/1/1999 to 1/17/1999). Time plots of the BOD_5 data for this facility (DCN 333070) showed increased values during this time period and much lower values for the remainder of the year.

14.3 CENSORING TYPES ASSOCIATED WITH DATA

In its statistical analyses, EPA considered the censoring type associated with the data. EPA considered measured values to be detected. In statistical terms, the censoring type for such data was 'non-censored' (NC). Measurements reported as being less than some sample-specific detection limit (e.g., <10 mg/L) were censored and were considered to be non-detected (ND). In the tables and data listings in this document and the record for the rulemaking, EPA has used the abbreviations NC and ND to indicate the censoring types. Laboratories can also report numerical results for specific pollutants detected in the samples as "right-censored." Right-censored measurements are those that are reported as being greater than the highest calibration value of the analysis (e.g., >1000 µg/L). The next section explains EPA assumptions for the right-censored data.

The distinction between the two censoring types, NC and ND, is important because the procedure used to determine the variability factors considers censoring type explicitly. This estimation procedure modeled the facility data sets using the modified delta-lognormal distribution described in Appendix E. In this distribution, data are modeled as a mixture of two distributions.

14.4 DATA SUBSTITUTIONS AND EXCLUSIONS

In some cases, EPA did not use all of the data described in Section 14.2 in calculating the limitations. Other than the data substitutions and exclusions described in this section and Section 14.2, EPA has used the data from the episodes and sampling points presented in Appendix D.

14.4.1 Data Substitutions

EPA's data substitutions included use of different values and/or censoring assumptions. The following paragraphs describe these substitutions.

In a few data sets, facilities reported their data to have zero values. (See DCN333007) Because laboratory equipment cannot measure 'zero' values, EPA substituted higher values for purposes of the statistical analyses. Some of these reported zero values were for O&G (as HEM) and those values were substituted with the baseline level of 5 mg/L. Some other zero values were for BOD_5, ammonia (as N), and TKN in Episode 326 (EPA did not use data from this episode in calculation of final limitations) and fecal coliforms (Episodes 293 and 297, 314, 326, (EPA did not regulate fecal coliforms based on these data.) EPA substituted baseline values, as defined in Appendix A, instead of zero values.

In EPA's view, some data were more likely to have been detection limits rather than measured (or non-censored) values. With this interpretation, the data are more appropriately modeled as non-detected values in the statistical analyses. This paragraph describes the data that were affected by this interpretation. (Also see DCN 333006.) For Episode 277, 11 percent of the ammonia (as N) data were reported as measured at 0.1 mg/L which was the same value as the

detection limit associated with 61 percent of the data. In addition, for Episode 397, 31 percent of the ammonia (as N) data were reported as measured at 0.1 mg/L. Thus, EPA considered all ammonia (as N) values of 0.1 mg/L at Episodes 277 and 397 to be non-detected. For O&G (as HEM), Episode 309 reported 28 percent of its data to be measured values of 5.1 mg/L. EPA assumed that these values resulted from adjusting the minimum level for slightly smaller sample sizes that required by the analytical method, and thus, assumed that the values were non-detected in its statistical analyses. For TSS, Episode 328 reported 21 percent of its data to be measured at 4 mg/L, which was the same value as the detection limit associated with 21 percent of the data. Thus, EPA assumed that all TSS values of 4 mg/L at Episode 328 were non-detected.

On the other hand, EPA assumed that some data that were reported as non-detected were measured (or non-censored values) for purposes of the statistical analyses. These values were for total nitrogen from Episode 304 (See DCN 3333006.) For measurements of total nitrogen, Episode 304 reported some data as being less than ('<') some value. In this case, the total nitrogen values were the sum of TKN and nitrate/nitrite. EPA suspects that the facility used this convention when the TKN value was measured below detection and the nitrate/nitrite was reported at a value substantially above the nominal quantitation limit. In such cases, the TKN would have been a very small fraction of the total nitrogen value. For this reason, EPA considered it was more appropriate to consider such total nitrogen values to be non-censored for purposes of its statistical analyses.

14.4.2 Data Exclusions

In addition to the data exclusions as part of the engineering reviews as described in Sections 14.1 and 14.2, EPA excluded some data from the statistical analyses.

EPA excluded right-censored data in the self-monitoring episodes from its calculations. Right-censored measurements are those that are reported as being greater than the highest calibration value of the analysis (e.g., >1000 µg/L). Episode 334 reported four right-censored values for BOD_5 and fecal coliforms. Those data points were excluded from the analysis as they

happened during a short time period and indicated some abnormal situation at the facility. EPA also had some right-censored data from the sampling episodes. None of the right-censored data were in the episode data sets selected as the basis for the final limitations. In its preliminary evaluations of the sampling episode data, EPA assumed that right-censored values were non-censored.

14.5 DATA AGGREGATION

In some cases, EPA determined that two or more samples had to be mathematically aggregated, or averaged, to obtain a single value that could be used in other calculations. In some cases, this meant that field duplicates and grab samples were aggregated for a single sampling point. Appendix D lists the data after these aggregations were completed and a single daily value was obtained for each day for each pollutant. See DCN 330001 for a listing of the data before aggregation.

Because each aggregated data value entered into the modified delta-lognormal model as a single value, the censoring type associated with that value was also important. In many cases, a single aggregated value was created from unaggregated data that were all either detected or non-detected. In the remaining cases with a mixture of detected and non-detected unaggregated values, EPA determined that the resulting aggregated value should be considered to be detected because the pollutant was measured at detectable levels.

This section describes each of the different aggregation procedures. They are presented in the order that the aggregation was performed. That is, field duplicates were aggregated first and grab samples second.

14.5.1 Aggregation of Field Duplicates

During the EPA sampling episodes, EPA collected a small number of field duplicates. Generally, ten percent of the number of samples collected were duplicated. Field duplicates are two samples collected for the same sampling point at approximately the same time, assigned different sample numbers, and flagged as duplicates for a single sampling point at a facility.

Because the analytical data from each duplicate pair characterize the same conditions at that time at a single sampling point, EPA aggregated the data to obtain one data value for those conditions. The data value associated with those conditions was the arithmetic average of the duplicate pair.

In most cases, both duplicates in a pair had the same censoring type. In these cases, the censoring type of the aggregate was the same as the duplicates. In the remaining cases, one duplicate was a non-censored value and the other duplicate was a non-detected value. In these cases, EPA determined that the appropriate censoring type of the aggregate was 'non-censored' because the pollutant had been present in one sample. (Even if the other duplicate had a zero value[4], the pollutant still would have been present if the samples had been physically combined.) Table 14-1 summarizes the procedure for aggregating the analytical results from the field duplicates. This aggregation step for the duplicate pairs was the first step in the aggregation procedures for both influent and effluent measurements.

Table 14-1. Aggregation of Field Duplicates

If the field duplicates are:	Censoring type of average is:	Value of aggregate is:	Formulas for aggregate value of duplicates:
Both non-censored	NC	arithmetic average of measured values	$(NC_1 + NC_2)/2$
Both non-detected	ND	arithmetic average of sample-specific detection limits	$(DL_1 + DL_2)/2$

[4]This is presented as a 'worst-case' scenario. In practice, the laboratories cannot measure 'zero' values. Rather they report that the value is less than some level (see Section 4).

Table 14-1. Aggregation of Field Duplicates (Continued)

If the field duplicates are:	Censoring type of average is:	Value of aggregate is:	Formulas for aggregate value of duplicates:
Both non-detected	ND	arithmetic average of sample-specific detection limits	$(DL_1 + DL_2)/2$

NC - non-censored (or detected).
ND - non-detected.
DL - sample-specific detection limit.

14.5.2 Aggregation of Grab Samples

During the EPA sampling episodes, EPA collected two types of samples: grab and composite. Typically, EPA collected composite samples. Of the pollutants promulgated for regulation, O&G (as HEM) was the only one for which the chemical analytical method specifies that grab samples must be used. EPA collected multiple (usually four) grab samples during a sampling day at a sampling point. To obtain one value characterizing the pollutant levels at the sampling point on a single day, EPA mathematically aggregated the measurements from the grab samples.

The procedure arithmetically averaged the measurements to obtain a single value for the day. When one or more measurements were non-censored, EPA determined that the appropriate censoring type of the aggregate was 'non-censored' because the pollutant was present. Table 14-2 summarizes the procedure.

Table 14-2. Aggregation of Grab Samples

If the grab or multiple samples are:	Censoring type of Daily Value is:	Daily value is:	Formulas for Calculating Daily Value:
All non-censored	NC	arithmetic average of measured values	$\frac{\sum_{i=1}^{n} NC_i}{n}$
All non-detected	ND	arithmetic average of sample-specific detection limits	$\frac{\sum_{i=1}^{n} DL_i}{n}$

Table 14-2. Aggregation of Grab Samples (Continued)

If the grab or multiple samples are:	Censoring type of Daily Value is:	Daily value is:	Formulas for Calculating Daily Value:
Mixture of non-censored and non-detected values (total number of observations is n=k+m)	NC	arithmetic average of measured values and sample-specific detection limits	$\frac{\sum_{i=1}^{k} NC_i + \sum_{i=1}^{m} DL_i}{n}$

NC - non-censored (or detected).
ND - non-detected.
DL - sample-specific detection limit.

14.6 OVERVIEW OF LIMITATIONS

The preceding sections discuss the data selected as the basis for the limitations and the data aggregation procedures EPA used to obtain daily values in its calculations. This section provides a general overview of limitations before returning to the development of the limitations for the MPP industry. This section describes EPA's objective for daily maximum and monthly average limitations, the selection of percentiles for those limitations, and compliance with final limitations. EPA has included this discussion in Section 14 because these fundamental concepts are often the subject of comments on EPA's effluent guidelines regulations and in EPA's contacts and correspondence with the MPP industry.

14.6.1 Objective

In establishing daily maximum limitations, EPA's objective is to restrict the discharges on a daily basis to a level that is achievable for a facility that targets its treatment at the long-term average. EPA acknowledges that variability around the long-term average results from normal operations. This variability means that occasionally facilities may discharge at a level that is greater than or lower than the long-term average. This variability also means that facilities may occasionally discharge at a level that is considerably lower than the long-term average. To allow for these possibly higher daily discharges, EPA has established the daily maximum limitation. A facility that discharges consistently at a level near the daily maximum limitation would <u>not</u> be operating its treatment system to achieve the long-term average, which is part of EPA's objective

in establishing the daily maximum limitations. That is, targeting treatment to achieve the limitations may result in frequent values exceeding the limitations due to routine variability in treated effluent.

In establishing monthly average limitations, EPA's objective is to provide an additional restriction to help ensure that facilities target their average discharges to achieve the long-term average. The monthly average limitation requires continuous dischargers to provide on-going control, on a monthly basis, that complements controls imposed by the daily maximum limitation. In order to meet the monthly average limitation, a facility must counterbalance a value near the daily maximum limitation with one or more values well below the daily maximum limitation. To achieve compliance, these values must result in a monthly average value at or below the monthly average limitation.

In estimating the limitations, EPA first determines an average performance level (the "option long-term average") that a facility with well-designed and operated model technologies (that reflect the appropriate level of control) is capable of achieving. This long-term average is calculated from the data from the facilities using the model technologies for the option. EPA expects that all facilities subject to the final limitations will design and operate their treatment systems to achieve the long-term average performance level on a consistent basis because facilities with well-designed and operated model technologies have demonstrated that this can be done.

Next, EPA determines an allowance for the variation in pollutant concentrations when wastewater is processed through extensive and well-designed treatment systems. This allowance incorporates all components of variability, including shipping, sampling, storage, and analytical variability. This allowance is incorporated into the limitations through the use of the variability factors that EPA calculated from the data from the facilities using the model technologies. If a facility operates its treatment system to achieve the relevant option long-term average, EPA expects the facility will be able to comply with the limitations. Variability factors assure that

normal fluctuations in a facility's treatment are accounted for in the limitations. By accounting for these reasonable excursions above the long-term average, EPA's use of variability factors results in limitations that are generally well above the actual long-term averages.

EPA calculates the percentile used as a basis for the daily maximum limitation using the product of the long-term average and the daily variability factor. EPA also calculates the percentile used as a basis for the monthly average limitation using the product of the long-term average and the monthly variability factor. The following subsection describes EPA's rationale for selecting the certain percentiles as the basis for the limitations.

14.6.2 Selection of Percentiles

EPA calculates limitations based upon percentiles chosen, on one hand, to be high enough to accommodate reasonably anticipated variability within control of the facility and, on the other hand, to be low enough to reflect a level of performance consistent with the Clean Water Act requirement that these effluent limitations be based on the "best" technologies. The daily maximum limitation is an estimate of the 99th percentile of the distribution of the *daily* measurements. The monthly average limitation is an estimate of the 95th percentile of the distribution of the *monthly* averages of the daily measurements.

The 99th and 95th percentiles do not relate to, or specify, the percentage of time a discharger operating the "best available" or "best available demonstrated" level of technology will meet (or not meet) the daily maximum and monthly average limitations. Rather, EPA used these percentiles in developing the limitations. If a facility is designed and operated to achieve the long-term average on a consistent basis and the facility maintains adequate control of its processes and treatment systems, the allowance for variability provided in the limitations is sufficient for the facility to meet the requirements of the rule. EPA used 99 percent and 95 percent to draw a line at a definite point in each statistical distributions (100 percent is not feasible because it represents an infinitely large value) while setting the percentile at a level that would ensure that operators work hard to establish and maintain the appropriate level of control.

By targeting its treatment at the long-term average, a well-operated facility would be able to comply with the limitations at all times because EPA has incorporated an appropriate allowance for variability into the limitations.

In conjunction with the statistical methods, EPA performs an engineering review to verify that the limitations are reasonable based upon the design and expected operation of the control technologies and the facility process conditions. As part of that review, EPA examines the range of performance by the facility data sets used to calculate the limitations. Some facility data sets demonstrate the best available technology. Other facility data sets may demonstrate the same technology, but not the best demonstrated design and operating conditions for that technology. For these facilities, EPA will evaluate the degree to which the facility can upgrade its design, operating, and maintenance conditions to meet the limitations. If such upgrades are not possible, then EPA will modify the limitations to reflect the lowest levels that the technologies can reasonably be expected to achieve.

14.6.3 Compliance with Limitations

EPA promulgates limitations with which facilities can comply at all times by properly operating and maintaining their processes and treatment technologies. EPA uses a percentile of a statistical distribution in developing the daily maximum limitation and the monthly average limitation because statistical methods provide a logical and consistent framework for analyzing a set of effluent data and determining values from the data that form a reasonable basis for effluent limitations. EPA establishes the limitations on the basis of percentiles estimated using data from facilities with well-operated and controlled processes and treatment systems. However, because EPA uses a percentile basis, the issue of exceedances (i.e., values that exceed the limitations) or excursions is often raised in public comments on limitations. For example, comments often suggest that EPA include a provision that allows a facility to be considered in compliance with permit limitations if its discharge exceeds the daily average limitations one day out of 100 and the monthly average discharge exceeds the monthly average limitation one month out of 20. This

issue was, in fact, raised in other rules, including EPA's final Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) rulemaking. EPA's general approach there for developing limitations based on percentiles is the same in this rule, and was upheld in *Chemical Manufacturers Association v. U.S. Environmental Protection Agency*, 870 F.2d 177, 230 (5th Cir. 1989). The Court determined that:

> EPA reasonably concluded that the data points exceeding the 99th and 95th percentiles represent either quality-control problems or upsets because there can be no other explanation for these isolated and extremely high discharges. If these data points result from quality-control problems, the exceedances they represent are within the control of the plant. If, however, the data points represent exceedances beyond the control of the industry, the upset defense is available.
> *Id*. at 230.

More recently, this issue was raised in EPA's Phase I rule for the pulp and paper industry. In that rulemaking, EPA used the same general approach for developing limitations based on percentiles that it had used for the OCPSF rulemaking and for today's rule. This approach for the monthly average limitation was upheld in *National Wildlife Federation, et al v. Environmental Protection Agency*, 286 F.3d 554 (D.C. Cir. 2002). The Court determined that:

> EPA's approach to developing monthly limitations was reasonable. It established limitations based on percentiles achieved by facilities using well-operated and controlled processes and treatment systems. It is therefore reasonable for EPA to conclude that measurements above the limitations are due to either upset conditions or deficiencies in process and treatment system maintenance and operation. EPA has included an affirmative defense that is available to mills that exceed limitations due to an unforeseen event. EPA reasonably concluded that other exceedances

> would be the result of design or operational deficiencies. EPA rejected Industry Petitioners' claim that facilities are expected to operate processes and treatment systems so as to violate the limitations at some pre-set rate. EPA explained that the statistical methodology was used as a framework to establish the limitations based on percentiles. These limitations were never intended to have the rigid probabilistic interpretation that Industry Petitioners have adopted. Therefore, we reject Industry Petitioners' challenge to the effluent limitations.

As that Court recognized, EPA's allowance for reasonably anticipated variability in its effluent limitations, coupled with the availability of the upset defense, reasonably accommodates acceptable excursions. Any further excursion allowances would go beyond the reasonable accommodation of variability and would jeopardize the effective control of pollutant discharges on a consistent basis and/or bog down administrative and enforcement proceedings in detailed fact-finding exercises, contrary to Congressional intent. See, as an example, Rep. No. 92-414, 92d Congress, 2d Sess. 64, *reprinted in* A Legislative History of the Water Pollution Control Act Amendments of 1972 at 1482; Legislative History of the Clean Water Act of 1977 at 464-65.

EPA expects that facilities will comply with promulgated limitations *at all times*. If the exceedance is caused by an upset condition, the facility would have an affirmative defense to an enforcement action if the requirements of 40 CFR 122.41(n) are met. If an exceedance is caused by a design or operational deficiency, then EPA has determined that the facility's performance does not represent the appropriate level of control. For promulgated limitations, EPA has determined that such exceedances can be controlled by diligent process and wastewater treatment system operational practices such as frequent inspection and repair of equipment, use of back-up systems, and operator training and performance evaluations.

EPA recognizes that, as a result of the rule, some dischargers may need to improve treatment systems, process controls, and/or treatment system operations in order to consistently

meet the effluent limitations. EPA believes that this consequence is consistent with the Clean Water Act statutory framework, which requires that discharge limitations reflect the best technology.

14.7 SUMMARY OF THE LIMITATIONS

The limitations for pollutants for each option are provided as 'daily maximums' and 'maximums for monthly averages' (except for pH). Definitions provided in 40 CFR 122.2 state that the daily maximum limitation is the "highest allowable 'daily discharge'" and the maximum for monthly average limitation (also referred to as the "average monthly discharge limitation") is the "highest allowable average of 'daily discharges' over a calendar month, calculated as the sum of all 'daily discharges' measured during a calendar month divided by the number of 'daily discharges' measured during that month." Daily discharges are defined to be the "'discharge of a pollutant' measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling." For the MPP rule, EPA has calculated daily maximum and monthly average limitations expressed in terms of allowable pollutant discharge in concentration-based units of milligrams per liter (mg/L).

14.8 ESTIMATION OF LIMITATIONS

This section discusses the calculation of the daily maximum and monthly average limitations. In the tables provided in this section, either the mean or long-term average is provided. If the column is labeled 'mean', then the arithmetic average is presented. The column labeled 'LTA' presents the long-term average which was calculated following the procedures in Appendix E.

14.8.1 Episode Long-Term Averages and Variability Factors

For each episode data set that contained individual daily measurements (e.g., monitored daily or weekly) EPA calculated the episode long-term average (LTA) and daily variability factor (VF) by using the modified delta-lognormal distribution (see Appendix E). In the following

discussion, these are considered to be based on the statistical model. Attachment 14-2 in Appendix F provides the episode long-term average and variability factors for all pollutants of concern for all options.

For the regulated pollutants, where appropriate, EPA has incorporated autocorrelation into the estimates from the data sets containing individual daily measurements. (See Attachment 14-3 in Appendix F for changes of the LTA and VF before and after incorporation, DCN 333050 for evaluation methodology). When data are said to be positively autocorrelated, it means that measurements taken at specific time intervals (such as 1 day or 2 weeks apart) are related. To determine if autocorrelation exists in the data, a statistical evaluation is required using many measurements for equally spaced intervals over an extended period of time. Where such data were available for the final rule, EPA performed a statistical evaluation of autocorrelation and if necessary provided adjustments to the limitations as explained in DCN 333050. As a result of its evaluation of autocorrelation, EPA determined that adjustments should be incorporated into the limitations for total nitrogen, ammonia (as N), BOD_5, and TSS for both the Meat and Poultry subcategories. EPA was only able to evaluate the autocorrelation in some data sets selected as the basis for the limitations for those pollutants. Where a data set was insufficient for purposes of evaluating autocorrelation, EPA transferred the values it used in the adjustment ("rho values") as shown in Attachments 14-3 in Appendix F. These autocorrelation adjustments resulted in higher limitations for pollutants for which adjustment was performed. Appendix E explains autocorrelation and the adjustments for these limitations in further detail. DCN 333050 describes EPA's evaluation of autocorrelation in the episode data sets.

For other episode data sets that contained monthly averages (listed in Part 2 of Appendix D), EPA calculated the mean of those values using the arithmetic average. In the final rule, EPA has included these monthly averages in developing the option LTA used as the basis for the limitation. EPA determined that it was appropriate to include these averages, so the limitations would be based upon a broader section of the industry.

14.8.2 Limitations

For each regulated pollutant, this section explains the selection process and method that EPA used to calculate each of the promulgated limits.

14.8.2.1 Poultry Subcategory, K

EPA promulgated limitations for ammonia (as N), BOD_5, O&G (as HEM), TSS, total nitrogen, and fecal coliforms for the Poultry Subcategory K. The basis of these limitations is discussed below.

BOD_5 and TSS

To develop the final limitations for BOD_5 and TSS for the Poultry Subcategory K, EPA first determined the median of the BOD_5 and TSS effluent mean concentrations of all of the poultry facilities in its database that utilize Option 2 or Option 2.5 technologies. In order to respond to comments, EPA eliminated all Option 2 and Option 2.5 facilities with a filter or chemical phosphorus removal from the analysis. The Option 2 and Option 2.5 technologies are the same except that Option 2.5 technology also includes partial denitrification. For this calculation, EPA combined the data from facilities using either option because EPA does not want to interfere with denitrification (which is required to achieve BAT limits for total nitrogen) and the data indicate that effluent discharges of BOD_5 and TSS are sometimes higher at facilities that employ partial denitrification. Table 14-3 provides information on the facilities and BOD_5 and TSS effluent mean concentrations used to calculate the median BOD_5 and TSS effluent concentrations. Based on comments that EPA should use all of the data available to it, EPA used its full effluent database for Option 2 and 2.5 facilities (i.e., including data from facilities that only provided data reported as summarized monthly averages) to select a model facility for use in developing the BOD_5 and TSS option LTAs for the final rule. This ensures that facilities operating the selected technology would be able to achieve the limitations of the final rule (including the BAT limitations for total nitrogen).

Table 14-3. Data Used to Determine the Median of BOD_5 and TSS Mean Effluent Concentrations from Treatment with Option 2 or Option 2.5 Technologies[a]

Facility Number	Treatment Option	Mean BOD_5 Effluent Concentration[a] mg/L	Mean TSS Effluent Concentration[a] mg/L
11	2.5	N/A	12.8
22	2	N/A	15.65
26	2.5	N/A	13.9
27	2	13.02	N/A
32	2.5	N/A	4.98
39	2	5.30	6.00
42	2	7.82	8.34
45	2.5	1.77	4.17
133	2	7.00	31.50
291	2	3.77	5.57
300	2.5	19.40	22.90
307a	2	7.87	10.1
309	2	Exceeds Permit Limit	11.1
312	2	3.51	8.94

[a] For facilities in EPA's BAT database, these values reflect the final values after data exclusions.

N/A - Not Available

Using the information in Table 14-3, EPA determined that the median BOD_5 and TSS effluent mean concentrations for all poultry facilities in EPA's database employing the Option 2 or Option 2.5 technologies are 7.0 mg/L and 10.1 mg/L, respectively. However, for purposes of calculating the option LTA and VFs for use in developing limitations for the final rule, EPA is limited to using only those episodes with individual data points (i.e. unsummarized daily/weekly monitoring or EPA's 3-5 day sampling episodes.) For TSS, the facility with its mean closest to 7.0 mg/L (Episode 307a) did provide individual data, so EPA used this data to develop the LTAs and VFs for the final limitations. For BOD_5, the facility with the median of means (Episode 133)

did not provide individual data points (only summarized monthly average data), therefore, EPA selected the facility whose mean was closest to the median value but that also provided individual data. For BOD_5, this facility is again Episode 307a, so EPA used this data to develop the option LTAs and VFs for the final limitations.

Because LTAs for most episode data sets are calculated from the statistical model, they are not necessarily the same as arithmetic averages of the data. EPA notes that LTAs for BOD_5 and TSS for facility 307a are just slightly higher than the mean concentrations provided in Table 14-3 (i.e. the BOD_5 option LTA = 7.98 mg/L and the TSS option LTA = 10.2 mg/L.) Using the methodology described in Appendix E and multiplying the LTA by the VFs for facility 307a, the BOD_5 daily maximum limit is 7.98 mg/L x 3.25 = 26 mg/L and the monthly average limitation is 7.98 mg/L x 1.96 = 16 mg/L. The TSS daily maximum limitation is 10.2 mg/L x 2.94 = 30 mg/L and the monthly average limitation is 10.2 x 1.87 = 20 mg/L. These limit numbers have all been rounded up to the nearest integer.

O&G (as HEM)

As explained above for BOD_5 and TSS, EPA selected Episode 307a as the model facility for the BOD_5 and TSS parameter limitations in the Poultry Subcategory K. EPA is unable to base the O&G (as HEM) limitations on data from Episode 307a because EPA's database does not contain any O&G (as HEM) data for Facility 307a.

Thus, to develop the final limitations for O&G (as HEM), as was done for BOD_5 and TSS, for the Poultry Subcategory K, EPA first determined the median of the O&G (as HEM) effluent LTA concentrations of all of the poultry facilities in its database that utilize Option 2 or Option 2.5 technologies. In response to comments, EPA eliminated all Option 2 and Option 2.5 facilities with a filter or chemical phosphorus removal from the analysis. The Option 2 and Option 2.5 technologies are the same except that Option 2.5 also includes partial denitrification. However, EPA found that no Option 2 facilities had any O&G (as HEM) data, so was left with only Option 2.5 facilities. Since EPA has no basis to conclude that this additional step would have any effect

on the O&G (as HEM) effluent concentrations, EPA concluded that it is appropriate to calculate the O&G (as HEM) limitations for the Poultry Subcategory K from Option 2.5. Table 14-4 provides information on the facilities and O&G (as HEM) effluent discharges used to calculate the median of the O&G (as HEM) effluent LTA concentrations. Based on comments that EPA should use all of the data available to it, EPA used its full effluent database for options 2 and 2.5 facilities (i.e., including data from facilities that only provided data reported as summarized monthly averages) to calculate the O&G (as HEM) LTAs and limitations for the final rule. This ensures that facilities operating the selected technology would be able to achieve the limitations of the final rule.

Table 14-4. Data Used to Establish O&G (as HEM) Limitations in the Poultry Subcategory K[a]

Episode Number	LTA, mg/L	1-Day VF	4-Day VF	Daily Max Limit, mg/L	Monthly Average Limit, mg/L
11	5.75	1.93	1.23		
26	6.21	2.51	1.37		
32	6.13	2.12	1.29		
6448	5.93	[b]	[b]		
312	[c]	[c]	[c]		
Final Limitation	6.03	2.19	1.30	13.2	7.8

[a] Limits are calculated as product of median LTA and mean VF.

[b] EPA is unable to calculate VFs for data sets that contain only a single non-censored value.

[c] Although this facility provided EPA with some summary effluent data, the data included boiler blowdown wastewater and is therefore not representative of poultry process wastewaters alone.

First, EPA calculated the option LTA for O&G (as HEM) as the *median* of the episode-specific LTAs. The median is the midpoint of the values ordered (i.e., ranked) from smallest to largest. For example, for O&G (as HEM), when the four episode LTAs are ordered, this midpoint value is 6.03 mg/L.

Second, EPA selected the option daily VF. After calculating the episode-specific VFs, EPA calculated the option daily VF as the mean of the episode-specific daily VFs for that pollutant in the subcategory and option. Likewise, the option monthly VF was the mean of the episode-specific monthly VFs for that pollutant in the subcategory and option. In this case, the option daily VF and the monthly VFs are 2.19 and 1.30, respectively.

Ammonia as N

Similar to the manner in which EPA selected Episode 307a to calculate the BOD_5 and TSS limitations, EPA first determined the median of the ammonia (as N) effluent mean concentrations of all the poultry facilities in its database that utilize the Option 2.5 technologies. In order to respond to comments, EPA eliminated all Option 2.5 facilities with a filter or chemical phosphorus removal. The Option 2 and Option 2.5 technologies are the same except that Option 2.5 also includes partial denitrification. For this evaluation, EPA used only the data from facilities using Option 2.5 because EPA does not want to discourage denitrification and the data indicate that effluent discharges of ammonia (as N) are sometimes higher from facilities that employ partial denitrification. Table 14-5 provides information on the facilities and ammonia (as N) effluent discharges used to calculate the median of the ammonia (as N) effluent mean concentrations. Based on comments that EPA should use all of the data available to it, EPA used its full effluent database for Option 2.5 facilities (i.e., including data from facilities that only provided data reported as summarized monthly averages) to select a model facility for use in developing the ammonia (as N) option LTA for the final rule. This ensures that facilities operating the selected technology would be able to achieve the limitations of the final rule (including the BAT limitations for total nitrogen).

Table 14-5. Mean Ammonia (as N) Effluent Concentration Data from Treatment with Option 2 or Option 2.5 Technologies[a]

Facility Number[b]	Treatment Option	Mean Ammonia (as N) Effluent Concentration[a] mg/L
11	2.5	2.2
22	2	0.36
26	2.5	1.4
27	2	2.2
32	2.5	0.69
39	2	0.60
42	2	0.38
45	2.5	0.17
133	2	2.0
291	2	0.89
300	2.5	2.5
307a	2	0.303
307c	2.5	0.36
309	2	0.66

[a] For facilities in EPA's model facility database, these values reflect the final values after data exclusions.

[b] EPA also has data for EPA sampling Episode 6448. EPA did not include Episode 6448 in this table because its ammonia (as N) effluent concentration is already accounted for by Episode 307e. This is because the data for Episode 307e encompass the time period of Sampling Episode 6448.

First, EPA calculated the option LTA for ammonia (as N) as the *median* of the episode-specific effluent mean concentrations. The median is the midpoint of the values ordered (i.e., ranked) from smallest to largest. Using the information in Table 14-5, EPA determined that the median ammonia (as N) effluent mean concentration for all poultry facilities in EPA's database employing the Option 2.5 technologies is 1.05 mg/L. However, for purposes of calculating the option LTA and VFs for use in developing limitations for the final rule, EPA is limited to using

only those episodes with individual data points (i.e. unsummarized daily/weekly monitoring or EPA's 3-5 day sampling episodes.) EPA selected the facility whose LTA was the closest to the median but that also provided individual data. Table 14-6 presents the episode data that could be used to develop limitations for the final rule. For ammonia (as N), the episode with an LTA closest to 1.05 mg/L for ammonia (as N) is Episode 26, so EPA used this episode data set to develop the LTAs and VFs for the final limitations. The ammonia (as N) daily maximum limitation is 5.9 mg/L (1.1 mg/L x 5.37) and the monthly average limitation is 2.81 mg/L (1.1 mg/L x 2.55).

Table 14-6. Data Used to Establish the Ammonia (as N) Limitations in the Poultry Subcategory K[a]

Episode Number	Option	LTA, mg/L	1-Day VF	4-Day VF
11	2.5	1.93	7.69	3.08
26	2.5	1.1	5.37	2.55
32	2.5	.69	2.46	1.66
45	2.5	.153	4.57	2.33
291	2	0.82	7.68	3.08
307a	2.	.303	5.02	2.40
307e	2.5	.36	5.83	2.0
309	2	0.56	7.49	3.16
6448	2.5	1.28	1.69	1.21

However, EPA received comments about the seasonal variability of ammonia (as N). In order to address these comments, EPA summarized all of the information for poultry facilities with ammonia (as N) permit limits in its database. For each facility that had tiered limits based on the time of the year, EPA compared the highest value to the lowest value. Tables 14-7 shows this comparison.

Table 14-7. Comparison of Winter and Summer Ammonia (as N) Permit Limitations for Poultry Facilities

Episode Number	Ammonia (as N) Daily Maximum Limit, mg/L		Ammonia (as N) Monthly Average Limit, mg/L	
	Winter High	Summer Low	Winter High	Summer Low
20	14	8	9	5
26	39	29	26	19
27	30	7.5	20	5
291	4	2.4	2.7	1.6
297	12	8	8	5
307	2.7	1.3	1.7	0.7
310	11	7.5	5.5	5
314	18	5	12	3
339	3.9	2.9	1.2	0.9

For each facility and each type of limit, EPA calculated the ratio between the winter high permit limit and mean of the winter and summer permit limit. EPA found that the average of these ratios was 1.30 for both the daily maximum permit limits and the monthly average permit limits.

Therefore, in order to account for seasonal variability, EPA calculated the final ammonia (as N) limits by multiplying the daily maximum and monthly average limitations determined previously by the average of the ratio determined above. The ammonia (as N) daily maximum and monthly average limitations are 8 mg/L (5.9 x 1.3) and 4 mg/L (2.8 x 1.3), respectively. These limit numbers have all been rounded up to the nearest integer.

Total Nitrogen

EPA conducted a thorough evaluation of all poultry subcategory facilities as possible BAT facilities to calculate total nitrogen limitations. This evaluation is discussed thoroughly in

DCN 300001 and is summarized as follows. First, EPA eliminated all facilities that do not employ the Option 2.5 technologies. This Option includes partial denitrification. Next, EPA eliminated all facilities that did not provide total nitrogen effluent data (or both TKN and nitrate/nitrite) or only provided summary data. EPA eliminated facilities that only provided summary data because daily variability cannot be determined from summary data. Next, EPA carefully reviewed the remaining facilities and eliminated some facilities because they were not operating their technology consistent with the BAT definition of partial denitrification. One facility was eliminated because it additionally treated tannery wastewater which is not subject to this rule. As a result of this evaluation, EPA concluded that data from two facilities could be used to establish the total nitrogen limitations. These Episodes are 307c and 339.

Table 14-8 provides information on the facilities and total nitrogen effluent discharges used to calculate the total nitrogen limitations.

Table 14-8. Data Used to Establish the Total Nitrogen Limitations in the Poultry Subcategory K[a]

Episode Number	LTA, mg/L	1-Day VF	4-Day VF
307c	55.5	2.79	1.93
339	35.5	2.35	1.66

First, EPA calculated the option LTA for total nitrogen as the *median* of the episode-specific LTAs. The median is the midpoint of the values ordered (i.e., ranked) from smallest to largest. For total nitrogen, this midpoint value is 45.5 mg/L.

Second, EPA selected the option daily VF. After calculating the episode-specific VFs, EPA calculated the option daily VF as the mean of the episode-specific daily VFs for that pollutant in the subcategory and option. Likewise, the option monthly VF was the mean of the episode-specific monthly VFs for that pollutant in the subcategory and option. In this case, the option daily VF and the monthly VFs are 2.57 and 1.795 respectively.

The total nitrogen daily maximum limit is 117 mg/L (45.5 mg/L x 2.57) and the monthly average limitation is 82 g/L (45.5 mg/L x 1.79).

However, EPA received comments that both Episode 307c and 339 have excess detention times in their anoxic basins. Therefore, EPA identified and used an additional factor to ultimately calculate the final total nitrogen limitations. This factor was related to the consideration of several variables, including the anoxic basin, BOD_5/TKN ratio, and influent total nitrogen variability and increased the effluent total nitrogen limits by 25 percent (DCN 300017). Therefore, the final total nitrogen limitations for Subcategory K are 147 mg/L and 103 mg/L for the daily maximum and monthly average limitations, respectively. These numbers have been rounded up to the nearest integer.

Fecal Coliforms

During EPA sampling episodes, EPA collected and analyzed for fecal coliforms. However, when EPA conducted this sampling, it exceeded the holding time specified for analysis for many samples. Subsequent analyses indicated that exceeding holding times could affect the results. (DCN 165310) Therefore, EPA proposed to establish fecal coliforms limitations for the Poultry Subcategory K equivalent to the existing limitations/standards for the Meat Subcategories (i.e., 400 MPN per 100 mL at any time). For the final rule, EPA has concluded this transfer is appropriate because EPA determined this level is achievable by the poultry facilities.

14.8.2.2 Poultry Further Processing Subcategory, Subcategory L

EPA promulgated limitations for ammonia (as N), BOD_5, O&G (as HEM), TSS, total nitrogen, and fecal coliforms for the Poultry Further Processing Subcategory L. EPA transferred all of these limitations from the Poultry Subcategory K.

In general, EPA sought to transfer data from first processors to further processors due to the lack of available effluent data for further processing facilities. With the available data, EPA

performed a comparison of influent from the two subcategories. EPA found the wastewater charateristics to be comparable. Therefore, EPA concludes this transfer is reasonable.

14.8.3 Meat Subcategories

EPA promulgated limitations for ammonia (as N) and total nitrogen for the Meat Subcategories. Ammonia (as N) and total nitrogen limitations were transferred from the Poultry Subcategory. Each of these transfers is discussed below.

Total Nitrogen

EPA did not identify any meat facilities that were operating the BAT Option 2.5 technology as defined in the final regulation and that were able to provide total nitrogen (or TKN and nitrate/nitrite) data for their effluent. Consequently, EPA evaluated the appropriateness of transferring the poultry total nitrogen limitations to these subcategories. EPA performed a comparison of the wastewater characteristics and wastewater treatment kinetics of poultry and meat facilities. EPA found that with the exception of higher influent TKN concentrations at meat facilities, the wastewaters concentrations are very similar. In order to account for the higher TKN concentrations, EPA transferred the LTA and VFs from the poultry BAT Option 2.5 facility with the influent TKN concentration that is most comparable to the average meat facility influent TKN concentration (i.e., Episode 307, 2002-2003 data only). Data for this facility has been provided above in Table 14-8.

In addition, for the same reasons explained in the discussion for the total nitrogen limitation in the Poultry Processing subcategory, EPA identified and used an additional factor to ultimately calculate the final total nitrogen limitations for the Meat Subcategories. This factor was related to the consideration of several variables, including the anoxic basin, BOD_5/TKN ratio, and influent total nitrogen variability and increased the effluent total nitrogen limits by 25 percent (DCN300017). The resulting limitations are 194 mg/L and 134 mg/L for the daily maximum and monthly average limitations, respectively.

Ammonia as N

As explained above, EPA performed a comparison of the wastewater characteristics and wastewater treatment kinetics of poultry and meat facilities. EPA found that with the exception of higher influent TKN concentrations at meat facilities, the wastewaters concentrations are very similar. In addition, EPA found that due to the nature of the design of biological treatment systems, the wastewaters were similar in treatability. Since the general wastewater characteristics of meat facilities are similar to poultry facilities, and the biological processes used to treat the wastewater are the same, EPA concludes that transferring ammonia (as N) limitations from the Poultry Subcategories to the Meat Subcategories is appropriate.

14.9 Summary of Final Limitations

Table 14-9 presents a summary of the limitations for the MPP industry.

Table 14-9. Final Limitations for the MPP Industry.

Subcategory	Pollutant	Daily Maximum Limitation, mg/L	Monthly Average Limitation, mg/L
Poultry Subcategories K and L	Ammonia (as N)	8.0	4.0
	BOD_5	26	16
	TSS	30	20
	O&G (as HEM)	14	8
	Total Nitrogen	147	103
Meat Subcategories	Ammonia (as N)	8.0	4.0
	Total Nitrogen	194	134

SECTION 15

REGULATORY IMPLEMENTATION

This section provides guidance to National Pollutant Discharge Elimination System (NPDES) permit writers and the regulated community for implementing 40 CFR Part 432 effluent limitations guidelines (ELGs) and standards for meat and poultry processing (MPP) facilities. The section is organized as follows:

- Section 15.1 describes the applicability of the revised Part 432 ELGs and standards.
- Section 15.2 summarizes compliance dates.
- Section 15.3 presents guidance on calculating NPDES permit effluent limitations.
- Section 15.4 summarizes compliance monitoring requirements.
- Section 15.5 discusses variances and modifications.

15.1 APPLICABILITY OF THE REVISED PART 432 EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS

The MPP ELGs and standards regulate direct discharges of process wastewaters into waters of the United States (e.g., streams, lakes, oceans) that are authorized by an NPDES permit. MPP facilities that discharge their process wastewaters to a publicly owned treatment works (POTW) are not regulated by this final rule. The revised 40 CFR Part 432 applies to all existing and new meat and poultry first processing (slaughtering) and further processing facilities and independent rendering facilities. Facilities above certain production thresholds (Table 15-1) that are involved in any of the following activities are subject to the revised or new limitations in this rule:

Table 15-1. Summary of 40 CFR 432 Production Thresholds for Regulated Subcategories

Regulatory Subcategory	Production Threshold	
	Non-Small	**Small**
A - Simple Slaughterhouse	>50 million lb/yr	≤50 million lb/yr
B - Complex Slaughterhouse	>50 million lb/yr	≤50 million lb/yr
C - Low-Processing Packinghouse	>50 million lb/yr	≤50 million lb/yr
D - High-Processing Packinghouse	>50 million lb/yr	≤50 million lb/yr
E - Small Processor	--	≤1,560,000 lb/yr
F - Meat Cutter	>50 million lb/yr	>1,560,000 lb/yr but ≤50 million lb/yr
G - Sausage and Luncheon Meats Processor	>50 million lb/yr	>1,560,000 lb/yr but ≤50 million lb/yr
H - Ham Processor	>50 million lb/yr	>1,560,000 lb/yr but ≤50 million lb/yr
I - Canned Meats	>50 million lb/yr	>1,560,000 lb/yr but ≤50 million lb/yr
J - Renderer	>10 million lb/yr	
K - Poultry First processing	>100 million lb/yr	≤100 million lb/yr
L - Poultry Further Processing	>7 million lb/yr	≤7 million lb/yr

- ***First Processing***. A first processor is a facility that slaughters live animals and produces whole or cut-up carcasses. First processing operations can include the assembly and holding of animals for slaughter; killing, bleeding; removal of hide, hair or feathers; evisceration and variety meat (organ) harvest; carcass washing; trimming; carcass chilling and refrigeration; and cleanup. A facility is still a first processor if it performs operations in addition to slaughtering, such as further processing or rendering. First processors include facilities classified as simple slaughterhouses (40 CFR Part 432, Subpart A), complex slaughterhouses (Subpart B), low-processing

packinghouses (Subpart C), and high-processing packinghouses (Subpart D), in addition to the newly created Subpart K for poultry first processors.

- ***Further Processing***. A further processor are operations which utilize whole carcasses or cut-up meat or poultry products for the production of fresh or frozen products, and may include the following types of processing: cutting and deboning, cooking, seasoning, smoking, canning, grinding, chopping, dicing, forming, breading, breaking, trimming, skinning, tenderizing, marinating, curing, pickling, extruding, and/or linking. A facility is still a further processor if it performs operations in addition to further processing, such as rendering (but not slaughtering). Further processors include facilities classified as small processors (40 CFR Part 432, Subpart E), meat cutters (Subpart F), sausage and luncheon meats processors (Subpart G), ham processors (Subpart H), and canned meats processors (Subpart I), in addition to the newly created Subpart L for poultry further processors.

- ***Rendering***. A renderer processes slaughtering by-products (e.g., animal fat, bone, blood, hair, feathers, dead animals) into usable products. An independent renderer is subject to 40 CFR Part 432, Subpart J, and is a facility that performs only rendering operations at a production rate greater than 10 million pounds per year and does not do any first or further processing.

Facilities in the meat subcategories (A through I) whose production falls below the specified production thresholds (see Table 15-1) remain subject to Part 432, as specified; that is, EPA is not revising the current limits in Part 432 for those facilities.

15.2 COMPLIANCE DATES

New and reissued NPDES permits to direct dischargers must include these effluent limitations, and the permits must require immediate compliance with such limitations. If the permitting authority wishes to provide a compliance schedule, it must do so through an enforcement mechanism.

New sources must comply with the new source standards (NSPS) of this rule when they commence discharging MPP process wastewater. Because the final rule was not promulgated within 120 days of the proposed rule, the Agency considers a discharger to be a new source if its construction commences more than 30 days after publications of the final rule in the Federal Register.

There are meat product facilities that were new sources subject to the earlier NSPS provisions because they commenced construction after promulgation of the earlier NSPS. The CWA provides for a protection period for such facilities from any more stringent standards. The protection period is generally 10 years from the completion of construction. See section 306(d) of the CWA, 33 U.S.C. § 1316(d) and 40 C.F.R. 122.29(d). Thus, any source that commenced construction after promulgation of the earlier NSPS and before promulgation of today's NSPS will not be subject to any more stringent BAT limitations in today's rule until the protection period identified in 40 C.F.R. 122.29(d) expires.

15.3 CALCULATION OF NPDES PERMIT LIMITATIONS

The existing ELGs and standards that are being retained for Best Practical Control Technology currently available (BPT), Best Conventional Pollutant Control Technology (BCT), Best Available Technology Economically Achievable (BAT), and NSPS are production-based limitations in pounds (of pollutant) per 1,000 pounds (of production unit). The new ELGs and standards being established for BPT, BCT, BAT, and NSPS are concentration-based limitations in milligrams per liter (mg/L). The NPDES regulations (at 40 CFR 122.45(f)) require permit writers to include in permits mass-based limitations for direct dischargers, but they allow an exception when the limits are expressed in terms of other units of measurement (e.g., concentration). This section provides guidance on how the 40 CFR Part 432 effluent guidelines are to be included in NPDES permits.

The effluent limitations included in 40 CFR Part 432 are provided as maximum daily discharge limitations and maximum monthly average discharge limitations. Definitions provided at 40 CFR 122.2 state that the "maximum daily discharge limitation" is the "highest allowable 'daily discharge'" and the "maximum average for monthly discharge limitation" is the "highest

allowable average of 'daily discharges' over a calendar month, calculated as the sum of all 'daily discharges' measured during a calendar month divided by the number of 'daily discharges' measured during that month." "Daily discharge" is defined as the "'discharge of a pollutant' measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling."

15.3.1 Meat and Independent Renderer Facilities

New and existing MPP facilities that are regulated under the meat and independent renderer subcategories will be subject to a combination of production- and concentration-based effluent limitations. The existing ELGs for Subcategories A through J that are being retained will remain as production-based limitations expressed in pounds (of pollutant) per 1,000 pounds (of production unit). In addition, the new 40 CFR Part 432 ELGs and standards established for several parameters are concentration-based limitations. A summary of the pollutants regulated under the meat and independent renderer subcategories and the basis by which they should be applied are provided in Table 15-2. In developing NPDES permit limitations for MPP facilities subject to both production- and concentration-based effluent limitations and standards, a permit writer must include both limitations.

Production units for existing effluent limitations and standards include live weight killed, equivalent live weight killed, finished product, and raw material. To convert the effluent limitations and standards expressed as pounds per 1,000 pounds of product to a monthly average or daily maximum permit limit, the permitting authority would use a production rate with units of 1,000 pounds per day. The NPDES permit regulations at 40 CFR 122.45(b)(2) require that NPDES permit limits be based on a "... reasonable measure of actual production." The production rates used for NPDES permitting for the MPP industry have commonly been the annual average production from the prior 5-year period, prorated to a daily basis.

Table 15-2. Summary of Basis for Pollutants Regulated under the Meat and Independent Renderer Subcategories

Applicable Subcategory(ies)	Size	Facility Type	Pollutants Regulated Under Existing 40 CFR Part 432 Production-Based Effluent Guidelines[a]	Additional Pollutants Regulated Under New 40 CFR Part 432 Concentration-Based Effluent Guidelines[b]
A–D	Non-small (>50 million lb/yr)	Existing	BOD_5, TSS, oil and grease, fecal coliforms, pH	Ammonia (as N), total nitrogen
		New	BOD_5, TSS, oil and grease, fecal coliforms, pH, ammonia (as N)	Total nitrogen
	Small (≤50 million lb/yr)	Existing	BOD_5, TSS, oil and grease, fecal coliforms, pH	--
		New	BOD_5, TSS, oil and grease, fecal coliforms, pH, ammonia (as N)	--
E	Small (≤1,560,000 lb/yr)	Existing/New	BOD_5, TSS, oil and grease, fecal coliforms, pH	--
F–I	Non-small (>50 million lb/yr)	Existing	BOD_5, TSS, oil and grease, fecal coliforms, pH, ammonia (as N)	Total nitrogen
		New	BOD_5, TSS, oil and grease, fecal coliforms, pH	Ammonia (as N), total nitrogen
	Small (>1,560,000 but ≤50 million lb/yr)	Existing	BOD_5, TSS, oil and grease, fecal coliforms, pH, ammonia (as N)	--
		New	BOD_5, TSS, oil and grease, fecal coliforms, pH	--
J	(>10 million lb/yr)	Existing	BOD_5, TSS, oil and grease, fecal coliforms, pH, ammonia (as N)	Total nitrogen
		New	BOD_5, TSS, oil and grease, fecal coliforms, pH, ammonia (as N)	Total nitrogen

Note: BOD_5 = 5-day biochemical oxygen demand; TSS = total suspended solids; N = nitrogen.

[a] Effluent limitations for fecal coliform bacteria and pH are not production-based. Furthermore, additional allocations are provided for BOD_5 and TSS for hide and by-product processing.

[b] Effluent limitations for all pollutants are concentration-based.

The objective in determining a production estimate for a facility is to develop a measure of production that can reasonably be expected to prevail during the next term of the permit. This measure is used in combination with the production-based limitations to establish a maximum

mass of pollutant that may be discharged each day and month. If the permit production rate is based on the maximum month, however, permit could allow excessive discharges of pollutants during significant portions of the life of the permit. These excessive allowances might discourage facilities from ensuring optimal waste management, water conservation, and wastewater treatment practices during lower production periods. On the other hand, if the average permit production rate is based on an average derived from the lowest year of production over the past 5 years, facilities might have trouble ensuring that their waste management, water conservation, and wastewater treatment practices can accommodate shorter periods of higher production. Facilities might need to target a more stringent treatment level than that on which the limits were based during periods of high production. To accomplish this, facilities would likely have to develop more efficient treatment systems and better water conservation and waste management practices for use during these periods.

The new ELGs and standards being established for BPT, BAT, and NSPS for ammonia and total nitrogen are concentration-based limitations. The permit writer, however, has the option to also include mass-based limitations in pounds (of pollutant) per day. Mass-based effluent limitations may be included in permits to ensure that dilution of process wastewaters will not be used as a substitute for treatment. Therefore, the permit writer would need to determine whether the potential exists for dilution of process wastewaters in the facility to be permitted.

The U.S. Department of Agriculture (USDA), Food Safety and Inspection Service (FSIS), issued a landmark rule in 1996, the Pathogen Reduction: Hazard Analysis and Critical Control Point (HACCP) Systems. The HAACP program is designed to ensure the safety of food products in the United States by reducing the occurrence and numbers of pathogenic microorganisms on meat and poultry products and thereby reducing the incidence of foodborne illness associated with consuming those products. The HACCP rule specifically requires MPP facilities (excluding renderers) to develop and implement a system of preventive controls to improve the safety of their products. The HACCP rule also mandates all MPP facilities to develop and implement written standard operating procedures for sanitation. To comply with the HACCP requirements, water is commonly used at MPP facilities to flush loose meat, blood, soluble protein, and inorganic particles from processing areas. As a result, MPP plants can use large quantities of

water during various processing and cleaning operations. Information collected by EPA as part of the MPP rule development effort indicates that water conservation is still practiced at MPP plants in light of the HAACP requirements. For example, within the USDA guidelines, water used in some MPP operations may be reclaimed and reused. Also, using dry cleaning to clean process area floors reduces the amount of water used. Section 6 provides additional information on reported water use levels for meat and poultry processing operations and rendering. EPA believes this information will be useful to permit writers and control authorities in those instances where they deem it appropriate to set mass-based limitations.

In making the decision whether to include mass-based limitations in NPDES permits, a permit writer needs to evaluate whether appropriate water conservation practices are being used at the MPP plant. If dilution of wastewater is a concern at a particular MPP plant, the permit writer should derive them mass-based limitations and include them in the permit. Mass-based effluent limitations are derived by multiplying the concentration-based effluent limitations from the final rule by an appropriate wastewater flow rate for the facility's MPP operations (expressed in gallons per day). The permit writer must use a reasonable estimate of process wastewater flows and the concentration limitations to develop mass-based limitations for the NPDES permit. Process wastewater discharge is defined in the regulation (40 CFR Part 432) to include wastewaters resulting from production of meat and poultry products that come into direct contact with raw materials, further-processed products, or final products, and surface runoff from the immediate process area that has the potential to become contaminated. The MPP effluent guidelines do not apply to nonprocess wastewater. Nonprocess wastewater means sanitary wastewater, noncontact cooling water, water from laundering, and noncontact storm water. Nonprocess wastewater also includes wastewater discharges from nonindustrial sources, such as residential housing, schools, churches, recreational parks, and shopping centers, as well as wastewater discharges from gas stations, utility plants, and hospitals. EPA considers storm water that is commingled with MPP operations process wastewater prior to treatment or discharge (contact storm water) subject to the MPP effluent guidelines. In cases where the process wastewater flow claimed by industry might be excessive, the permit writer may develop a more appropriate process wastewater flow for use in computing the mass-based effluent limitations.

15.3.2 Poultry Facilities

New and existing MPP facilities that are regulated under the poultry processing subcategories will be subject to concentration-based effluent limitations. The new 40 CFR Part 432 ELGs and standards established for several parameters are concentration-based limitations (in milligrams per liter). A summary of the pollutants regulated under the poultry processing subcategories is provided in Table 15-3.

Table 15-3. Summary Basis for Pollutants Regulated under the Meat and Independent Renderer Subcategories

Applicable Subcategory(ies)	Size	Facility Type	Pollutants Regulated Under New 40 CFR Part 432 Concentration-Based Effluent Guidelines
K	Non-small (>100 million lb/yr)	Existing and new	BOD_5, TSS, oil and grease (as HEM), fecal coliforms, pH, ammonia (as N), total nitrogen
	Small (≤100 million lb/yr)	Existing	--
		New	BOD_5, TSS, oil and grease (as HEM), fecal coliforms, pH, ammonia (as N)
L	Non-Small (>7 million lb/yr)	Existing and new	BOD_5, TSS, oil and grease (as HEM), fecal coliforms, pH, ammonia (as nitrogen) total nitrogen
	Small (≤ 7 million lbs/yr)	Existing	--
		New	BOD_5, TSS, oil and grease (as HEM), fecal coliforms, pH, ammonia (as N)

Note: HEM=hexane-extractable material.

The ELGs and standards being established for BPT, BCT, BAT, and NSPS are concentration-based limitations. The permit writer, however, has the option to include mass-based limitations in pounds (of pollutant) per day as well. As described in Section 15.3.2, there are several considerations for a permit writer in deciding whether to include, as well as in calculating, mass-based limitations for MPP facilities.

15.3.3 Mixed Meat and Poultry Production Facilities

A limited number of MPP facilities process both meat and poultry products at the same site. In these instances, a permit writer will need to apply all applicable effluent guidelines for each subcategory applicable to the particular operations at the MPP facility. Permit writers should use the "building block approach," whereby the allowable pollutant loads from individual regulated waste streams are combined to derive a single limitation applicable to the combined wastewaters.

For example, if an existing facility discharges wastewater from meat slaughtering operations commingled with wastewater discharges from poultry further processing operations, the permit writer must base the effluent limitations in the permit on the limitations for Subparts A through D as well as Subpart L. It should be noted that the ELGs for certain conventional pollutants (BOD, TSS, and oil and grease) are based on production in Subparts A through I. However, in Subparts K and L (for poultry plants) the ELGs for these same conventional pollutants are concentration-based. In this instance, the permit writer would need to convert the concentration-based limitations in subparts K and L to mass-based limits to allow for combination with the applicable production-based limitations (in pounds per day). Section 15.3.2 describes several considerations for a permit writer when calculating mass-based limitations at MPP facilities.

Under certain circumstances, a mixed MPP facility will be subject to two different concentration-based limitations. For example, the final rule includes different concentration-based effluent limitations for total nitrogen for those subparts applicable to meat processing (A through D and F through I) and those subparts applicable to poultry processing (K and L). Because a permit writer is required to apply all applicable effluent guidelines, and in most instances all process flows are combined before treatment, the permit writer should establish a flow-weighted concentration that would serve as the effluent limitation. Before selecting appropriate process flow values for use in flow-weighting the different concentration-based limitations, the permit writer should consider the factors discussed in Section 15.3.2 above. Alternatively, permit writers may also combine concentration-based effluent limitations by

converting each to a mass limitation using the appropriate waste water flow from each applicable waste stream and then combining the mass values. As noted previously, Section 15.3.2 describes several considerations for a permit writer when calculating mass-based limitations at MPP facilities.

15.3.4 Facilities Covered by Additional Guidelines or Technology-Based Effluent Limitations Established on a Case-By-Case Basis

When a facility is also covered by other existing effluent guidelines (e.g., leather tanning), the facility will need to comply with both regulations. In those cases, the permit writer will combine the limitations using an approach that proportions the limitations based on the different production levels (for production-based standards) or wastewater flows (for concentration-based standards). NPDES permit writers refer to this approach as the "building block approach."

There might also be instances when other existing effluent guidelines regulate a set of pollutants different from those in the MPP final rule. As described in the EPA *NPDES Permit Writers' Manual* (USEPA, (EPA-833-B-96-003; USEPA, 1996), if all regulated process wastewaters are combined, there are two approaches for properly applying the effluent guidelines:

- If one waste stream containing a pollutant that is not covered by an effluent guideline is combined with another waste stream that has applicable effluent guidelines for the same pollutant, then the permit writers must use best professional judgment (BPJ) to establish a technology-based effluent limit for the nonregulated wastewater.

- If one waste stream that does not contain a pollutant is combined with another waste stream that has applicable effluent guidelines for the pollutant, the permit writer must ensure that the nonregulated waste stream does not dilute the regulated waste stream to the point where the pollutant is not analytically detectable. If this circumstance occurs, the permit writer will most likely need to establish internal outfalls, as allowed under 40 CFR 122.45(h).

The NPDES permit regulations at 40 CFR 125.3 require the establishment of technology-based limits derived on a case-by-case basis using BPJ for nonmunicipal (industrial) facilities. BPJ limits may be particularly established by permit writers for MPP facilities in cases where the effluent limitations in the final rule are not available for, or do not regulate, a particular pollutant of concern or a particular waste stream (e.g., nonprocess waste waters). Like the approach described above for applying effluent limitations from different effluent guidelines, permit writers will need to combine as appropriate any BPJ-based effluent limitations. If the limitations are based on production or mass, the final NPDES permit limitations will be the sum of the mass effluent limitations derived in Sections 15.3.1 and 15.3.2 and any mass effluent limitations developed on a case-by-case basis using BPJ by the permit writer to take into account nonprocess wastewater discharge. If applicable effluent limitations are based on concentration, the permit writer should flow-weight the applicable effluent concentrations.

15.3.5 Facilities With Highly Variable or Seasonal Production

Certain MPP facilities might expect production to change significantly during the permit term. In those cases where highly variable production is expected, a permit writer can include alternative or tiered limits. According to the EPA *NPDES Permit Writer's Manual* (EPA-833-B-96-003; USEPA, 1996), up to a 20 percent fluctuation in production is considered normal. To address instances where the production at an MPP facility is expected to be highly variable, a permit writer can establish tiered limits. Tiered limits are simply a set of limits that vary based on the production at the facility. In establishing tiered limits, permit writers should ensure that the permit clearly identifies how the tiered limits are to be applied (e.g., how to calculate and report production).

For facilities with large seasonal variations in production, permit writers might want to consider the use of seasonal limitations (one set of limits based on spring/summer production rates and another set of limits based on fall/winter production rates).

15.4 OTHER NPDES PERMIT CONDITIONS

In accordance with the requirements contained in 40 CFR Parts 122 and 125, a number of other NPDES permit conditions are applicable to direct discharging MPP facilities. This section highlights several conditions with particular relevance to such MPP facilities.

15.4.1 Upset and Bypass Provisions

A "bypass" is an intentional diversion of the streams from any portion of a treatment facility. An "upset" is an exceptional incident in which unintentional and temporary noncompliance with technology-based permit effluent limitations occurs because of factors beyond the reasonable control of the permittee. EPA's regulations concerning bypasses and upsets for direct dischargers are set forth at 40 CFR 122.41(m) and (n).

15.4.2 Best Management Practices

Sections 304(e), 308(a), 402(a), and 501(a) of the Clean Water Act (CWA) authorize the EPA Administrator to prescribe BMPs as part of ELGs and standards, or as part of a permit. Section 304(e) of the CWA authorizes EPA to include BMPs in ELGs for certain toxic or hazardous pollutants for the purpose of controlling “plant site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage.” CWA Section 402(a)(1) and the NPDES regulations at 40 CFR 122.44(k) also provide for BMPs to control or abate the discharge of pollutants when numeric limitations and standards are infeasible. In addition, section 402(a)(2), read in concert with section 501(a), authorizes EPA to prescribe as wide a range of permit conditions as the Administrator deems appropriate to ensure compliance with applicable effluent limitations and standards and such other requirements.

Dikes, curbs, and other control measures are being used at some MPP facilities to contain leaks and spills as part of “good housekeeping” practices. On a facility-by-facility basis, however, a permit writer may choose to incorporate BMPs into the permit. Section 8.8 provides a detailed discussion of pollution prevention practices and BMPs used in the MPP industry.

15.4.3 Compliance Monitoring

NPDES permit writers must establish requirements for regulated MPP facilities to monitor their effluent to ensure that they are complying with effluent limitations. As specified at 40 CFR 122.41, 122.44, and 122.48, all NPDES permits must specify requirements for using, maintaining, and installing (if appropriate) monitoring equipment; monitoring type, intervals, and frequencies that will provide representative data; analytical methods; and reporting and recordkeeping. The NPDES program requires permittees (with certain specific exceptions) to monitor for limited pollutants and report data at least once a year.

EPA has not promulgated specific monitoring requirements or monitoring frequencies in the MPP final rule; therefore, NPDES permit writers may establish monitoring requirements and monitoring frequencies at their discretion. The Agency notes, however, that in developing the Part 432 limitations, it considered a weekly sampling frequency. EPA expects that facilities properly operating and maintaining the option technology will be able to comply with the monthly average limitation/standard when they sample at the assumed weekly monitoring frequency, although compliance is required regardless of the number of samples analyzed and averaged in a month. EPA does not, however, condone the practice of allowing the number of monitoring samples to vary arbitrarily merely to allow a facility to achieve a desired average concentration, (a value below the limit). It is expected that enforcement authorities would prefer, or even require, monitoring samples at some regular, predetermined frequency. If a facility has difficulty complying with the standards on an ongoing basis, the facility should improve its equipment, operations, and/or maintenance.

In addition, Part 136 requires facilities to collect grab samples for oil and grease. In developing the Part 432 oil and grease limitations, EPA generally collected six grab samples in a 24-hour monitoring day. The sample types for pH can range from a one-time grab sample during a monitoring day to continuous sampling throughout a monitoring day where pH is a critical aspect of the wastewater treated or the wastewater treatment operation.

In May 2000 EPA promulgated a regulation streamlining the NPDES regulations (Amendments to Streamline the National Pollutant Discharge Elimination System Program

Regulations: Round Two (65 FR 30886; May 15, 2000)), which includes a monitoring waiver for direct dischargers subject to effluent guidelines. A direct discharging facility may choose not to sample a guideline-limited pollutant if that discharger "has demonstrated through sampling and other technical factors that the pollutant is not present in the discharge or is present only at background levels from intake water and without any increase in the pollutant due to activities of the discharger" (65 FR 30908; 40 CFR 122.44). EPA noted in the preamble to the final NPDES streamlining rule that the Agency is granting a waiver from monitoring requirements but not a waiver from the limit. In addition, the revision does not waive monitoring for any pollutants for which there are limits based on water quality standards. The waiver for direct dischargers lasts for the term of the reissued NPDES permit and is not available during the term of the first permit issued to a discharger. Any request for this waiver must be submitted with the application for a reissued permit or request for modification of a reissued permit. With the permit writer's authorization, any direct discharging facility covered by the MPP ELGs and standards may use the monitoring waiver contained in the NPDES streamlining final rule.

15.5 VARIANCES AND MODIFICATIONS

The CWA requires application of effluent limitations established pursuant to section 301 or the pretreatment standards of section 307 to all direct and indirect dischargers. However, the statute provides for the modification of these national requirements in a limited number of circumstances. Moreover, the Agency has established administrative mechanisms to provide an opportunity for relief from the application of the national ELGs and pretreatment standards for categories of existing sources for toxic, conventional, and nonconventional pollutants.

15.5.1 Fundamentally Different Factors Variances

EPA will develop effluent limitations or standards different from the otherwise applicable requirements if an individual discharging facility is fundamentally different with respect to the factors considered in establishing the limitations or standards applicable to the individual facility. Such a modification is known as a "fundamentally different factors" (FDF) variance.

EPA provides for FDF variances from the BPT effluent limitations, BAT limitations for toxic and nonconventional pollutants, and BCT limitations for conventional pollutants for direct dischargers. FDF variances for toxic pollutants were challenged judicially and ultimately sustained by the Supreme Court (see *Chemical Manufacturers Assn* v. *NRDC*, 479 U.S. 116 (1985)).

Subsequently, in the Water Quality Act of 1987, Congress added section 301(n) to the CWA to authorize modifications of the otherwise applicable BAT effluent limitations or categorical pretreatment standards for existing sources if a facility is fundamentally different with respect to the factors specified in section 304 (other than costs) from the facilities EPA considered in establishing the effluent limitations or pretreatment standard. Section 301(n) also defined the conditions under which EPA may establish alternative requirements. Under Section 301(n), an application for approval of an FDF variance must be based solely on either information submitted during rulemaking raising the factors that are fundamentally different or information the applicant did not have an opportunity to submit. The alternative limitation or standard must be no less stringent than justified by the difference and must not result in markedly more adverse non-water quality environmental impacts than does the national limitation or standard.

The EPA regulations at 40 CFR Part 125, Subpart D, authorizing the Regional Administrators to establish alternative limitations and standards, further detail the substantive criteria used to evaluate FDF variance requests for direct dischargers. Thus, 40 CFR 125.31(d) identifies six factors (e.g., volume of process wastewater, age and size of a discharger's facility) that may be considered in determining whether a facility is fundamentally different. The Agency must determine whether, on the basis of one or more of these factors, the facility in question is fundamentally different from the facilities and factors EPA considered in developing the nationally applicable effluent guidelines. The regulation also lists four other factors (e.g., the infeasibility of installation within the time allowed, a discharger's ability to pay) that may not provide a basis for an FDF variance. In addition, under 40 CFR 125.31(b)(3), a request for limitations less stringent than the national limitation may be approved only if compliance with the national limitations would result in either a removal cost wholly out of proportion to the

removal cost considered during development of the national limitations, or a non-water quality environmental impact (including energy requirements) fundamentally more adverse than the impact considered during development of the national limits.

The legislative history of section 301(n) underscores the necessity for the FDF variance applicant to establish eligibility for the variance. EPA's regulations at 40 CFR 125.32(b)(1) are explicit in imposing this burden on the applicant. The applicant must show that the factors relating to the discharge controlled by the applicant's permit which are claimed to be fundamentally different are, in fact, fundamentally different from those factors EPA considered in establishing the applicable guidelines. An FDF variance is not available to a new source subject to NSPS.

15.5.2 Economic Variances

Section 301(c) of the CWA authorizes a variance from the otherwise applicable BAT effluent guidelines for nonconventional pollutants due to economic factors. Normally, the discharger must file the request for a variance from effluent limitations developed from BAT guidelines during the public notice period for the draft permit. Other filing time periods might apply, as specified at 40 CFR 122.21(1)(2). Specific guidance for this type of variance is available from EPA's Office of Wastewater Management.

15.5.3 Water Quality Variances

Section 301(g) of the CWA authorizes a variance from BAT effluent guidelines for certain nonconventional pollutants due to localized environmental factors. These pollutants are ammonia, chlorine, color, iron, and total phenols.

SECTION 16

GLOSSARY, ACRONYMS, AND ABBREVIATIONS

A

AAMP - The American Association of Meat Processors

Administrator - The Administrator of the U.S. Environmental Protection Agency

Agency - The U.S. Environmental Protection Agency

Alternate discharge - See Zero discharge

AMI - American Meat Institute

AMSA - Association of Metropolitan Sewerage Agencies

Average monthly discharge limitation - The highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during the calendar month divided by the number of "daily discharges" measured during the month.

B

BAT - The best available technology economically achievable, applicable to effluent limitations for industrial discharges to surface waters, as defined by Section 304(b)(2)(B) of the CWA.

BCT - The best control technology for conventional pollutants, applicable to discharges of conventional pollutants from existing industrial point sources, as defined by Section 304(b)(4) of the CWA.

Blood processing - The blood may be heated to coagulate the albumin; then, the albumin and fibrin are separated (e.g., with a screen or centrifuge) from the blood water and forwarded for further processing. The blood water or serum remaining after coagulation may be evaporated for animal feed, or it may be sewered.

BOD_5 - Biochemical oxygen demand measured over a 5 day period.

BPJ - Best professional judgment

BPT - The best practicable control technology currently available, applicable to effluent limitations, for industrial discharges to surface waters, as defined by Section 304(b)(1) of the CWA.

C

Canned meat processor (Definition for 40 CFR 432, Subpart I) - An operation that prepares and cans meats (such as stew, sandwich spreads, or similar products) alone or in combination with other finished products at rates greater than 2730 kg (6000 lb) per day.

CFR - Code of Federal Regulations

Clean water act (CWA) - The Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. Section 1251 et seq.), as amended.

Complex slaughterhouse (Definition for 40 CFR 432, Subpart B) - A slaughterhouse that accomplishes extensive by-product processing, usually at least three of such operations as rendering, paunch and viscera handling, blood processing, hide processing, or hair processing

Conventional pollutants - Constituents of wastewater as determined by Section 304(a)(4) of the CWA (and EPA regulations), i.e., pollutants classified as biochemical oxygen demand, total suspended solids, oil and grease, fecal coliform, and pH.

D

Daily discharge - The discharge of a pollutant measured during any calendar day or any 24-hour period that reasonably represents a calendar day.

Deep-well injection - Long-term or permanent disposal of untreated, partially treated, or treated wastewaters by pumping the wastewater into underground formations of suitable character through a bored, drilled, or driven well.

Direct discharger - A facility that discharges or may discharge treated or untreated wastewaters into waters of the United States.

DMR - Discharge monitoring report

Dry rendering - The process of cooking animal byproducts by dry heat in open steam-jacketed tanks.

E

Effluent limitation guideline (ELGs) - Under CWA section 502(11), any restriction, including schedules of compliance, established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean (CWA Sections 301(b) and 304(b)).

ELWK - Equivalent live weight killed

Existing source - For this rule, any facility from which there is or may be a discharge of pollutants, the construction of which is commenced before the publication of the final regulations prescribing a standard of performance under Section 306 of the CWA.

F

Facility- All contiguous property and equipment owned, operated, leased, or under the control of the same person or entity.

FDF - Fundamentally different factor

Finished product - The final manufactured product produced on site, including products intended for consumption with no additional processing as well as products intended for further processing, when applicable.

First processing - Operations which receive live meat animals or poultry and produce a raw, dressed meat or poultry product, either whole or in parts.

FSIS - Food Safety and Inspection Service

FTE - Full time equivalent employee

Further processing - Operations which use whole carcasses or cut-up meat or poultry products for the production of fresh or frozen products, and may include the following types of processing: cutting and deboning, cooking, seasoning, smoking, canning, grinding, chopping, dicing, forming, or breading.

G

Ground water - Water in a saturated zone or stratum beneath the surface of land or water

H

Ham processor (Definition for 40 CFR 432, Subpart H) - An operation that manufactures hams alone or in combination with other finished products at rates greater than 2730 kg (6000 lb) per day.

Hazardous waste - Any waste, including wastewater, defined as hazardous under RCRA, TSCA, or any state law.

Hexane extractable method (HEM) - A measure of oil and grease in wastewater by mixing the wastewater with hexane and measuring the oils and greases that are removed from the wastewater with the hexane. See 40 CFR Part 136.

Hide processing - Wet or dry hide processing. Includes demanuring, washing, and defleshing, followed by curing.

High-processing packinghouse (Definition for 40 CFR 432, Subpart D) - A packinghouse that processes both animals slaughtered at the site and additional carcasses from outside sources.

I

In scope - Facilities and/or wastewaters that EPA proposes to be subject to this guidelines.

Indirect discharger - A facility that discharges or may discharge wastewaters into a publicly owned treatment works.

L

Live weight killed (LWK) - The total weight of the total number of animals slaughtered during a specific time period.

Long-term average (LTA) - For purposes of the effluent guidelines, average pollutant levels achieved over a period of time by a facility, subcategory, or technology option. LTAs were used in developing the effluent limitations guidelines and standards in the proposed regulation.

Low-processing packinghouse (Definition for 40 CFR 432, Subpart C) - A packinghouse that processes no more than the total animals killed at that plant, normally processing less than the total kill.

M

Maximum monthly average discharge limitation - The highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during the calendar month, divided by the number of "daily discharges" measured during the month.

Meat - The term "meat" includes all animal products from cattle, calves, hogs, sheep and lambs, etc., except those defined as poultry.

Meat cutter (Definition for 40 CFR 432, Subpart F) - An operation fabricates, cuts, or otherwise produces fresh meat cuts and related finished products from livestock carcasses, at rates greater than 2730 kg (6000 lb) per day.

Meat product operations - Include meat and poultry slaughtering operations, by-product operations, rendering, and further processing.

Minimum level - The level at which an analytical system gives recognizable signals and an acceptable calibration point.

MPP - Meat and poultry products

N

NAICS - North American Industry Classification System. NAICS was developed jointly by the U.S., Canada, and Mexico to provide new comparability in statistics about business activity across North America.

National pollutant discharge elimination system (NPDES) permit - A permit to discharge wastewater into waters of the United States issued under the National Pollutant Discharge Elimination system, authorized by Section 402 of the CWA. See NPDES.

Nitrification capability - The capability of a POTW treatment system to oxidize ammonia or ammonium salts initially to nitrites (via nitrosomonas bacteria,) and subsequently to nitrates (via Nitrobacter bacteria). Criteria for determining the nitrification capability of a POTW treatment system are: bioassays confirming the presence of nitrifying bacteria, and analyses of the nitrogen balance demonstrating a reduction in the concentration of ammonia or ammonium salts and an increase in the concentrations of nitrites and nitrates.

Non-contact cooling water - Water used for cooling in process and nonprocess applications which does not come into contact with any raw material, intermediate product, by-product, waste product (including air emissions), or finished product.

Non-conventional pollutants - Pollutants that are neither conventional pollutants nor priority pollutants listed at 40 CFR §401.15 and Part 423 Appendix A.

Non-detect value - The analyte is below the level of detection that can be reliably measured by the analytical method. This is also known in statistical terms as left-censoring.

Non-water quality environmental impact - Deleterious aspects of control and treatment technologies applicable to point source category wastes, including, but not limited to air pollution, noise, radiation, sludge and solid waste generation, and energy used.

NRA - National Renderers Association

NRDC - Natural Resources Defense Council

NPDES program - The National Pollutant Discharge Elimination System (NPDES) program authorized by Sections 307, 318, 402, and 405 of the Clean Water Act. It applies to facilities that discharge wastewater directly to United States surface waters.

NSPS - New Source Performance Standards, applicable to industrial facilities whose construction is begun after the effective date of the final regulations (if those regulations are promulgated after 120 days from publication of proposal in the Federal Register). See 40 CFR 122.2.

NTTA - National Technology Transfer and Advancement Act

NWPCAM - The National Water Pollution Control Assessment Model (version 1.1) is a computer model to model the instream dissolved oxygen concentration, as influenced by pollutant reductions of BOD_5, total Kjeldahl nitrogen, total suspended solids, and fecal coliform bacteria.

O

Off-site - Outside the boundaries of a facility

On-site - The same or geographically contiguous property, which may be divided by a public or private right-of-way, provided the entrance and exit between the properties is at a crossroads intersection, and access is by crossing as opposed to going along the right-of-way. Non-contiguous properties owned by the same company or locality but connected by a right-of-way, which it controls, and to which the public does not have access, is also considered on-site property.

Out-of-scope - Out-of-scope facilities are facilities which EPA has not determined to be subject to provisions of this guideline, or facilities that do not engage in meat products operations.

Outfall - The mouth of conduit drains and other conduits from which a facility effluent discharges into receiving waters.

P

Packinghouse - A plant that both slaughters animals and subsequently processes carcasses into cured, smoked, canned, or other prepared meat products.

Pass through - The term "pass through" means a discharge that exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

Point source - Any discernable, confined, and discrete conveyance from which pollutants are or may be discharged. See CWA section 502(14).

Pollutants of concern (POCs) - Pollutants commonly found in meat and poultry processing wastewaters. Generally, a chemical is considered as a POC if it is detected in untreated process wastewater at five times a baseline value in more than 10 percent of the samples.

Poultry - Broilers, other young chickens, hens, fowl, mature chickens, turkeys, capons, geese, ducks, and small game such as quail, pheasants, and rabbits.

Poultry operations - Includes poultry slaughtering operations, by-product operations, rendering, and further processing.

Priority pollutant - 126 compounds that are a subset of the 65 toxic pollutants and classes of pollutants outlined, pursuant to Section 307 of the CWA.

Process wastewater - Any water which, during red meat or poultry operations, comes into direct contact with or results from the storage, production, or use of any raw material, intermediate product, finished product, by-product, or waste product. Wastewater from equipment cleaning,

direct-contact air pollution control devices, rinse water, storm water associated with industrial activity, and contaminated cooling water are considered to be process wastewater. Process wastewater may also include wastewater that is contract hauled for off-site disposal. Sanitary wastewater, uncontaminated noncontact cooling water, and storm water not associated with industrial activity are not considered to be process wastewater.

PSES - Pretreatment standards for existing sources of indirect discharges, under Section 307(b) of the CWA, applicable (for this rule) to indirect dischargers that commenced construction prior to promulgation of the final rule.

PSNS - Pretreatment standards for new sources under Section 307(c) of the CWA.

Publicly owned treatment works (POTW) - A treatment works as defined by section 212 of the Clean Water Act, which is owned by a State or municipality (as defined by section 502(4) of the Clean Water Act). This definition includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes and other conveyances, only if they convey wastewater to a POTW treatment plant. The term also means the municipality as defined in section 502(4) of the Clean Water Act, which has jurisdiction over the indirect discharges to and the discharges from such a treatment works.

R

Raw material - The basic input materials to a renderer, composed of animal and poultry trimmings, bones, meat scraps, dead animals, feathers and related usable by-products.

RCRA - The Resource Conservation and Recovery Act of 1976 (RCRA) (42 U.S.C. Section 6901 et seq.), which regulates the generation, treatment, storage, disposal, or recycling of solid and hazardous wastes.

Renderer (Definition for 40 CFR 432, Subpart J) - An independent or off-site rendering operation, conducted separately from a slaughterhouse, packinghouse, or poultry dressing or processing plant, that manufactures at rates greater than 75,000 pounds of raw material per day of

meat meal, tankage, animal fats or oils, grease, and tallow, and may cure cattle hides, but excluding marine oils, fish meal, and fish oils.

RFA - Regulatory Flexibility Act

S

Sample-specific detection limit - The smallest quantity in the experiment calibration range that may be measured reliably in any given sample.

SAP - Sampling and analysis plan.

Sausage and luncheon meat processor (Definition for 40 CFR 432, Subpart G) - An operation that cuts fresh meats, grinds, mixes, seasons, smokes, or otherwise produces finished products, such as sausage, bologna, and luncheon meats at rates greater than 2730 kg (6000 lb) per day.

SBREFA - Small Business Regulatory Enforcement Fairness Act of 1996.

SCC - Sample control center

SER - Small entity representative

SIC - Standard Industrial Classification (SIC) - A numerical categorization system used by the U.S. Department of Commerce to catalogue economic activity. SIC codes refer to the products, or group of products, produced or distributed, or to services rendered by an operating establishment. SIC codes are used to group establishments by the economic activities in which they are engaged. SIC codes often denote a facility's primary, secondary, tertiary, etc. economic activities.

Simple slaughterhouse (Definition for 40 CFR 432, Subpart A) - A slaughterhouse that accomplishes very limited by-product processing, if any, usually no more than two of such operations as rendering, paunch and viscera handling, blood processing, hide processing, or hair processing.

Site - A site is generally one contiguous physical location at which manufacturing operations related to the meat products industry occur. This includes, but is not limited to, slaughtering, processing, and rendering. In some instances, a site may include properties located within separate fence lines, but located close to each other.

Slaughter house - A plant that slaughters animals and has as its main product fresh meat as whole, half, or quarter carcasses, or smaller meat cuts.

Small-business - The definitions of small business for the meat products industries are in SBA's regulations at 13 CFR 121.201. These size standards were updated effective October 1, 2000. SBA size standards for the meat and poultry products industry (i.e., for NAICS codes 311611, 311612, 311613, and 311615) define a "small business" as one with 500 or fewer employees.

Small processor - (Definition for 40 CFR 432, Subpart E) An operation that produces up to 2730 kg (6000 lb) per day of any type or combination of finished products.

Stearin - An ester of glycerol and stearic acid found in MPP wastewaters.

Surface water - Waters of the United States, as defined at 40 CFR 122.2.

T

TKN - Total Kjeldahl nitrogen

Treatment - Any method, technique, or process designed to change the physical, chemical, or biological character or composition of any metal-bearing, oily, or organic waste so as to neutralize such wastes, to render such wastes amenable to discharge, or to recover metal, oil, or organic content from the wastes.

TSS - Total suspended solids

V

Variability factor - Used in calculating a limitation (or standard) to allow for reasonable variation in pollutant concentrations when processed through extensively and well designed

treatment systems. Variability factors assure that normal fluctuations in a facility's treatment are accounted for in the limitations. By accounting for these reasonable excursions above the long-term average, EPA's use of variability factors results in limitations that are generally well above the actual long-term averages.

Viscera handling (wet or dry viscera handling) - Includes removal of partially digested feed and washing of viscera.

W

Wastewater - See Process Wastewater.

Wastewater treatment - The processing of wastewater by physical, chemical, biological, or other means to remove specific pollutants from the wastewater stream, or to alter the physical or chemical state of specific pollutants in the wastewater stream. Treatment is performed for discharge of treated wastewater, recycle of treated wastewater to the same process which generated the wastewater, or for reuse of the treated wastewater in another process.

Wet rendering - The process of cooking animal byproducts by steam under pressure in closed tanks.

Z

Zero (or alternate) Discharge - Disposal of process and/or nonprocess wastewaters other than by direct discharge to a surface water or by indirect discharge to a POTW or PrOTW. Examples include land application, deep well injection, and contract hauling.

APPENDIX A

ANALYTICAL METHODS AND BASELINE VALUES

The analytical methods described in this appendix were used to determine pollutant levels in wastewater samples collected by EPA and industry at a number of meat and poultry product facilities. (Sampling efforts are described in Section 3.) In developing the final rule, EPA used data from samples collected by EPA and industry to determine the levels of *Aeromonas*, ammonia as nitrogen, biochemical oxygen demand (BOD), carbonaceous biochemical oxygen demand, chemical oxygen demand (COD), chloride, *Cryptosporidium*, dissolved biochemical oxygen demand, dissolved total phosphorus, *Escherichia coli* (*E. coli*), fecal coliform bacteria, fecal *Streptococcus*, 21 metals, oil and grease (measured as *n*-hexane-extractable material [HEM]), nitrate/nitrite, six pesticides, *Salmonella*, total coliform bacteria, total dissolved solids (TDS), total Kjeldahl nitrogen (TKN), total organic carbon (TOC), total orthophosphate, total phosphorus, total residual chlorine, total suspended solids (TSS), and volatile residue. As explained in Section 7, EPA is regulating a subset of these pollutants.

Sections A.1 and A.2 of this appendix explain nominal quantitation limits and baseline values. Section A.3 describes the reporting conventions used by laboratories in expressing the results of the analyses. Section A.4 describes each analytical method and the corresponding baseline values that EPA used in determining the pollutants of concern. Section A.5 defines total nitrogen. Table A-1 lists the analytical methods and baseline values used for each pollutant.

A.1 NOMINAL QUANTITATION LIMITS

The nominal quantitation limit is the smallest quantity of an analyte that can be reliably measured with a particular method. Protocols used for determining nominal quantitation limits in a particular method depend on the definitions and conventions that EPA used at the time the method was developed. The nominal quantitation limits associated with the methods addressed in this section fall into five categories:

1. The first category pertains to EPA Methods 1660 and 1664, which define the minimum level (ML) as the lowest level at which the entire analytical system must give a recognizable signal and an acceptable calibration point for the analyte. These methods are described in Section A.4.1.

2. The second category pertains specifically to EPA Method 1620, which is explained in detail in Section A.4.2.

3. The third category pertains to the remainder of the chemical methods (classical wet chemistry and pesticides) in which a variety of terms are used to describe the lowest level at which measurement results are quantitated. In some cases (especially with the classical wet chemistry analytes) the methods date to the 1970s and 1980s when EPA used different concepts of quantitation. These methods typically list a measurement range or lower limit of measurement. The terms differ by method and, as discussed in subsequent sections, the levels presented are not always representative of the lowest levels laboratories currently can achieve.

   For methods associated with a calibration procedure, the laboratories demonstrated through a low-point calibration standard that they were capable of reliable quantitation at method-specified (or lower) levels. In such cases these nominal quantitation limits are operationally equivalent to the ML (though not specifically identified as such in the methods). In the case of titrimetric or gravimetric methods, the laboratory adhered to the established lower limit of the measurement range published in the methods. Details of the specific methods are presented in Sections A.4.3 through A.4.17.

4. The fourth category pertains to *Cryptosporidium*. There is currently no detection limit associated with the method used to determine *Cryptosporidium* (EPA Method 1622, described in Section A.4.18), so when *Cryptosporidium* was not found in the sample, no number was associated with the sample. Therefore, there is no nominal quantitation limit for *Cryptosporidium*.

5. The fifth category pertains to all microbiological methods except methods for *Cryptosporidium*. The fifth category pertains specifically to the multiple-tube test procedure, explained in detail in Section A.4.19.

A.2 BASELINE VALUES

As described further in Section 7, in determining the pollutants of concern, EPA compared the reported concentrations for each pollutant to a multiple of the baseline value. As described in Section A.3 and shown in Table A-1, for most pollutants, the baseline value was set equal to the nominal quantitation limit for the analytical method. EPA made two general types of exceptions, and these are briefly described below. Section A.4 provides additional details about these exceptions in the context of the analytical method.

The first type of exception occurred when baseline values differed from the nominal quantitation limits in the analytical methods. When the baseline values had lower values, EPA made these exceptions because the laboratory had submitted data that demonstrated reliable measurements could be obtained at lower levels for those pollutants. When the baseline values had higher values, EPA concluded that the nominal quantitation limit for a specified method was less than the level that laboratories could reliably achieve and adjusted the baseline value upward.

The second type of exception was setting baseline values at a common value for multiple analytical methods for the same pollutant. For some analytes, EPA permitted the laboratories to choose between methods to accommodate sample characteristics. When these methods had different nominal quantitation limits, EPA usually used the one with the lowest value or the one associated with the method used for most samples.

A.3 ANALYTICAL RESULTS REPORTING CONVENTIONS

All of the analytical chemistry data were reported as liquid concentrations in weight/volume units, e.g., micrograms per liter (µg/L). *Cryptosporidium* results were reported in the calculated number of *Cryptosporidium* oocysts detected per liter. Bacteriological data generated using multiple-tube fermentation techniques were reported as most probable number per 100 milliliters (MPN/100 mL) or for data generated using membrane filtration techniques, as colony forming units (CFU/100 mL).

The laboratories expressed the results of the analyses either numerically or as not quantitated[1] for a pollutant in a sample. If the pollutant was quantitated[2] in the sample, then the result was expressed numerically. For the non-quantitated results, for each sample, the laboratories reported a "sample-specific quantitation limit."[3] The sample-specific quantitation limit for a particular pollutant is generally the smallest quantity in the calibration range that can be measured in any given sample. The sample-specific quantitation limit was used as a reporting limit for this industry. Two reporting examples are provided below.

Example 1: For a hypothetical pollutant X, the sample-specific quantitation limit is 10 µg/L. When the laboratory quantitated the amount of pollutant X in the sample as being 15 µg/L, the result would be reported as "15 µg/L".

Example 2: For the hypothetical pollutant X, the sample-specific quantitation limit is 10 µg/L. When the laboratory could not quantitate the amount of pollutant X in the sample, the result would be reported as "<10 µg/L." That is, the analytical result indicated a value less than the sample-specific quantitation limit of 10 µg/L. The actual amount of pollutant X in that sample is between zero (i.e., the pollutant is not present) and 10 µg/L. If a pollutant is reported as non-quantitated in a particular wastewater sample, this does not mean that the pollutant is not present in the wastewater. It means that analytical techniques (whether because of instrument limitations, pollutant interactions, or other reasons) do not permit its measurement at levels below the sample-specific quantitation limit.

In its calculations, EPA generally substituted the reported value of the sample-specific quantitation limit for each non-quantitated result. In a few cases described in Section A.4.1, when the sample-specific quantitation limit was less than the baseline value, EPA substituted the

[1] Elsewhere in this document and in the preamble to the final rule, EPA refers to pollutants as "not detected" or "non-detected." This appendix uses the term "not quantitated" or "non-quantitated" rather than non-detected.

[2] Elsewhere in this document and in the preamble to the final rule, EPA refers to pollutants as "detected." This appendix uses the term "quantitated" rather than detected.

[3] Elsewhere in this document and in the preamble to the proposed rule, EPA refers to a "sample-specific quantitation limit" as a "sample-specific detection limit" or, more simply, as a "detection limit."

baseline value for the non-quantitated result. And in a few instances (also described in Section A.4.1), when the quantitated value was below the baseline value, EPA considered these values to be non-quantitated in the statistical analyses and substituted the baseline value for the measured value.

A.4 ANALYTICAL METHODS

EPA and industry analyzed all of the meat product facility wastewater samples using methods identified in Table A-1. (As explained in Section 7, EPA is regulating only a subset of these analytes.) EPA generally used either EPA methods from *Methods for Chemical Analysis of Water and Wastes* (MCAWW) or the American Public Health Association's *Standard Methods for the Examination of Water and Wastewater* (SM). Table A-1 provides a summary of the pollutants analyzed, the method(s) used to measured each analyte, the nominal quantitation levels, and the baseline levels. The following sections provide additional information supporting the summary in Table A-1.

In analyzing samples, EPA generally used approved analytical methods listed in Title 40, Part 136 of the Code of Federal Regulations (40 CFR 136) for compliance monitoring or methods EPA has used for decades in support of effluent guidelines development. Exceptions for use of non-approved methods are explained in the method-specific subsections that follow Table A-1. Except for nitrate/nitrite, EPA established limitations or standards based only on data generated by approved methods listed in 40 CFR 136. As explained in Section A.4.10, EPA used nitrate/nitrite data from Method 300.0 to develop the final limitations and standards for total nitrogen and is promulgating the use of Method 300.0 for compliance.

Each of the following sections states whether the method is approved for compliance monitoring in 40 CFR 136 (even if the pollutant will not be regulated), provides a short description of the method, identifies the nominal quantitation limit, and explains EPA's choice for the baseline value. The sections are ordered alphabetically by analyte name within the five categories identified in Section A.1.

Table A-1. Analytical Methods and Baseline Values

Analyte	Method	CAS Number	Sample Collection & Analysis	Nominal Quantitation Value	Baseline Value
Aeromonas	9260L	C2101	EPA	2.0/100 mL	2.0/100 mL
Ammonia as nitrogen	350.1	7664417	Industry	0.01 mg/L	0.20 mg/L
	350.2		EPA	0.20 mg/L	
	350.3		Industry	0.03 mg/L	
	SM4500-NH3 B			N/A	
	SM4500-NH3 C			0.02 mg/L	
	SM4500-NH3 E			5.0 mg/L	
	SM4500-NH3 F			0.03 mg/L	
	SM4500-NH3 G			0.8 mg/L	
Antimony	1620	7440360	EPA	20.0 µg/L	20.0 µg/L
Arsenic	1620	7440382	EPA	10.0 µg/L	10.0 µg/L
Barium	1620	7440393	EPA	200.0 µg/L	200.0 µg/L
Beryllium	1620	7440417	EPA	5.0 µg/L	5.0 µg/L
BOD_5	405.1	C003	EPA	2.0 mg/L	2.0 mg/L
	SM5210 B			2.0 mg/L	
Boron	1620	7440428	EPA	100.0 µg/L	100.0 µg/L
Cadmium	1620	7440439	EPA	5.0 µg/L	5.0 µg/L
Carbonaceous BOD_5	405.1	C002	EPA	2.0 mg/L	2.0 mg/L
	SM5210 B			2.0 mg/L	
Carbaryl	632	63252	EPA	1.0 µg/L	1.0 µg/L
COD	410.1	C004	EPA	50.0 mg/L	5.0[a] mg/L
	410.2			5.0 mg/L	
	410.4 (automated)			3.0 mg/L	
	410.4 (manual)			20.0 mg/L[b]	
	SM5220 B			5.0 mg/L	
	SM5220 C		Industry	50.0 mg/L	
	HACH 8000			3.0 mg/L	
Chloride	300.0	16887006	EPA	0.05 mg/L	1.0 mg/L
	325.3			1.0 mg/L	
Chromium	1620	7440473	EPA	10.0 µg/L	10.0 µg/L
cis-Permethrin	1660	61949766	EPA	5.0 µg/L	5.0 µg/L
Cobalt	1620	7440484	EPA	50.0 µg/L	50.0 µg/L
Copper	1620	7440508	EPA	25.0 µg/L	25.0 µg/L
Cryptosporidium	1622	137259508	EPA	0 oocysts/L	0 oocysts/L
Dichlorvos	1657	62737	EPA	2.0 µg/L	2.0 µg/L
Dissolved BOD_5	405.1	C003D	EPA	2.0 mg/L	2.0 mg/L

Table A-1. Analytical Methods and Baseline Values (Continued)

Analyte	Method	CAS Number	Sample Collection & Analysis	Nominal Quantitation Value	Baseline Value
Dissolved total phosphorus	365.2	14265442D	EPA	0.01 mg/L	0.01 mg/L
	365.3				
E. coli	SM9221 F	C050	EPA	2.0/100 mL	2.0/100 mL
Fecal coliform	SM9221 C	C2106	Industry	2.0/100 mL	2.0/100 mL
	SM9221 E		EPA	2.0/100 mL	
	SM 9222 D		Industry	2.0/100 mL	
Fecal Streptococcus	SM9230 B	C2107	EPA	2.0/100 mL	2.0/100 mL
HEM	1664	C036	EPA	5.0 mg/L	5.0 mg/L
	1664 A			5.0 mg/L	
Lead	1620	7439921	EPA	50.0 µg/L	50.0 µg/L
Malathion	1657	121755	EPA	2.0 µg/L	2.0 µg/L
Manganese	1620	7439965	EPA	15 µg/L	15 µg/L
Mercury	1620	7439976	EPA	0.20 µg/L	0.20 µg/L
Molybdenum	1620	7439987	EPA	10.0 µg/L	10.0 µg/L
Nickel	1620	7440020	EPA	40.0 µg/L	40.0 µg/L
Nitrate/Nitrite	300.0	C005	EPA	0.01 mg/L	0.05 mg/L
	352.1		Industry	0.1 mg/L	
	353.1		EPA	0.01 mg/L	
	353.2		EPA	0.05 mg/L	
	354.1		Industry	0.01 mg/L	
	SM4500-NO2 B		Industry	0.005 mg/L	
	SM4500-NO3 D		Industry	0.14 mg/L	
	SM4500-NO3 E		Industry	0.01 mg/L	
Oil and grease	413.1	C036	Industry	5.0 mg/L	5.0 mg/L
	SM5520 B		Industry	10.0 mg/L	
	SM 5520 D		Industry	10.0 mg/L	
Salmonella	FDA-BAM	68583357	EPA	2.0 mg/L	2.0 mg/L
Selenium	1620	7782492	EPA	5.0 µg/L	5.0 µg/L
Silver	1620	7440224	EPA	10.0 µg/L	10.0 µg/L
Tetrachlorvinphos	1657	22248799	EPA	2.0 µg/L	2.0 µg/L
Thallium	1620	7440280	EPA	10.0 µg/L	10.0 µg/L
Tin	1620	7440315	EPA	30.0 µg/L	30.0 µg/L
Titanium	1620	7440326	EPA	5.0 µg/L	5.0 µg/L
Total coliform	SM9221 B	E10606	EPA	2.0/100 mL	2.0/100 mL
Total dissolved solids	160.1	C010	EPA	10.0 mg/L	10.0 mg/L

Table A-1. Analytical Methods and Baseline Values (Continued)

Analyte	Method	CAS Number	Sample Collection & Analysis	Nominal Quantitation Value	Baseline Value
Total Kjeldahl nitrogen	351.2	C021	EPA	0.10 mg/L	0.5 mg/L
	351.3		EPA	0.50 mg/L	
	SM4500-Norg B		Industry	N/A	
	SM4500-NH3 E		Industry	5.0 mg/L	
Total organic carbon	415.1	C012	EPA	1.0 mg/L	1.0 mg/L
Total orthophosphate	300.0	C034	EPA	0.20 mg/L	0.01 mg/L
	365.2			0.01 mg/L	
Total phosphorus	365.2	14265442	EPA	0.01 mg/L	0.01 mg/L
	365.3		EPA	0.01 mg/L	
	365.4		Industry	0.01 mg/L	
	SM4500-P B		Industry	0.01 mg/L	
	SM4500-P E		Industry	0.01 mg/L	
	HACH 8190		Industry	0.01 mg/L	
Total residual chlorine	330.5	7782505	EPA	0.20 mg/L	0.20 mg/L
	HACH 8167			0.10 mg/L	
Total suspended solids	160.2	C009	EPA	4.0 mg/L	4.0 mg/L
	SM2540 D		Industry	4.0 mg/L	
trans-Permethrin	1660	61949777	EPA	5.0 µg/L	5.0 µg/L
Vanadium	1620	7440622	EPA	50.0 µg/L	50.0 µg/L
Volatile residue	160.4	C030	EPA	10.0 mg/L	10.0 mg/L
Yttrium	1620	7440655	EPA	5.0 µg/L	5.0 µg/L
Zinc	1620	7440666	EPA	20.0 µg/L	20.0 µg/L

[a] The baseline value was adjusted to reflect the lowest nominal quantitation limit of the titrimetric procedures (410.1, 410.2, and 5220B). See Section A.4.6 for a detailed explanation.

[b] Method 410.4 lists two different quantitation limits that are dependent on whether the automated or manual protocols were followed. The automated method limit is 3 mg/L and the manual method limit is 20 mg/L.

A.4.1 EPA Methods 1660 (*cis*-Permethrin, *trans*-Permethrin) and 1664, 1664A, 413.1, SM5520B, and SM5520D (HEM)

Laboratories used EPA Method 1660 to measure *cis*-permethrin and *trans*-permethrin, and EPA Methods 1664 and 1664A to measure *n*-hexane-extractable material (HEM). While 40 CFR 136 lists Method 1664A as an approved method for compliance monitoring of HEM, Part 136 does not list any methods for the pesticides *cis*-permethrin and *trans*-permethrin. Table 7 in 40 CFR 455, however, lists Method 1660 as approved for compliance monitoring of permethrin for the Pesticide Chemicals Point Source Category. (Permethrin is the common name given to any mixture of the two isomers, *cis*-permethrin and *trans*-permethrin.)

These methods use the minimum level (ML) concept for quantitation of the pollutant(s). The ML is defined as the lowest level at which the entire analytical system must give a recognizable signal and an acceptable calibration point for the analyte. When an ML is published in a method, EPA has demonstrated that the ML can be achieved in at least one well-operated laboratory. When that laboratory or another laboratory uses that method, the laboratory is required to demonstrate, through calibration of the instrument or analytical system, that it can achieve pollutant measurements at the ML.

For *cis*-permethrin, *trans*-permethrin, and HEM, EPA used the method-specified MLs as the baseline values. In determining the pollutants of concern and in calculating the HEM standards, if a quantitated value or sample-specific quantitation limit was reported with a value less than the ML specified in the method, EPA substituted the value of the ML and assumed that the measurement was not quantitated. For example, for *cis*-permethrin with an ML of 5 µg/L, if the laboratory reported a quantitated value of 3 µg/L, EPA would have assumed that the concentration was not quantitated[4] with a sample-specific quantitation limit of 5 µg/L. The objective of this comparison was to identify any results for the three pollutants reported below the method-defined ML. Results reported below the ML were changed to the ML to ensure that all results used by EPA were reliable. In most cases, the quantitated values and sample-specific quantitation limits were equal to or greater than the baseline values.

[4] As explained in Appendix C, EPA applied different statistical assumptions to quantitated and non-quantitated results.

A.4.2 EPA Method 1620 (Metals)

Laboratories used EPA Method 1620 to measure the concentrations of 21 metals. Although EPA Method 1620 is not listed in 40 CFR 136 as an approved method for compliance monitoring, it represents a consolidation of the analytical techniques in several approved methods listed in 40 CFR Part 136, such as EPA Method 200.7 (inductively coupled plasma (ICP) atomic emission spectroscopy of trace elements) and Method 245.1 (mercury cold vapor atomic absorption technique). This method was developed specifically for the effluent guidelines program. EPA Method 1620 includes more metal analytes than are listed in the approved methods and contains quality control requirements at least as stringent as the approved methods in 40 CFR 136.

EPA Method 1620 employs the concept of an instrument detection limit (IDL). The IDL is defined as "the smallest signal above background noise that an instrument can detect reliably."[5] Data reporting practices for EPA Method 1620 analyses follow the conventional metals-reporting practices used in other EPA programs, in which values are required to be reported at or above the IDL. In applying EPA Method 1620, IDLs are determined on a quarterly basis by each analytical laboratory and are, therefore, laboratory-specific and time-specific. Although EPA Method 1620 contains MLs, the MLs predate EPA's recent refinements of the ML concept described earlier. The ML values associated with EPA Method 1620 are based on a consensus opinion reached between EPA and laboratories during the 1980s regarding levels that could be considered reliable quantitation limits when using EPA Method 1620. These limits do not reflect advances in technology and instrumentation since the 1980s. Consequently, the IDLs were used as the lowest values for reporting purposes, with the general understanding that reliable results can be produced at or above the IDLs. Though the baseline values were derived from the MLs (or adjusted MLs) in EPA Method 1620, EPA used the laboratory-reported quantitated values and sample-specific quantitation limits, which captured concentrations down to the IDLs, in its data analyses.

[5] Keith, L.H., W. Crummett, J. Deegan, R.A. Libby, J.K. Taylor, G. Wentler (1983). "Principles of Environmental Analysis," Analytical Chemistry, Volume 55, Page 2217.

In general, EPA used the MLs specified in Method 1620 as the baseline values. However, EPA adjusted the baseline value for lead to 50 micrograms per liter (µg/L) and boron to 100 µg/L. In EPA Method 1620, lead has an ML of 5 µg/L for graphite furnace atomic absorption (GFAA) spectroscopy analysis; EPA determined, however, that it was not necessary for the laboratories to measure down to such low levels and that lead could be analyzed by ICP spectroscopy.[6] Consequently, the ML requirement was adjusted to 50 µg/L, the ML for the ICP method. In EPA Method 1620, boron has an ML of 10 µg/L, but laboratory feedback years ago indicated that laboratories could not reliably achieve this low level. As a result, EPA requires laboratories to measure values at only 100 µg/L and above. Thus, EPA adjusted the baseline value to 100 µg/L.

A.4.3 Methods 350.1, 350.2, 350.3, 4500-NH_3 B, SM4500-NH_3 C, SM4500-NH_3 D, SM4500-NH_3 E, SM4500-NH_3 F, and SM4500 NH_3-G (Ammonia as Nitrogen)

For EPA sampling episodes, ammonia as nitrogen was measured using Method 350.2, which is listed as approved for compliance monitoring in 40 CFR 136. Industry supplied data generated by 350.1, 350.3, SM4500-NH_3 B, SM4500-NH_3 C, SM4500-NH_3 D, SM4500-NH_3 E, SM4500-NH_3 F, and SM4500-NH_3 G. All of the methods used by the industry to determine ammonia as nitrogen are approved in 40 CFR 136, except for SM4500-NH3 D.

Method 350.2 utilizes either colorimetric, titrimetric, or electrode procedures to measure ammonia. SM4500-NH3 B is a preliminary distillation procedure used to separate the ammonia from sample matrix interferences. Method 350.1 is an automated colorimetric method that uses a continuous flow analytical system; SM4500-NH_3 C is colorimetric; SM4500-NH3 D is a phenate method; SM4500-NH_3 E is titrimetric; and 350.3 and SM4500-NH_3 F & G are potentiometric methods that all measure ammonia.

Method 350.2 has a lower measurement range limit of 0.20 milligrams per liter (mg/L) for the colorimetric and electrode procedures and a lower measurement range limit of 1.0 mg/L for the titrimetric procedure. Rather than using different baseline values for the same pollutant,

[6] Also antimony, arsenic, selenium, and thallium were analyzed by ICP instead of GFAA. The method MLs were used because the laboratories demonstrated that their IDLs were able to quantitate below the ML for these four analytes.

EPA used the 0.20 mg/L because it represented a value at which ammonia as nitrogen can be measured reliably by several determinative techniques in Method 350.2, as well as in other approved methods in 40 CFR 136.

A.4.4 Methods 405.1 and SM5210 B (BOD_5, Carbonaceous BOD_5, and Dissolved BOD_5)

Biochemical oxygen demand (BOD_5), carbonaceous BOD_5 ($CBOD_5$), and dissolved BOD_5 ($DBOD_5$) were measured using Method 405.1 and Standard Method (SM) 5210 B, both of which are approved for compliance monitoring in 40 CFR 136. BOD_5 and $CBOD_5$ are essentially the same method, except an organic compound is added to the $CBOD_5$ test to inhibit nitrogenous oxygen demand. If the sample does not include any nitrogenous demand to inhibit, the results should be comparable for BOD_5 and $CBOD_5$. BOD_5 and dissolved BOD_5 are the same method, except that the dissolved BOD_5 sample is filtered prior to analysis (either in the field or immediately upon receipt by the laboratory).

Method 405.1 and SM5210 B are identical and the nominal quantitation limit, expressed in the methods as the lower limit of the measurement range at 2 mg/L, is the same for all three forms of BOD_5. EPA used this nominal quantitation limit of 2 mg/L as the baseline value in determining the pollutants of concern.

A.4.5 EPA Method 632 (Carbaryl)

Carbaryl was determined by EPA Method 632. No methods approved for carbaryl are given in 40 CFR 136. However, Method 632 is approved for compliance monitoring of carbaryl for the Pesticide Chemicals Point Source Category (see Table 7 in 40 CFR 455).

In this method, samples are prepared by liquid-liquid extraction with methylene chloride in a separatory funnel. The extract is analyzed by a high-pressure liquid chromatograph with an ultraviolet (UV) detector. The nominal quantitation limit was determined by a low-point calibration standard. The nominal quantitation limit for carbaryl is 1 μg/L, which was used as the baseline value.

A.4.6 Methods 410.1, 410.2, 410.4, SM5220 B, SM5220 C, and HACH 8000 (Chemical Oxygen Demand)

EPA determined chemical oxygen demand (COD) using Methods 410.1, 410.2, 410.4, and SM5220 B. Industry determined COD using SM5220 C and HACH 8000. Methods 410.1, 410.2, 410.4, SM5220 C and HACH 8000 are approved for compliance monitoring in 40 CFR 136.

Methods 410.1, 410.2, and SM5220 C are titrimetric procedures that follow identical analytical protocols and differ only in the range of COD concentrations that they are designed to measure. Reagent concentrations and sample volumes are adjusted to accommodate a wide range of sample concentrations, because the dynamic range of the chemistry used to detect COD is somewhat limited. Standard Method 5220 B is a titrimetric method that incorporates the different reagent concentrations and sample volumes listed in Methods 410.1 and 410.2 into one method. Data from all three of these methods are directly comparable. Method 410.4 is a colorimetric procedure. The HACH 8000 method is a colorimetric procedure that utilizes a preliminary digestion procedure and can be used for various concentration ranges.

Methods 410.1 and SM5220 C are designed to measure mid-level concentrations (greater than 50 mg/L) of COD and are associated with a nominal quantitation limit of 50 mg/L. Method 410.2 is designed to measure low-level concentrations of these parameters in the range of 5 to 50 mg/L. Method 410.4 has a measurement range of 3 to 900 mg/L for automated procedures and a measurement range of 20 to 900 mg/L for manual procedures. The HACH 8000 method has a lower measurement limit of 3.0 mg/L. EPA contracts required laboratories to measure down to the lowest quantitation limit possible regardless of the method used. Therefore, if the laboratory analyzed a sample using Method 410.1 and obtained a non-quantitated result, it had to reanalyze the sample using Method 410.2. Thus, the quantitation limit reported for non-quantitated results was equal to 5 mg/L, unless sample dilutions were required for complex matrices.

For all COD data, EPA used the baseline value of 5 mg/L, which is associated with the lower quantitation limit for the titrimetric procedures because most of the data used to determine the pollutants of concern had been obtained by the titrimetric procedures (Methods 410.1, 410.2, or SM5220 B).

A.4.7 Methods 325.3 and 300.0 (Chloride)

Chloride was measured using Method 325.3, which is approved for compliance monitoring in 40 CFR 136, and Method 300.0, which is not listed in 40 CFR 136. Method 325.3 is a colorimetric (actually titrimetric) procedure and measures concentrations greater than 1 mg/L. Method 300.0 uses ion chromatography and can measure to levels as low as 0.05 mg/L. EPA allowed laboratories to use Method 300.0 even though it is not approved at 40 CFR 136 because the analytical methods normally used for chloride are subject to interferences sometimes present in samples containing blood, animal tissue, or other particulates. With Method 300.0, the complex matrices are not a factor and this method has a lower nominal quantitation limit than Method 325.3. (Section A.4.10 provides a more detailed description of Method 300.0.)

For all chloride data, EPA used the baseline value of 1 mg/L, which is associated with the higher quantitation limit for the colorimetric procedure because most of the data used in the pollutants of concern analysis had been obtained by the colorimetric procedure (Method 325.3).

A.4.8 EPA Method 1657 (Dichlorvos, Malathion, Tetrachlorvinphos)

Laboratories used Method 1657 to measure dichlorvos, malathion, and tetrachlorvinphos concentrations in the samples. There is one approved method for malathion at 40 CFR 136 – SM6630C; however, the other two pesticides are not listed in 40 CFR 136. EPA Method 1657 was selected for analysis of all three pesticides for several reasons, including the following:

- Method 1657 is approved for compliance monitoring of all three pesticides for the Pesticide Chemicals Point Source Category (see Table 7[7] in 40 CFR 455).
- EPA 1600-series methods were developed specifically for the effluent guidelines program; therefore, they have more stringent quality control requirements than Standard Methods.
- It was more economical to use one method for the three pesticides than to analyze malathion separately by SM6630C.

[7] Table 7 lists tetrachlorvinphos as stirofos.

In Method 1657, samples are prepared by liquid-liquid extraction. The extract is dried and concentrated and a 1-µL aliquot of the extract is injected into the gas chromatography equipment. The nominal quantitation limit of 2 µg/L was used as the baseline value for all three pesticides. This nominal quantitation limit was determined from the results of low-point calibration standards.

A.4.9 Methods 365.2, 365.3, 365.4, SM4500-P B, SM4500-P E, and HACH 8190 (Dissolved Total Phosphorus and Total Phosphorus)

EPA determined dissolved total phosphorus and total phosphorus by Methods 365.2 and 365.3. Industry determined total phosphorus by Methods 365.4, SM4500-P B, SM4500-P E, and HACH 8190. Methods 365.2, 365.3, 365.4, SM4500-P B, and SM4500-P E are approved for compliance monitoring of total phosphorus at 40 CFR 136. HACH 8190 is a colorimetric method that is considered to be a comparable version of Method 365.2. Total phosphorus represents all of the phosphorus present in the sample, regardless of form, as measured by the persulfate digestion procedure. Dissolved phosphorus results were obtained by filtering the sample prior to this step.

Methods 365.2 and 365.3 are spectrophotometric methods that differ from each other only in the preparation of one of the reagents. Method 365.2 specifies the separation of the ammonium molybdate and the antimony potassium tartrate from the ascorbic acid reagent, while Method 365.3 allows for the combining these reagents into a single solution. Because the chemistry is unaffected, data from the two methods are directly comparable. Method 365.4 is an automated colorimetric method. SM4500-P B is the sample digestion step used with SM 4500-P E, a spectrophotometric method comparable to Method 365.2.

These methods have the same nominal quantitation limit, 0.01 mg/L, for both analytes. EPA used this value as the baseline value for both dissolved total phosphorus and total phosphorus.

A.4.10 Methods 300.0, 352.1, 353.1, 353.2, 354.1, SM4500-NO_2 B, SM4500NO_3-D, and SM4500-NO_3 E (Nitrate/Nitrite)

For EPA sampling episodes, nitrate/nitrite was measured by Methods 300.0, 353.1, and 353.2. For industry-supplied data, nitrate/nitrite was measured by Methods 352.1, 354.1, SM4500-NO_2 B, SM4500-NO_3 D, and SM4500-NO_3 E. All of these methods, except for Methods 300.0 and SM4500-NO3 D, are approved for compliance monitoring in 40 CFR 136. Because nitrate/nitrite is a component of total nitrogen (see Section A.5), EPA considered approving EPA Method 300.0 at 40 CFR Part 432 for compliance monitoring of nitrate/nitrite or amending 40 CFR Part 136 to include Method 300.0 for determination of nitrate/nitrite from wastewaters. In the preamble to the MPP proposed rule, EPA requested comments on the use of this method for the MPP point source category and whether the method should be approved and included in 40 CFR Part 432, 40 CFR Part 136, or both. EPA did not receive any comments on this topic. EPA is planning to propose a rule to amend 40 CFR Part 136 to include Method 300.0 for determining nitrate/nitrite in wastewater.

Many of the approved analytical methods for nitrite/nitrate in 40 CFR 136, including Methods 352.1, 353.1 and 353.2, are based on colorimetric techniques (adding to a sample reagents that form a colored product when they react with the nitrate/nitrite and then measuring the intensity of the colored product). Such methods can be subject to interferences in the complex matrices associated with this industry, where samples may contain blood, animal tissue, or other particulates that affect both the color development and ability to pass light through the sample to measure the intensity of the colored product. In contrast, Method 300.0 employs the technique known as ion chromatography to measure 10 inorganic anions, including nitrate and nitrite. Ion chromatography permits the various inorganic anions to be separated from one another as well as from other materials and contaminants present in the sample. Each anion can be identified on the basis of its characteristic retention time (the time required to pass through the instrumentation). After separation, the anions are measured by a conductivity detector that responds to changes in the effluent from the ion chromatograph–changes that occur when the negatively charged anions (analytes) elute at characteristic retention times, thereby changing the conductivity of the solution. Thus, Method 300.0 offers better specificity for nitrate and nitrite in the presence of

interferences compared with the approved colorimetric methods. Method 300.0 is included in the rulemaking record (Docket No. W-01-06, Record No. 10036).

Methods 353.1 and 353.2 are essentially the same method, with variations in the technique used to reduce the nitrite (NO_2) present in the sample to nitrate (NO_3). Method 353.1 uses hydrazine to accomplish the reduction, while Method 353.2 uses cadmium granules. Method 353.2 is typically preferred simply because the cadmium granules are far easier to handle and less toxic than hydrazine. The chemistry of the colorimetric determination is the same, as are the interferences. SM4500-NO_3 E is a manual cadmium reduction method that is similar to Method 353.3. The reduction methods convert all of the nitrate into nitrite and measure total nitrite concentration.

Methods 354.1 and SM4500-NO_2 B directly measure nitrite. These methods are essentially the same as the oxidized nitrogen methods, but without the reduction. Methods 352.1, SM4500-NO_3 D, and 300.0 directly measure nitrate. Method 352.1 uses the colorimetric reaction of brucine sulfate with nitrate to form a color that is proportional to the nitrate concentration. SM4500-NO_3 D uses a nitrate electrode to measure nitrate. Method 300.0 is detailed above.

Each of the methods lists slightly different nominal quantitation limits that are expressed in the methods as the lower limit of the measurement range. The nominal quantitation limit for Methods 300.0, 353.1, 354.1, and SM4500-NO_3 E is 0.01 mg/L. The nominal quantitation limit for Method 353.2 is 0.05 mg/L, and for 352.1 is 0.1 mg/L. The nominal quantitation limit for SM4500-NO_2 B is 0.005 mg/L and for SM4500-NO_3 D is 0.14 mg/L. Rather than use different baseline values for the same pollutant, EPA used the nominal quantitation limit of 0.05 mg/L from Method 353.1 as the baseline value for nitrate/nitrite. EPA chose this value because Method 353.1 was used to obtain most of the data used in the pollutants of concern analysis. This value is also the maximum of the nominal quantitation limits from the methods used by EPA.

A.4.11 Methods 413.1, SM5520 B, and SM5520 D (Oil and Grease)

Industry determined oil and grease by Methods 413.1, SM5520 B, and SM5520 D. Methods 413.1 and SM5520 B are listed as approved methods for compliance monitoring in 40 CFR 136, whereas SM5520 D is not listed there. Methods 413.1 and SM5520 B are gravimetric

methods. SM5520 D is a soxhlet extraction method. Method 413.1 has a lower limit measurement range of 5.0 mg/L, and SM5520 B and SM5520 D have a lower limit measurement range of 10 mg/L. EPA used the nominal quantitation limit of 5.0 mg/L from EPA Method 1664A as the baseline value.

A.4.12 Method 160.1 (Total Dissolved Solids)

Total dissolved solids (TDS) was measured by Method 160.1, which is approved for compliance monitoring in 40 CFR 136 (see 'residue – filterable'). Method 160.1 is a gravimetric method with a lower limit measurement range of 10 mg/L. EPA used this nominal quantitation limit of 10 mg/L as the baseline value.

A.4.13 Methods 351.2, 351.3, SM4500-Norg B, and SM4500-NH_3 E (Total Kjeldahl Nitrogen)

For EPA sampling episodes, total Kjeldahl nitrogen (TKN) was measured by Methods 351.2 and 351.3. For industry supplied data, TKN was measured by SM4500-Norg B and SM4500-NH_3 E. All of these methods are approved for compliance monitoring in 40 CFR 136.

Method 351.2 is designed to be used with a flow colorimetry apparatus with a lower measurement range limit of 0.1 mg/L. Method 351.3 is a manual colorimetric analysis that has a lower measurement range limit of 0.5 mg/L. SM4500-Norg B is the sample preparation method and SM4500-NH_3 E is the determinative method for TKN. SM4500-Norg B and SM4500-NH_3 have a lower measurement range of 5 mg/L. Rather than use different baseline values for the same pollutant, EPA used the nominal quantitation limit of 0.5 mg/L from Method 351.3 as the baseline value for TKN. EPA chose this value because Method 351.3 was used by EPA to obtain most of the data used in the pollutants of concern analysis. This value is also the maximum of the nominal quantitation limits from the two methods used by EPA.

A.4.14 Method 415.1 (Total Organic Carbon)

Total organic carbon (TOC) was determined by Method 415.1, which is approved for compliance monitoring in 40 CFR 136. Method 415.1 is a combustion (or oxidation) method

with a lower measurement range limit of 1 mg/L. EPA used this nominal quantitation limit of 1 mg/L as the baseline value.

A.4.15 Methods 365.2 and 300.0 (Total Orthophosphate)

Methods 365.2 and 300.0 were used to measure orthophosphate concentrations. Total orthophosphate is the inorganic phosphorus (PO_4) in the sample. Method 365.2 is approved for compliance monitoring of total orthophosphate in 40 CFR 136, while Method 300.0 is not. As explained previously (see Sections A.4.7 and A.4.10), EPA allowed laboratories to use Method 300.0 because interferences sometimes present in samples containing blood, animal tissue, or other particulates are not a factor in the analysis.

Method 365.2 is a colorimetric method for determining orthophosphate and measures concentrations greater than 0.01 mg/L. Method 300.0 uses ion chromatography and can measure down to 0.20 mg/L. For all orthophosphate data, EPA used the baseline value of 0.01 mg/L, which is associated with the lower quantitation limit for the colorimetric procedure because the laboratories used Method 365.2 to produce the majority of the data used in the pollutants of concern analysis.

A.4.16 Methods HACH 8167 and 330.5 (Total Residual Chlorine)

Total residual chlorine was determined by Methods 330.5 and HACH 8167. Method 330.5 is approved for compliance monitoring in 40 CFR 136. Methods 330.5 and HACH 8167 use the same colorimetric reagent, N,N-diethyl-p-phenylene diamine (DPD), and are essentially the same procedure; thus, the data are directly comparable.

The nominal quantitation limit in Method 330.5 is 0.2 mg/L; the nominal quantitation limit for method HACH 8167 is 0.1 mg/L. Rather than use two different baseline values for the same pollutant, EPA used the value associated with Method 330.5 (0.2 mg/L) as the baseline value because Method 330.5 was used to produce the majority of the data used in the pollutants of concern analysis. The Method 330.5 baseline value also is the higher of the two values.

A.4.17 Method 160.2 and SM2540 D (Total Suspended Solids)

For EPA sampling episodes, total suspended solids (TSS) was determined using Method 160.2. For industry supplied data, TSS was measured by SM2540 D. Both methods are approved for compliance monitoring in 40 CFR 136. Both methods are gravimetric with a lower limit measurement range of 4 mg/L. The nominal quantitation limit of 4 mg/L was used as the baseline value.

A.4.18 Method 160.4 (Volatile Residue)

Volatile residue was determined by Method 160.4, which is approved for compliance monitoring in 40 CFR 136. Method 160.4 is a gravimetric and ignition method with a lower limit measurement range of 10 mg/L. The nominal quantitation limit of 10 mg/L was used as the baseline value.

A.4.19 EPA Method 1622 (*Cryptosporidium*)

Cryptosporidium was determined by EPA Method 1622, which, as explained in Section A.1, has not been approved for compliance monitoring. However, Methods 1622 and 1623 are 40 CFR Part 136-approved methods for *Cryptosporidium* for ambient water monitoring, published on July 21, 2003 (68 *Federal Register* (FR) 139, pages 43272–43283; correction notice in 68 FR 182 page 54934). In Method 1622, the laboratory filters a 10-liter sample through an absolute-porosity filter to capture any target organisms that may be present, elutes the filter, concentrates the eluate, purifies the concentrate using immunomagnetic separation, and applies the purified sample to a microscope slide. The purified sample is stained with an antibody stain and a vital dye stain, and target organisms are identified and counted based on immunofluorescence assay, differential interference microscopy, and vital dye staining characteristics.

Due to the high turbidity of the sample matrices for these episodes, it was necessary for the analytical laboratory to modify the sample processing steps of the method, depending on the nature of the particulates in the sample. For samples that contained a high concentration of biological particles, a small volume of the sample (100 to 250 milliliters (mL)) was concentrated using centrifugation and then processed according to EPA Method 1622. For samples with lower

concentrations of biological particulates that could be filtered, a 10-liter sample was filtered through a compressed foam filter, the filter was eluted, and the eluate was concentrated by centrifugation and then processed according to EPA Method 1622.

As explained earlier, there is no detection limit or baseline value associated with EPA Method 1622; however, EPA used the baseline value of zero in the pollutant of concern analysis. Furthermore, if *Cryptosporidium* was not quantitated, the sample was reported as zero.

A.4.20 SM9221B, SM9221C, SM9221D, SM9221E, SM9221F, SM9230B, SM9260L, FDA-BAM Chapter 5 (Total Coliform, Fecal Coliform, *E. coli*, Fecal Streptococcus, *Aeromonas*, *Salmonella*)

Laboratories measured the densities of total coliform, fecal coliform, *E. coli*, fecal streptococcus, *Aeromonas*, and *Salmonella* in 100-milliliter samples using the multiple-tube fermentation procedures specified in *Standard Methods* and the Food and Drug Administration's *Biological Analytical Manual* (FDA-BAM). EPA used methods approved for compliance monitoring in 40 CFR 136 for total coliform (SM9221B), fecal coliform (SM9221C,D,E), and fecal streptococcus (SM9230B). At the time of the sampling there were no methods approved in 40 CFR 136 for *E. coli*, *Aeromonas*, and *Salmonella*; however, EPA published final ambient water monitoring methods for *E.coli* on July 21, 2003 (68 FR 139, pages 43272–43283; correction notice in 68 FR 182, page 54934). The method used for *E. coli*, SM9221F, is now an approved method in Part 136.

To measure total coliform (SM 9221B), fecal coliform (SM 9221C,D,E), and *E. coli* (SM 9221F), samples were inoculated into a presumptive medium (lauryl tryptose broth) and incubated. Tubes positive for growth and gas production were transferred into confirmatory media: brilliant green bile broth (for total coliform), EC (for fecal coliform), or EC-MUG (for *E. coli*). Tubes with growth and gas production in their respective media were recorded as positive.

To measure fecal streptococcus (SM 9230B), samples were inoculated into a presumptive medium (azide dextrose broth) and incubated. Tubes positive for turbidity (growth) were confirmed by streaking onto bile esculin agar plates. All plates with typical growth were recorded as positive for fecal streptococcus.

Aeromonas densities were determined using SM 9260L, followed by the confirmation steps in EPA Method 1605 to minimize false positive results. Samples were inoculated into a presumptive medium (TSB30) and incubated. Tubes with growth were streaked onto ampicillin-dextrin agar (ADA). All yellow colonies were isolated on nutrient agar and confirmed as *Aeromonas* if they were oxidase positive and were able to ferment trehalose. In addition to the biochemical confirmation, colony morphologies from ADA and nutrient agar were recorded and used to differentiate between *Aeromonas* and *Bacillus*.

The FDA-BAM Chapter 5 method was used to determine *Salmonella* densities. Samples were inoculated into a presumptive medium (tetrathionate broth) and incubated. Tubes with growth were streaked onto Hektoen enteric agar plates. Typical colonies were confirmed on triple sugar iron agar slants. The FDA-BAM method was used instead of the approved Kenner-Clark method because the performance of the FDA-BAM method is better suited for samples that contain blood and particulates.

The nominal quantitation limit for these analytes was determined using the most probable number (MPN) approach specified in *Standard Methods*. The MPN of each target organism per 100 milliliters was calculated based on the positive and negative results from the analysis of multiple replicates at multiple dilutions for each sample (see Table 9221.IV of *Standard Methods* and Table 2 in Appendix 2 of FDA-BAM). Based on the tables in *Standard Methods*, the nominal quantitation limit for all analytes was 2 MPN per 100 mL. The nominal quantitation limit was used as the baseline value. No values were reported below the baseline value.

A.4.20.1 Holding Time Study

When EPA conducted its own sampling episodes at the facilities, it exceeded the required holding time for some samples. Although laboratories qualified to conduct total coliform, fecal coliform, and *E. coli* analyses might have been within driving distance of the facilities being evaluated, laboratories qualified to perform fecal streptococcus, *Salmonella*, and *Aeromonas* analyses generally were not available, because analysis for these analytes is more complex than coliform analyses. As a result, for most sampling episodes, EPA decided to ship samples overnight to a laboratory capable of performing all of the bacterial analyses. Because these

samples would exceed the holding time requirements in 40 CFR 136, EPA performed a holding time study to evaluate the possible effects of analyzing samples at different holding times.

To determine whether or not the results for samples with longer holding times were consistent with results for samples analyzed within 8 hours (i.e., the time period consistent with 40 CFR 136 for compliance sampling), for total coliforms, fecal coliforms, *E. coli*, *Aeromonas*, fecal streptococcus, and *Salmonella* from MPP facilities, EPA conducted a holding time study to evaluate sample concentrations at 8, 24, 30, and 48 hours after sample collection for wastewater effluent samples from a beef facility (before disinfection and final effluent), a pork facility (final effluent prior to discharge into the sewer system), and a poultry facility (final effluent). The study report, which contains results for all target bacteria, is DCN 165311 in Section 22.6 in the public record for the Notice of Data Availability (NODA). Only the results for fecal coliform and *E. coli* are discussed here, because EPA is not establishing numeric limitations for other target indicators in the holding time study. As holding times increase, the fecal coliform and *E. coli* concentrations may change. EPA's intent in conducting the study was to gain some insight into the length of time that would still provide results comparable to the results for samples held for eight hours.

For red meat effluent, the results of this study indicate that samples for fecal coliform and *E. coli* measurements can be held for 24 hours and still produce results comparable to analyses conducted at 8 hours after sample collection, provided that samples are stored on ice until analysis and not frozen. For poultry wastewater effluent, the study results indicate that samples held longer than 8 hours do not provide comparable results to results at 8-hour holding times.

For red meat facilities where EPA is retaining the previously promulgated limitations and standards, EPA is using the fecal coliform data from the EPA sampling episodes for some analyses such as (1) calculations for loadings and (2) evaluation of treatment performance by comparing influent and effluent data. For the treatment technologies that EPA considered, all of the red meat data from sampling episodes are associated with holding times of about 24 hours. Based on the results of the holding time study, EPA is using the 24-hour data for these analyses. Note that EPA is not revising the current limitations and standards for red meat facilities and thus is not using these data to develop limitations and standards for fecal coliform. In the NODA,

EPA requested comments on the use of the 24-hour holding time data for analysis of loadings and treatment performance at red meat facilities. EPA did not receive any comments in response to the solicitation in the NODA.

For poultry facilities, where EPA transferred the existing limitations and standards from the red meat subcategories, EPA used only data within the 8-hour holding time for its loading analysis because the holding time study indicated that longer holding times for poultry processing wastewaters were not comparable to the 8-hour period. Because only one sampling episode (6304) meets this criterion, EPA based its loadings and other analyses on fecal coliform data from this single sampling episode and any appropriate self-monitoring data. EPA used these data in evaluating the achievability of the limitations that EPA transferred from the existing limitations for the red meat subcategory. EPA received comments on the transfer of limitations for the poultry subcategory from the red meat subcategory, and on its planned use of data to analyze loadings and treatment performance.

A.4.20.2 Monitoring of E. coli and Fecal Coliform

Although EPA considers fecal coliform to be the appropriate parameter for regulation for the MPP industry, EPA recognizes that some states and tribes may still prefer that facilities monitor directly for *E. coli*. Because concentrations of fecal coliform and *E. coli* might be similar in these matrices, EPA is considering an alternative that would allow facilities to monitor *E. coli* instead of fecal coliform in the effluent. This alternative would be available when EPA amends 40 CFR 136 to include an analytical method for *E. coli* in industrial effluent. EPA expects to promulgate such a method in the next few years. EPA is conducting validation studies of this method and expects to propose this method in 2004. See Vol. 68, No. 156 of the Federal Register for more detail.

A.4.20.3 Reporting Units

EPA received comments requesting that the Agency allow for monitoring of fecal coliforms to be reported in colony forming units (CFU) per 100 milliliters in addition to most probable numbers (MPN) per 100 mL as specified in the existing regulations. Based on the research of Thomas and Woodward in *Estimation of Coliforms Density by the Membrane Filter*

and the Fermentation Tube Methods, results from either technique can be considered comparable as long as the volume analyzed is equivalent. This finding of comparability is consistent with documentation for the existing fecal coliform limitations and standards. Therefore, EPA is revising the limitations and standards to allow for fecal coliform results to be reported in units of either MPN per 100 mL or CFU per 100 mL, based on the analytical method used to determine the results. Specifically, fecal coliform results should be reported in MPN per 100 mL if the multiple-tube format is used; and in CFU per 100 mL if the membrane filtration (MF) technique is used. According to SM 9222A and SM 9222B, although statistical comparisons show the MF technique to be more precise than the multiple-tube procedure, data generated from the MF and the multiple-tube test yield approximately the same water quality information.

A.5 Total Nitrogen

EPA is regulating total nitrogen to ensure that the relationship between organic nitrogen (estimated by TKN) and inorganic nitrogen (estimated by nitrate/nitrite) is maintained. EPA is defining "total nitrogen" to be the sum of nitrate/nitrite and TKN for the purposes of the MPP industry. This summation includes nitrogen in the trinegative oxidation state (the dominant oxidation state of nitrogen in organic compounds), ammonia-nitrogen, and nitrogen in nitrite (NO_2^-) and nitrate (NO_3^-). In developing the limitations (see Section 14), EPA used a baseline value of 0.1 mg/L, which is the sum of the baseline values for nitrate/nitrite (0.05 mg/L) and TKN (0.05 mg/L).

APPENDIX B

SURVEY DESIGN AND CALCULATION OF NATIONAL ESTIMATES

In 2001, EPA distributed two industry surveys. The first survey, entitled 2001 Meat Products Industry Screener Survey (short survey), was mailed to 1,650 meat products industry facilities. The second survey, entitled 2001 Meat Products Industry Survey (detailed survey), was mailed to 350 meat products industry facilities.

Section B.1 of this appendix describes the survey design (identification of facilities in the industry and sample design). Section B.2 of this appendix describes the selection of the sample. Section B.3 of this appendix describes response status of short survey facilities. Section B.4 of this appendix describes the calculation of sample weights. Section B.5 of this appendix describes the methodology for estimating national totals and their variance estimates. Section B.6 of this appendix summarizes EPA's analysis of the detailed survey.

B.1 SURVEY DESIGN

This section describes the development of the sampling plan, which includes identification of the meat products industry and stratification of facilities.

B.1.1 Sample Frame

To produce a mailing list of facilities for the detailed survey and short survey, EPA developed a sample frame of the meat products industry. A sample frame is a list of all members (sampling units) of a population, from which a random sample of members will be drawn for the survey. Therefore, a sample frame is the basis for the development of a sampling plan to select a random sample. EPA used several data sources to construct this sample frame. The March 2000 Hazard Analysis and Critical Control Points (HACCP) database was the main source of data. It was supplemented with information from the Urner-Barry Meat and Poultry Directory 2000 and an April 2000 list of 236 renderers provided by the National Renderers Association (NRA). The sample frame for the meat product survey contained 8,217 facilities.

EPA classified each facility into sampling strata by considering facility type, facility size, and type of animal used at the facility. Each facility was of one of the following three types: first processor, further processor, or renderer. Three size categories were used to determine the facility size. The size category was defined as large for facilities with 500 employees or more, small for

facilities with 10 to 499 employees, and very small for facilities with 9 employees or less. Each facility on the sample frame specialized in one or several types of animal. These types of animal corresponded to poultry, beef, pork, and other. Renderers were not identified by size or animal type.

B.1.2 Sample Design

The sample frame for the survey included an unknown number of out-of-scope facilities. In order to obtain reliable counts of eligible meat product facilities, i.e., the facilities that were in-scope, by type and facility size directly from the frame, the survey was designed as a two-phase sample.

A first-phase sample of 2,000 facilities was selected from a sample frame containing 8,217 facilities. Additionally, a second-phase sample of 350 facilities was selected from the first-phase sample. All 350 second-phase sample facilities were mailed the detailed questionnaire, while the remaining 1,650 first-phase sample facilities received the short questionnaire. While the abridged form collected basic data to determine eligibility status and types of meat processed, the long form collected data about the 350 second-phase sample facilities for technical and financial information. Because of time constraints, both surveys were sent out simultaneously. To improve the accuracy of estimates from the detailed survey, the final weights were calibrated to the estimated counts of eligible facilities from the short survey.

EPA identified a list of 65 facilities that were to be selected for the second-phase detailed sample with certainty to obtain information necessary for evaluating facility operations and best technology options. The first-phase and second-phase facility samples were stratified samples. Stratification separated the eligible population into non-overlapping strata that were as homogeneous as possible. Stratification assured that the sample would contain the same proportions as found on the sample frame, for those variables used to define the strata. The first-phase sample (selecting 1,935 non-certainties from 8,152) was stratified by facility type and size. The stratification of the second-phase sample was based only on facility type, since just 285 facilities were to be selected from the 1,935 first-phase non-certainties.

Table B-1 shows the distribution of facilities on the sample frame by facility type (first processor, further processor, renderer, or missing), size, and certainty status. Most certainty facilities were large first processors. Only 5 certainty facilities were small and none of the very small facilities were included in the sample with certainty.

B.1.3 Imputing for Missing Facility Type

In order to estimate the number of eligible facilities by type, size, and meat product (the purpose of the short survey), it was necessary to include samples of sufficient size from each facility-type-by-size stratum. This required assigning each facility on the frame to one of these strata; however, this information was unknown for many facilities; thus, EPA imputed the missing stratification data.

Table B-1. Distribution of Facilities in the Sample Frame by Certainty, Facility Type, and Size

Certainty status	Facility type	Size				Total
		Large	Small	Very small	Unknown	
Non-certainties	First Processor	149	234	0	0	383
	Further Processor	34	883	0	0	917
	Renderer	0	0	0	235	235
	Unknown	50	1,259	5,308	0	6,617
Non-certainty total		233	2,376	5,308	235	8,152
Certainties	First Processor	56	3	0	0	59
	Further Processor	1	0	0	0	1
	Renderer	0	0	0	1	1
	Unknown	2	2	0	0	4
Certainty total		59	5	0	1	65
Grand total		292	2,381	5,308	236	8,217

From Table B-1 it is seen that facility type had to be imputed for 6,617 non-certainty facilities.[1] The facilities to be imputed a specific type were chosen randomly from the set of facilities with missing type. The facilities with unknown facility type were distributed between "first processors" and "further processors" proportionally to the reported number by type within

[1] It should be noted that no imputation was carried out on the four certainty facilities with missing facility type, as they were to be included in the sample by design.

each size category. Therefore, 9 (=50 x (34/(34+149))) of the 50 large facilities with missing facility type were assigned to the further processor category, while the remaining 41 large facilities were assigned to the "first processor" category. Similarly, 995 of the 1,259 small facilities with missing facility type were assigned the "further processor" type, and the remaining 264 small facilities were assigned the "first processor" type. All very small facilities were assumed to be further processors because very small facilities in this industry were typically further processors.

All imputed values were used only for allocating the sample. None of the values were used for estimation and any wrong assumption simply resulted in a less efficient sample (larger variance). In addition, this imputation process was not expected to introduce any bias in the statistical procedure. For example, all very small facilities were assumed to be further processors; however, if any very small facility reported as a first processor it was treated as such in all analyses.

B.1.4 Imputing for Missing Animal Type

Before selecting the samples, the frame was sorted by animal type within each stratum. This allowed for appropriate representation of the different animal types in random selection of the sample. Table B-2 shows the distribution by animal type of noncertainty facilities that were not renderers. It should be noted that the stratification did not require the specification of animal type for the renderers. All large facilities with missing animal type were randomly assigned to one of the 7 animal type categories described in Table B-2 proportionally to the large facilities with animal types reported in the frame. On the other hand, small and very small facilities were combined and randomly assigned to animal type groups proportionally to the number of small facilities reported with animal types.

Table B-2. Distribution of Noncertainty and Non-Renderer Facilities Imputed for Animal Type

Facility size	Animal type	Number of facilities reported on frame	Number of facilities imputed
Large	Pork only	17	4
	Poultry only	127	30
	Poultry & Pork	2	0
	Beef only	10	2
	Beef & Pork	6	1
	Beef & Poultry	3	2
	Beef & Poultry & Pork	23	6
	Missing	45	N/A
Small and very small	Pork only	157	805
	Poultry only	152	779
	Poultry & Pork	32	164
	Beef only	196	1,005
	Beef & Pork	203	1,041
	Beef & Poultry	76	390
	Beef & Poultry & Pork	438	2,246
	Missing	6,430	N/A
Total		7,917	6,475

B.2 SAMPLE SELECTION OF FACILITIES

The design of the first-phase sample was based upon the assumption that large facilities were more likely to be eligible than small facilities, which in turn were expected to be eligible more frequently than very small facilities. Thus, EPA determined that oversampling of the large facilities would be appropriate, in order to include many eligible facilities. Too much oversampling would reduce the accuracy of estimates because some facilities would have much greater weights than other facilities. An examination of alternative oversampling schemes[2] suggested balancing these two constraints by selecting large facilities at six times the rate of very small facilities, and at twice the rate of small facilities.

[2] July 28, 2000 memorandum from David Marker to Helen Jacobs and Jade Lee-Freeman.

After sorting by animal type, the facilities were selected from each stratum using systematic sampling scheme. Systematic sampling involve selecting every k^{th} facility where k is determined by the selection rate. The allocation of the sample is described in Table B-3. The allocation in Table B-3 was based upon the 6-3-1 rule according to which, large facilities were selected at a rate that was 6 times higher than that of very small facilities and twice higher than that of small facilities. Using this allocation scheme, EPA selected a total of 2,000 facilities from the frame of 8,217 facilities.

Table B-3. Allocation of the First-Phase Sample

Stratum *h*	**Sample frame size** (N_h)	**First phase sample size** (n_h)
Certainty	65	65
Large First Processor	190	152
Large FurtherProcessor	43	34
Small First Processor	498	199
Small Further Processor	1,878	750
Very Small Further Processor	5,308	706
Renderer	235	94
Total	8,217	2,000

The 350 sample facilities were allocated in the second-phase sample to provide similar precision for each of seven analytic domains of interest. These domains were: poultry, beef, and pork first processors; poultry, beef, and pork further processors; and renderers. The 285 noncertainty sample facilities were therefore allocated so that approximately 41 (=285/7) were in each of these seven domains. The entire second-phase sample, including the noncertainty sample, consisted of 121 first processors, 122 further processors, and 42 renderers, along with 65 facilities selected with certainty. The facilities were sorted within facility type by animal type (as listed in Table B-4) before selecting the samples. Table B-4 shows how the first-phase sample in the previous table was distributed across the short and detailed surveys.

Table B-4. Allocation of the Sample to the Short and Detailed Surveys

Facility size and type	Sample size		
	First phase	Short survey	Detailed Survey
Certainty	65	0	65
Large First processor	152	100	52
Large Further processor	34	31	3
Small First processor	199	130	69
Small Further processor	750	688	62
Very small Further processor	706	649	57
Renderer	94	52	42
Total	2,000	1,650	350

For the purpose of selecting the sample of facilities, the WESSAMP SAS macro developed at Westat was used. WESSAMP selects systematic samples within sampling strata defined through a set of parameters.

B.3 RESPONSE STATUS OF SHORT (SCREENER) SAMPLE FACILITIES

Of the 1,650 facilities to which a short form was mailed, 173 did not return the form and as of December 31, 2002 eligibility was unknown for 157 of them. The remaining 16 were known to be eligible non-respondents. EPA also assumed that some of the 157 facilities with unknown eligibility were eligible non-respondents. A total of 286 facilities that were either out-of-scope or could not be located were classified as ineligible. The remaining 1,191 facilities were eligible respondents. These were facilities that returned a complete form and indicated that they engaged in meat processing. The short survey weights were constructed for a total of 1,254 eligible respondents. This includes 63 certainty facilities that completed the detailed survey questionnaire. They are included in the weighting for both surveys to allow national estimates to be produced from either set of respondents. Thus, the short survey weights were constructed using the 1,191 eligible short survey respondents, and 63 “shadow” facilities corresponding to the 63 certainty facilities that were eligible to be detailed survey respondents.

Table B-5 shows the response status by stratum for the 1,650 facilities that were mailed the short survey (excluding the 63 shadow facilities).

Table B-5. Response Status for the Short Survey by First-Phase Stratum

Stratum	Sample size	Eligible Respondent (S_1)	Non-respondent		Ineligible	
			Known Eligibility (S2)	Unknown Eligibility (S4)	Out-of-Scope (S_3)	Non-deliverable
Large First Processor	100	97	1	1	1	0
Large Further Processor	31	28	0	1	2	0
Small First Processor	130	101	1	9	15	4
Small Further Processor	688	498	7	59	73	51
Very Small Further Processor	649	435	7	85	57	65
Renderer	52	32	0	2	5	13
Total	1,650	1,191	16	157	153	133

B.4 WEIGHTING OF THE SHORT SURVEY

This section describes the methodology used to calculate the base weights, non-response adjustments, and the final weights for the short survey. In its analysis, EPA applied sample weights to survey data. The short survey was weighted in order to account for variable probabilities of selection, differential response rates, and ineligible facilities. The base weights and non-response adjustments reflect the probability of selection for each facility and adjustments for facility level non-responses, respectively. Weighting the data allows inferences to be made about all eligible facilities, not just those included in the sample, but also those not included in the sample or those that did not respond to the survey. Also, the weighted estimates have a smaller variance than unweighted estimates (see Section B.5 of this appendix for variance estimation.)

B.4.1 Base Weight Calculation

The first step in weighting the short survey was to assign a base weight to each of the sample facilities. The base weight associated with a short survey facility was calculated by multiplying the reciprocal of the probability of including that facility in the first-phase sample of 2,000 facilities, by the reciprocal of the probability of not including that facility in the detailed survey sample in the second phase. Table B-6 shows the calculation of the base weight. The short

survey base weight for a given first-phase stratum h and second-phase stratum l can formally be written as follows:

$$Base\ weight_{hl} = \left(\frac{n_h}{N_h}\right)^{-1} \times \left(1 - \frac{m_l}{M_l}\right)^{-1}$$

where N_h is the number of facilities in the sample frame that belong to first-phase stratum h, n_h is the number of facilities selected in the first-phase sample that belong to first-phase stratum h (N_h and n_h are shown in Table B-5), M_l is the number of first-phase sample facilities that belonged to second-phase stratum l, and m_l is the number of facilities selected in the detailed survey sample from second-phase stratum l.

For example, in the first-phase sample, 34 of 43 large further processors were selected, so the first-phase inclusion probability was 0.7907. The second-phase sample only stratified by facility type, so the second-phase inclusion probability for further processors in the detailed survey was (3 + 62 + 57)/(34 + 750 + 706) = 0.0819 (see Table B-4). The overall inclusion probability for the short survey was (0.7907) x (1 - 0.0819) = 0.72596. The base weight was the reciprocal of this probability, i.e., reciprocal of 0.72596, which is 1.3775.

Table B-6. Base Weight Calculation for the Short Survey

Stratum	First-phase inclusion probability (n_h/N_h)	Second-phase detailed survey inclusion probabilities (m_l/M_l)	Short survey inclusion probabilities $\left(\frac{n_h}{N_h}\left(1-\frac{m_l}{M_l}\right)\right)$	Short survey base weights $\left(\left(\frac{n_h}{N_h}\right)^{-1}\times\left(1-\frac{m_l}{M_l}\right)^{-1}\right)$
Large First processor	0.8000	0.3447	0.52422	1.9076
Small First processor	0.3996	0.3447	0.26185	3.8191
Large Further processor	0.7907	0.0819	0.72596	1.3775
Small Further processor	0.3994	0.0819	0.36666	2.7273
Very Small Further processor	0.1330	0.0819	0.12212	8.1889
Renderer	0.4000	0.4468	0.22128	4.5192

B.4.2 Eligibility and Non-response Adjustment

The base weights associated with the short survey facilities were adjusted for non-response. Because 157 of the 173 non-responding facilities had an unknown eligibility status, it was assumed that they were distributed among eligible (respondent and non-respondent) and out-of-scope facilities in the same proportions as the respondents within each stratum. It was assumed that all non-respondents did receive their surveys. The non-response adjustment was applied in two steps. In the first step, the base weights of facilities were multiplied by the adjustment factor obtained by dividing the sum of the weights of all sample facilities by the sum of the weights of facilities with known eligibility status. Thus, the weight, w_{hi} for a facility i in stratum h, after the unknown eligibility adjustment can be written as follows:

$$\begin{aligned} w_{hi} &= \left(base\ weight\right)_{hi} \times \left(unknown\_eligibility\ adjustment\right)_h \\ &= \left(base\ weight\right)_{hi} \times \left(\frac{S_1 + S_2 + S_3 + S_4}{S_1 + S_2 + S_3}\right)_h \end{aligned}$$

where S_1, S_2, S_3, and S_4 represent the sum of the weights for stratum h of eligible respondents, eligible non-respondents, unknown eligibility non-respondents, and ineligible facilities, respectively (see Table B-5). In the second step, the unknown eligibility adjusted

weight was further adjusted to account for eligible non-respondents, which was the final survey weight. As with the adjustment for unknown eligibility, the non-response adjustment factor was defined as the ratio of the sum of the weights of eligible facilities (both respondents and non-respondents) to the sum of the weights of the eligible respondent facilities only. This non-response adjustment was also performed within strata in order to account for differential response rates in the short survey. Table B-7 shows the non-response adjustment factors (both unknown eligibility adjustment and non-response adjustment for eligible non-respondents) and final weights for each stratum.

Table B-7. Non-Response Adjustment and Final Weight for the Short Survey

Stratum *h*	**Short survey base weight**	**Unknown Eligibility adjustment** $\left(\frac{S_1 + S_2 + S_3 + S_4}{S_1 + S_2 + S_3}\right)$	**Non-response adjustment** $\left(\frac{S_1 + S_2}{S_1}\right)$	**Short survey final weight** (W_h)
Large First Processor	1.9076	1.0101	1.0103	1.9467
Small First Processor	3.8191	1.0769	1.0099	4.1536
Large Further Processor	1.3775	1.0333	1.0000	1.4234
Small Further Processor	2.7273	1.1021	1.0141	3.0480
Very Small Further Processor	8.1889	1.1703	1.0161	9.7380
Renderer	4.5192	1.0541	1.0000	4.7635

EPA has revised the short survey weighting based on all responses received until December 31, 2002. These revised survey weights have been used to produce the national estimates. (See Section B.6.)

B.5 ESTIMATION METHOD

This section presents the general methodology and equations for calculating estimates from the short survey.

B.5.1 National Estimates

National total estimates were obtained for each characteristic and domain of interest by multiplying the reported value by the final survey weight (non-response-adjusted weight

including both unknown eligibility adjustment and adjustment for eligible non-respondents) and by summing all weighted values for the facilities that belong to the domain of interest *k*.

$$\hat{y}_k = \sum_i w_{ki} y_{ki}$$

Similarly, ratio estimates (for example, of the mean) in a given domain *k* were obtained as a ratio of two national total estimates. For example, the average cattle production by facilities doing first processing was calculated by dividing the weighted production of cattle by the weighted count of first processors.

$$\bar{y}_k = \frac{\sum_i w_{ki} y_{ki}}{\sum_i w_{ki}}$$

where w_{hi} is the final weight for facility *i*, y_{ki} is the cattle production for facility *i*, both in domain *k*, and the summation is over all facilities reporting cattle production.

Note that many facilities were involved in more than one type of activity or production. Their classification into one activity type, either first processing, further processing, rendering, or some combination was determined by the relative concentration of their production in any activity. Similar classification issues arose when reporting production by animal type (red meat, poultry, or mixed). For purposes of statistical weighting procedures, if at least 85 percent of total production was of a given type of activity, it was classified accordingly (e.g., first processor). If no activity type accounted for 85 percent of production it was classified as mixed type. The same rule was used for animal type.

B.5.2 Variance Estimates

To compute the correct estimates of standard errors a set of jackknife replicate weights was constructed and attached to each facility. Under the jackknife replication method, a number

of subsamples (called jackknife replicates) were generated from the full sample, and the entire weighting process as described in the previous sections was repeated for each replicate. In this way, a series of replicate weights were generated for each facility, which together with the full-sample weight were used to calculate sampling errors (see Wolters, 1985 for a description of the jackknife and other variance estimation methods)[3]. Given that there were almost 1,200 responding facilities for the short survey, it was decided to create 90 replicates for variance estimation. Each respondent was assigned a number between 1 and 90. The first replicate used the values from all facilities except those assigned to group 1. The other replicates were derived in a similar way by excluding the values for a different group each time.

In order to illustrate how the sampling errors have been calculated, let be the weighted national average estimate of a characteristic *y* (e.g., first processor meat production of cattle) for the entire data set. If is the corresponding estimate for jackknife replicate *r*, then the estimated variance of *y* is given by the following formula:

$$\mathrm{var}\left(\bar{y}\right) = \frac{89}{90}\sum_{r=1}^{90}\left(\bar{y}_{(r)} - \bar{y}\right)^2$$

where the summation extends over all 90 jackknife replicates that were formed for the short survey. This jackknife variance was often used to compute 95 percent confidence limits around the estimate. These limits are given by:

$$\bar{y} \pm 1.96\sqrt{\mathrm{var}\left(\bar{y}\right)}$$

The WesVar program was used to compute estimates of standard errors.

[3] Wolters, K. M. (1985) Introduction to Variance Estimation, Springer-Verlag Publishers, New York.

B.6 ANALYSIS OF THE DETAILED SURVEY

For the final rule, the base weight associated with a detailed sample facility was calculated by multiplying the reciprocal of the probability of including that facility in the first-phase sample of 2,000 facilities, by the reciprocal of the probability of including that facility in the detailed survey sample. Table B-8 shows the calculation of the base weight. The detailed survey base weight for a given first-phase stratum h and second-phase stratum l can formally be written as follows:

$$Base\ weight_{hl} = \left(\frac{n_h}{N_h}\right)^{-1}\left(\frac{m_l}{M_l}\right)^{-1}$$

where N_h is the number of facilities in the sample that belong to first-phase stratum h (N_h and n_h are shown in Table B-3), n_h is the number of facilities selected in the first-phase sample that belong to first-phase stratum h, M_l is the number of first-phase sample facilities that belong to second-phase stratum l, and m_l is the number of facilities selected in the detailed survey sample from second-phase stratum l (second-phase stratum totals can be found in the column labeled "Detailed Survey" in Table B-4).

Table B-8. Base Weight Calculation for the Detailed Survey Sample

Stratum	First-phase inclusion probability (n_h / N_h)	Second-phase inclusion probabilities (m_l / M_l)	Detailed survey inclusion probabilities $\left(\left(\frac{n_h}{N_h}\right)\left(\frac{m_l}{M_l}\right)\right)$	Detailed survey base weights $\left(\left(\frac{n_h}{N_h}\right)^{-1}\left(\frac{m_l}{M_l}\right)^{-1}\right)$
Large First Processor	0.8000	0.3447	0.2758	3.6260
Small First Processor	0.3996	0.3447	0.1378	7.2594
Large Further Processor	0.7907	0.0819	0.0647	15.4460
Small Further Processor	0.3994	0.0819	0.0327	30.5816
Very Small Further Processor	0.1330	0.0819	0.0109	91.8232
Renderer	0.4000	0.4468	0.1787	5.5952
Certainties	1.0000	1.0000	1.0000	1.0000

Due to duplication on the sample frame, a few facilities were sampled for both the short and detailed surveys. Such facilities were encouraged to complete both forms since estimates are made independently from both surveys.

The non-response adjustment for the detailed survey was carried out with the same methodology used to adjust the base weights for the short survey (see Section B.4.2). The non-response adjustments for each stratum are shown in Table B-9. However, the non-response-adjusted weights were further adjusted to benchmark them to the weighted counts of eligible facilities calculated from the short survey. This is because the much larger sample size in the short survey provides better estimates of the number of eligible facilities in each stratum. This second adjustment was done within type and size categories and yielded the final weight. If h designates a first-phase stratum, then the detailed survey final weight w_i for a given facility i can be written as
follows:

$$W_i = \left(NR - Adjusted\ Weight\right)_i \times \frac{\left(Estimated\ Number\ of\ Facilities\ from\ Short\ Survey\right)_h}{\left(Estimated\ Number\ of\ Facilities\ from\ Detailed\ Survey\right)_h}$$

Table B-9. Non-Response Adjustment and Final NR Adjusted Weight for the Detailed Survey

Stratum *h*	Detailed survey base weight	Non-response adjustment $\left(\frac{S_1 + S_2 + S_3 + S_4}{S_1 + S_2 + S_3}\right)$	Non-response adjustment $\left(\frac{S_1 + S_2}{S_1}\right)$	Detailed survey final NR adjusted weight (W_{hi})
Large First Processor	3.6260	1.0000	1.0000	3.6260
Small First Processor	7.2594	1.1731	1.0513	8.9525
Large Further Processor	15.4460	1.0000	1.0000	15.4460
Small Further Processor	30.5816	1.0577	1.2162	39.3391
Very Small Further Processor	91.8232	1.1818	1.2500	135.6479
Renderer	5.5952	1.0526	1.0000	5.8897

As a first step in the benchmarking, EPA categorized facilities into groups using the facility meat type (red meat, poultry, or a mixture) and production type (first processing, further processing, first processing/further processing, first processing/rendering, further processing/rendering, first processing/further processing/rendering). In addition, EPA gathered independent renderers into one group. As a result of crossing three meat types by six different production types and adding rendering as a separate type, EPA obtained the following 19 possible types of facilities.

1. Red Meat Slaughter,
2. Red Meat Slaughter/Render,
3. Red Meat Processor,
4. Red Meat Processor/Render,
5. Red Meat Both,
6. Red Meat Both/Render,
7. Poultry Slaughter,
8. Poultry Slaughter/Render,

9. Poultry Processor,
10. Poultry Processor/Render,
11. Poultry Both,
12. Poultry Both/Render,
13. Mixed Meat Slaughter,
14. Mixed Meat Slaughter/Render,
15. Mixed Meat Processor,
16. Mixed Meat Processor/Render,
17. Mixed Meat Both,
18. Mixed Meat Both/Render, and
19. Renderer Only.

EPA further split these facility types into non-small (or large) and small based on total production. Thus, EPA obtained a total of 38 possible groups of facilities. Within each of the 38 groups, EPA compared the estimated number of facilities using the short survey weights to the estimates using the detailed survey weights. Because the detailed questionnaire had data for only a few or no facilities within some groups, it was necessary to collapse some groups. Moreover, the adjustment factors were either too small or too large for some of the groups. Therefore, the 38 facility groups were collapsed to form 11 post-strata. To perform this step, EPA determined that it was appropriate to collapse certain production types and sizes within meat type. For example, two groups for non-small red meat slaughters and non-small red meat slaughter/render were collapsed into a single group. The criteria for collapsing were that the short survey sample count for the post-stratum (after collapsing) must be at least 10 and that for the detailed survey the sample count must be at least 5. Moreover, the adjustment factors must be between 0.4 (=1/2.5) and 2.5. The large variations in the post-stratification adjustment factors introduces large variations in the final (post-stratified) weights that results in increased variances. On the other hand, too much collapsing of cells would introduce bias. Therefore, the choice of lower and upper cut-off values for the adjustment factors was a trade-off between the bias and variance. EPA chose these lower and upper threshold values of adjustment factors because values larger

than 0.4 for lower threshold and values smaller than 2.5 for upper threshold would have resulted in too much collapsing, and hence the risk of potential bias. For the final rule, the certainty cases were held out of the post-stratification step, so that the sum of the weights for the non-certainty detailed survey respondents were made to match the sum of the weights for the non-certainty short survey respondents. As a result, none of the weights are now less than 1.0.

Within each of the 11 groups, we then benchmarked the detailed survey weights so that the national estimate of facilities using the detailed questionnaire database matched the national estimates based upon the short survey data. Because facilities from different sampling strata could be assigned to the same group, it is possible to have facilities with different survey weights within a particular group after collapsing. By collapsing these groups, we obtained information about facilities with similar characteristics, and improved precision for its national estimates based upon data available only from the detailed questionnaire (e.g., data about the wastewater treatment components).

Table B-10 provides the number of facilities in the short survey database, the number of facilities in the detailed questionnaire database, and the national estimate of the number of facilities. Both the short survey and detailed survey provide the same national estimate of number of facilities for each of the 11 post-strata.

Table B-10. Number of MPP Facilities

Post-Stratum	Number of Facilities		
	Shortsurvey Respondents	**Detailed Survey Respondents**	**National Estimate**
Non-small Red Meat Slaughter, Slaughter/Render, Processor, Processor/Render, Slaughter/Processor or Slaughter/Processor/Render	82	54	210
Small Red Meat Slaughter or Slaughter/Render	62	6	493
Small Red Meat Processor or Processor/Render	309	43	1873
Small Red Meat Slaughter/Processor or Slaughter/Processor/Render	122	16	1018

Table B-10. Number of MPP Facilities (Continued)

Post-Stratum	Number of Facilities		
	Shortsurvey Respondents	**Detailed Survey Respondents**	**National Estimate**
Small Mixed Meat	340	18	1911
Non-small Poultry Slaughter or Poultry Slaughter/Render	79	27	170
Non-small Poultry Slaughter/Processor, Processor, or Processor/Render	75	35	175
Non-small Poultry Slaughter/Processor/ Render	10	9	28
Small Poultry Slaughter, Slaughter/Render, Slaughter/Processor, Slaughter/Processor/Render, Processor, or Processor/Render	50	6	327
Render Only	29	20	132

Note the national estimates presented in Table B-10 include all MPP facilities (e.g., direct dischargers, indirect dischargers, zero dischargers, and all facilities regardless of size) and is not the same as the national estimate of number of regulated MPP facilities (e.g., direct dischargers above the category-specific production thresholds).
National estimates and corresponding standard errors for the detailed survey are calculated using the methods described in Section B.5 for the short survey.

APPENDIX C

40 CFR PART 432

Calibration verification standard (VER): The mid-point calibration standard (CS3) that is used to verify calibration. See Table 4.

Chlorophenolics: collectively, the analytes listed in Table 1.

CS1, CS2, CS3, CS4, CS5: See Calibration standards and Table 4.

Field blank: An aliquot of reagent water or other reference matrix that is placed in a sample container in the laboratory or the field, and treated as a sample in all respects, including exposure to sampling site conditions, storage, preservation, and all analytical procedures. The purpose of the field blank is to determine if the field or sample transporting procedures and environments have contaminated the sample.

GC: Gas chromatograph or gas chromatography.

HRGC: High resolution GC.

IPR: Initial precision and recovery; four aliquots of the diluted PAR standard analyzed to establish the ability to generate acceptable precision and accuracy. An IPR is performed prior to the first time this method is used and any time the method or instrumentation is modified.

K–D: Kuderna-Danish concentrator; a device used to concentrate the analytes in a solvent.

Laboratory blank: See Method blank.

Laboratory control sample (LCS): See Ongoing precision and recovery standard (OPR).

Laboratory reagent blank: See Method blank.

May: This action, activity, or procedural step is neither required nor prohibited.

May not: This action, activity, or procedural step is prohibited.

Method blank: An aliquot of reagent water that is treated exactly as a sample including exposure to all glassware, equipment, solvents, reagents, internal standards, and surrogates that are used with samples. The method blank is used to determine if analytes or interferences are present in the laboratory environment, the reagents, or the apparatus.

Minimum level (ML): The level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed.

MS: Mass spectrometer or mass spectrometry.

Must: This action, activity, or procedural step is required.

OPR: Ongoing precision and recovery standard (OPR); a laboratory blank spiked with known quantities of analytes. The OPR is analyzed exactly like a sample. Its purpose is to assure that the results produced by the laboratory remain within the limits specified in this method for precision and recovery.

PAR: Precision and recovery standard; secondary standard that is diluted and spiked to form the IPR and OPR.

Preparation blank: See Method blank.

Primary dilution standard: A solution containing the specified analytes that is purchased or prepared from stock solutions and diluted as needed to prepare calibration solutions and other solutions.

Quality control check sample (QCS): A sample containing all or a subset of the analytes at known concentrations. The QCS is obtained from a source external to the laboratory or is prepared from a source of standards different from the source of calibration standards. It is used to check laboratory performance with test materials prepared external to the normal preparation process.

Reagent water: Water demonstrated to be free from the analytes of interest and potentially interfering substances at the method detection limit for the analyte.

Relative standard deviation (RSD): The standard deviation times 100 divided by the mean.

RF: Response factor. See Section 10.5.1.

RR: Relative response. See Section 10.4.4.

RSD: See Relative standard deviation.

Should: This action, activity, or procedural step is suggested but not required.

Stock solution: A solution containing an analyte that is prepared using a reference material traceable to EPA, the National Institute of Science and Technology (NIST), or a source that will attest to the purity and authenticity of the reference material.

VER: See Calibration verification standard.

PART 431 [RESERVED]

PART 432—MEAT PRODUCTS POINT SOURCE CATEGORY

Subpart A—Simple Slaughterhouse Subcategory

Sec.

AUTHORITY: Secs. 301, 304 (b) and (c), 306 (b) and (c), and 307(c) of the Federal Water Pollution Control Act, as amended; 33 U.S.C. 1251, 1311, 1314 (b) and (c), 1316 (b) and (c), 1317(c); 86 Stat. 816 et seq., Pub. L. 92–500; 91 Stat. 1567, Pub. L. 95–217.

SOURCE: 39 FR 7897, Feb. 28, 1974, unless otherwise noted.

Subpart A—Simple Slaughterhouse Subcategory

§ 432.10 Applicability; description of the simple slaughterhouse subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of red meat carcasses, in whole or part, by simple slaughterhouses.

§ 432.11 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR part 401 shall apply to this subpart.

(b) The term ''slaughterhouse'' shall mean a plant that slaughters animals and has as its main product fresh meat as whole, half or quarter carcasses or smaller meat cuts.

(c) The term ''simple slaughterhouse'' shall mean a slaughterhouse which accomplishes very limited by-product processing, if any, usually no more than two of such operations as rendering, paunch and viscera handling, blood processing, hide processing, or hair processing.

(d) The term ''LWK'' (live weight killed) shall mean the total weight of the total number of animals slaughtered during the time to which the effluent limitations apply; i.e., during any one day or any period of thirty consecutive days.

(e) The term ''ELWK'' (equivalent live weight killed) shall mean the total weight of the total number of animals slaughtered at locations other than the slaughterhouse or packinghouse, which animals provide hides, blood, viscera or renderable materials for processing at that slaughterhouse, in addition to those derived from animals slaughtered on site.

(f) The term ''oil and grease'' shall mean those components of process waste water amenable to measurement by the method described in ''Methods for Chemical Analysis of Water and Wastes,'' 1971, EPA, Analytical Quality Control Laboratory, page 217.

§ 432.12 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

(a) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to onsite slaughter or subsequent meat, meat product or by-product processing of carcasses of animals slaughtered onsite, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg LWK)	
BOD5	0.24	0.12
TSS	0.40	0.20
Oil and grease	0.12	0.06
Fecal coliform	(1)	(1)
pH	(2)	(2)
	English units (pounds per 1,000 lb LWK)	
BOD5	0.24	0.12
TSS	0.40	0.20
Oil and grease	0.12	0.06
Fecal coliform	(1)	(1)
pH	(2)	(2)

[1] Maximum at any time 400 mpn/100 ml.
[2] Within the range 6.0 to 9.0.

(b) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the processing (defleshing, washing and curing) of hides derived from animals slaughtered at locations other than the slaughterhouse, which may be discharged by a point source subject to the provisions of this subpart, in addition to the discharge allowed by § 432.12(a):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD5	0.04	0.02
TSS	0.08	0.04
	English units (pounds per 1,000 lb ELWK)	
BOD5	0.04	0.02
TSS	0.08	0.04

(c) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the processing of blood derived from animals slaughtered at locations other than the slaughterhouse, which may be discharged by a point source subject to

the provisions of this subpart, in addition to the discharge allowed by § 432.12(a):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD5	0.04	0.02
TSS	0.08	0.04
	English units (pounds per 1,000 lb ELWK)	
BOD5	0.04	0.02
TSS	0.08	0.04

(d) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the wet or low temperature rendering of material derived from animals slaughtered at locations other than the slaughterhouse, which may be discharged by a point source subject to the provisions of this subpart, in addition to the discharge allowed by § 432.12(a):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD5	0.06	0.03
TSS	0.12	0.06
	English units (pounds per 1,000 lb ELWK)	
BOD5	0.06	0.03
TSS	0.12	0.06

(e) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the dry rendering of material derived from animals slaughtered at locations other than the slaughterhouse, which may be discharged by a point source subject to the provisions of this subpart, in addition to the discharge allowed by § 432.12(a):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD5	0.02	0.01
TSS	0.04	0.02
pH	(1)	(1)
	English units (pounds per 1,000 lb ELWK)	
BOD5	0.02	0.01
TSS	0.04	0.02
pH	(1)	(1)

[1] Within the range 6.0 to 9.0.

[39 FR 7897, Feb. 28, 1974, as amended at 60 FR 33964, June 29, 1995]

§ 432.13 [Reserved]

§ 432.14 Pretreatment standards for existing sources.

Any existing source subject to this subpart that introduces process wastewater pollutants into a publicly owned treatment works must comply with 40 CFR part 403. In addition, the following pretreatment standard establishes the quantity or quality of pollutants or pollutant properties controlled by this section which may be discharged to a publicly owned treatment works by a point source subject to the provisions of this subpart.

Pollutant or pollutant property	Pretreatment standard
pH	No limitation.
BOD5	Do.
TSS	Do.
Oil and grease	Do.
Fecal coliform	Do.

[40 FR 6446, Feb. 11, 1975, as amended at 60 FR 33964, June 29, 1995]

§ 432.15 Standards of performance for new sources.

(a) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to on-site slaughter or subsequent meat, meat product or by-product processing of carcasses of animals slaughtered on-site which may be discharged by a new source subject to

the provisions of this subpart: the limitations shall be as specified in § 432.12(a), with the exception that in addition to the pollutants or pollutant properties controlled by that subsection, discharges of ammonia shall not exceed the limitations set forth below:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg LWK)	
Ammonia	0.34	0.17
	English units (pounds per 1,000 lb LWK)	
Ammonia	0.34	0.17

(b) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the processing of blood derived from animals slaughtered at locations other than the slaughterhouse, which may be discharged by a new source subject to the provisions of this subpart, in addition to the discharge allowed by §§ 432.15(a) and 432.12(c):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
Ammonia	0.06	0.03
	English units (pounds per 1,000 lb ELWK)	
Ammonia	0.06	0.03

(c) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the wet or low temperature rendering of material derived from animals slaughtered at locations other than slaughterhouse, which may be discharged by a new source subject to the provisions of this subpart, in addition to the discharge allowed by §§ 432.15(a) and 432.12(d):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
Ammonia	0.10	0.05
	English units (pounds per 1,000 lb ELWK)	
Ammonia	0.10	0.05

(d) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the dry rendering of material derived from animals slaughtered at locations other than the slaughterhouse which may be discharged by a new source subject to the provisions of this subpart, in addition to the discharge allowed by §§ 432.15(a) and 432.12(e):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
Ammonia	0.04	0.02
	English units (pounds per 1,000 lb ELWK)	
Ammonia	0.04	0.02

[39 FR 7897, Feb. 28, 1974; 39 FR 26423, July 19, 1974]

§ 432.16 Pretreatment standards for new sources.

Any new source subject to this subpart that introduces process wastewater pollutants into a publicly owned treatment works must comply with 40 CFR part 403.

[60 FR 33964, June 29, 1995]

§ 432.17 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT): The limitations shall be the same as those specified for conventional pollutants (which are defined in § 401.16) in § 432.12 of this subpart for the best practicable control technology currently available (BPT).

[51 FR 25001, July 9, 1986]

Subpart B—Complex Slaughterhouse Subcategory

§ 432.20 Applicability; description of the complex slaughterhouse subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of red meat carcasses, in whole or part, by complex slaughterhouses.

§ 432.21 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR part 401 shall apply to this subpart.

(b) The term ''slaughterhouse'' shall mean a plant that slaughters animals and has as its main product fresh meat as whole, half or quarter carcasses or smaller meat cuts.

(c) The term ''complex slaughterhouse'' shall mean a slaughterhouse that accomplishes extensive by-product processing, usually at least three of such operations as rendering, paunch and viscera handling, blood processing, hide processing, or hair processing.

(d) The term ''LWK'' (live weight killed) shall mean the total weight of the total number of animals slaughtered during the time to which the effluent limitations apply; i.e., during any one day or any period of thirty consecutive days.

(e) The term ''ELWK'' (equivalent live weight killed) shall mean the total weight of the total number of animals slaughtered at locations other than the slaughterhouse or packinghouse, which animals provide hides, blood, viscera or renderable materials for processing at that slaughterhouse, in addition to those derived from animals slaughtered on site.

(f) The term ''oil and grease'' shall mean those components of process waste water amenable to measurement by the method described in ''Methods for Chemical Analysis of Water and Wastes,'' 1971, EPA, Analytical Quality Control Laboratory, page 217.

§ 432.22 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

(a) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to on-site slaughter or subsequent meat, meat product or by-product processing of carcasses of animals slaughtered on-site, which may be discharged by a point source subject to the provisions of this subpart after application of the best practical control technology currently available:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg LWK)	
BOD5	0.42	0.21
TSS	0.50	0.25
Oil and grease	0.16	0.08
Fecal coliform	(1)	(1)
pH	(2)	(2)
	English units (pounds per 1,000 lb LWK)	
BOD5	0.42	0.21
TSS	0.50	0.25
Oil and grease	0.16	0.08
Fecal coliform	(1)	(1)
pH	(2)	(2)

[1] Maximum at any time 400 mpn/100 ml.
[2] Within the range 6.0 to 9.0.

(b) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the processing (defleshing, washing and curing) of hides derived from animals slaughtered at locations other than the slaughterhouse, which may be discharged by a point source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD5	0.04	0.02
TSS	0.08	0.04
	English units (pounds per 1,000 lb ELWK)	
BOD5	0.04	0.02
TSS	0.08	0.04

(c) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the processing of blood derived from animals slaughtered at locations other than the slaughterhouse, which may be discharged by a point source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD5	0.04	0.02
TSS	0.08	0.04
	English units (pounds per 1,000 lb ELWK)	
BOD5	0.04	0.02
TSS	0.08	0.04

(d) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the wet or low temperature rendering of material derived from animals slaughtered at locations other than the slaughterhouse, which may be discharged by a point source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD5	0.06	0.03
TSS	0.12	0.06
	English units (pounds per 1,000 lb ELWK)	
BOD5	0.06	0.03
TSS	0.12	0.06

(e) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the dry rendering of material derived from animals slaughtered at locations other than the slaughterhouse, which may be discharged by a point source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD5	0.02	0.01
TSS	0.04	0.02
	English units (pounds per 1,000 lb ELWK)	
BOD5	0.02	0.01
TSS	0.04	0.02

[39 FR 7897, Feb. 28, 1974; 39 FR 26423, July 19, 1974, as amended at 45 FR 82254, Dec. 15, 1980; 60 FR 33964, June 29, 1995]

§ 432.23 [Reserved]

§ 432.24 Pretreatment standards for existing sources.

Any existing source subject to this subpart that introduces process wastewater pollutants into a publicly owned treatment works must comply with 40 CFR part 403. In addition, the following pretreatment standard establishes the quantity or quality of pollutants or pollutant properties controlled by this section which may be discharged to a publicly owned treatment works by a point source subject to the provisions of this subpart.

Pollutant or pollutant property	Pretreatment standard
pH	No limitation.
BOD5	Do.
TSS	Do.
Oil and grease	Do.
Fecal coliform	Do.

[40 FR 6446, Feb. 11, 1975, as amended at 60 FR 33965, June 29, 1995]

§ 432.25 Standards of performance for new sources.

(a) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to on-site slaughter or subsequent meat, meat product or by-product processing of carcasses of animals slaughtered on-site which may be discharged by a new source subject to the provisions of this subpart: The limitations shall be as specified in § 432.22(a), with the exception that in addition to the pollutants or pollutant properties controlled by that subsection, discharges of ammonia shall not exceed the limitations set forth below:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg LWK)	
Ammonia	0.48	0.24
	English units (pounds per 1,000 lb LWK)	
Ammonia	0.48	0.24

(b) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the processing of blood derived from animals slaughtered at locations other than the slaughterhouse, which may be discharged by a new source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section and § 432.22(c):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
Ammonia	0.06	0.03
	English units (pounds per 1,000 lb ELWK)	
Ammonia	0.06	0.03

(c) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the wet or low temperature rendering of material derived from animals slaughtered at locations other than the slaughterhouse, which may be discharged by a new source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section and § 432.22(d):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
Ammonia	0.10	0.05
	English units (pounds per 1,000 lb ELWK)	
Ammonia	0.10	0.05

(d) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the dry rendering of material derived from animals slaughtered at locations other than the slaughterhouse, which may be discharged by a new source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section and § 432.22(e):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
Ammonia	0.04	0.02
	English units (pounds per 1,000 lb ELWK)	
Ammonia	0.04	0.02

[39 FR 7897, Feb. 28, 1974; 39 FR 26423, July 19, 1974]

§ 432.26 Pretreatment standards for new sources.

Any new source subject to this subpart that introduces process wastewater pollutants into a publicly owned treatment works must comply with 40 CFR part 403.

[60 FR 33965, June 29, 1995]

§ 432.27 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT): The limitations shall be the same as those specified for conventional pollutants (which are defined in § 401.16) in § 432.22 of this subpart for the best practicable control technology currently available (BPT).

[51 FR 25001, July 9, 1986]

Subpart C—Low-Processing Packinghouse Subcategory

§ 432.30 Applicability; description of the low-processing packinghouse subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of red meat carcasses in whole or part, by low-processing packinghouses.

§ 432.31 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR part 401 shall apply to this subpart.

(b) The term ''packinghouse'' shall mean a plant that both slaughters animals and subsequently processes carcasses into cured, smoked, canned or other prepared meat products.

(c) The term ''low processing packinghouse'' shall mean a packinghouse that processes no more than the total animals killed at that plant, normally processing less than the total kill.

(d) The term ''LWK'' (live weight killed) shall mean the total weight of the total number of animals slaughtered during the time to which the effluent limitations apply; i.e., during any one day or any period of thirty consecutive days.

(e) The term ''ELWK'' (equivalent live weight killed) shall mean the total

weight of the total number of animals slaughtered at locations other than the slaughterhouse or packinghouse, which animals provide hides, blood, viscera or renderable materials for processing at that slaughterhouse, in addition to those derived from animals slaughtered on-site.

(f) The term ''oil and grease'' shall mean those components of process waste water amenable to measurement by the method described in ''Methods for Chemical Analysis of Water and Wastes,'' 1971, EPA, Analytical Quality Control Laboratory, page 217.

§ 432.32 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

(a) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to on-site slaughter or subsequent meat, meat product or byproduct, processing of carcasses of animals slaughtered on-site, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg LWK)	
BOD5	0.34	0.17
TSS	0.48	0.24
Oil and grease	0.16	0.08
Fecal coliform	(1)	(1)
pH	(2)	(2)
	English units (pounds per 1,000 lb LWK)	
BOD5	0.34	0.17
TSS	0.48	0.24
Oil and grease	0.16	0.08
Fecal coliform	(1)	(1)
pH	(2)	(2)

[1] Maximum at any time 400 mpn/100 ml.
[2] Within the range 6.0 to 9.0.

(b) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the processing (defleshing, washing and curing) of hides derived from animals slaughtered at locations other than the packinghouse, which may be discharged by a point source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD5	0.04	0.02
TSS	0.08	0.04

(c) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the processing of blood derived from animals slaughtered at locations other than the packinghouse, which may be discharged by a point source subject to

the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD5	0.04	0.02
TSS	0.08	0.04
	English units (pounds per 1,000 lb ELWK)	
BOD5	0.04	0.02
TSS	0.08	0.04

(d) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the wet or low temperature rendering of material derived from animals slaughtered at locations other than the packinghouse, which may be discharged by a point source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD5	0.06	0.03
TSS	0.12	0.06
	English units (pounds per 1,000 lb ELWK)	
BOD5	0.06	0.03
TSS	0.12	0.06

(e) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the dry rendering of material derived from animals slaughtered at locations other than the packinghouse, which may be discharged by a point source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD5	0.02	0.01
TSS	0.04	0.02
	English units (pounds per 1,000 lb ELWK)	
BOD5	0.02	0.01
TSS	0.04	0.02

[39 FR 7897, Feb. 28, 1974, as amended at 60 FR 33965, June 29, 1995]

§ 432.33 [Reserved]

§ 432.34 Pretreatment standards for existing sources.

Any existing source subject to this subpart that introduces process wastewater pollutants into a publicly owned treatment works must comply with 40 CFR part 403. In addition, the following pretreatment standard establishes the quantity or quality of pollutants or pollutant properties controlled by this section which may be discharged to a publicly owned treatment works by a point source subject to the provisions of this subpart.

Pollutant or pollutant property	Pretreatment standard
pH	No limitation.
BOD5	Do.
TSS	Do.
Oil and grease	Do.
Fecal coliform	Do.

[40 FR 6447, Feb. 11, 1975, as amended at 60 FR 33965, June 29, 1995]

§ 432.35 Standards of performance for new sources.

(a) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to on-site slaughter or subsequent meat, meat product or by product processing of carcasses of animals slaughtered on-site which may be discharged by a new source subject to the provisions of this subpart: The limitations shall be as specified in §432.32(a), with the exception that in

addition to the pollutants or pollutant properties controlled by that subsection, discharges of ammonia shall not exceed the limitations set forth below:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg LWK)	
Ammonia	0.48	0.24
	English units (pounds per 1,000 lb LWK)	
Ammonia	0.48	0.24

(b) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the processing of blood derived from animals slaughtered at locations other than the packinghouse, which may be discharged by a new source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section and § 432.32(c):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
Ammonia	0.06	0.03
	English units (pounds per 1,000 lb ELWK)	
Ammonia	10.06	0.03

(c) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the wet or low temperature rendering of material derived from animals slaughtered at locations other than the packinghouse, which may be discharged by a new source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section and § 432.32(a).

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
Ammonia	0.10	0.05
ENT A='01'≤English units (pounds per 1,000 lb ELWK)		
Ammonia	0.10	0.05

(d) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the dry rendering of material derived from animals slaughtered at locations other than the packinghouse, which may be discharged by a new source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section and § 432.32(e):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
Ammonia	0.04	0.02
	English units (pounds per 1,000 lb ELWK)	
Ammonia	0.04	0.02

[39 FR 7897, Feb. 28, 1974; 39 FR 26423, July 19, 1974]

§ 432.36 Pretreatment standards for new sources.

Any new source subject to this subpart that introduces process wastewater pollutants into a publicly owned treatment works must comply with 40 CFR part 403.

[60 FR 33965, June 29, 1995]

§ 432.37 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT): The limitations shall be the same as those specified for conventional pollutants (which are defined in § 401.16) in § 432.32 of this subpart for the best practicable control technology currently available (BPT).

[51 FR 25001, July 9, 1986]

Subpart D—High-Processing Packinghouse Subcategory

§ 432.40 Applicability; description of the high-processing packinghouse subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of red meat carcasses, in whole or part, by high-processing packinghouses.

§ 432.41 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR part 401 shall apply to this subpart.

(b) The term ''packinghouse'' shall mean a plant that both slaughters animals and subsequently processes carcasses into cured, smoked, canned or other prepared meat products.

(c) The term ''high-processing packinghouse'' shall mean a packinghouse which processes both animals slaughtered at the site and additional carcasses from outside sources.

(d) The term ''LWK'' (live weight killed) shall mean the total weight of the total number of animals slaughtered during the time to which the effluent limitations apply; i.e., during any one day or any period of thirty consecutive days.

(e) The term ''ELWK'' (equipment live weight killed) shall mean the total weight of the total number of animals slaughtered at locations other than the slaughterhouse or packinghouse, which animals provide hides, blood, viscera or renderable materials for processing at that slaughterhouse, in addition to those derived from animals slaughtered on-site.

(f) The term ''oil and grease'' shall mean those components of process waste water amenable to measurement by the method described in ''Methods for Chemical Analysis of Water and Wastes,'' 1971, EPA, Analytical Quality Control Laboratory, page 217.

§ 432.42 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

(a) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to on-site slaughter or subsequent meat, meat product or byproduct processing of carcasses of animals slaughtered on-site, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg LWK)	
BOD5+	0.48	0.24
TSS+	0.62	0.31
Oil and grease	0.26	0.13
Fecal coliform	(1)	(1)
pH	(2)	(2)
	English units (pounds per 1,000 lb LWK)	
BOD5+	0.48	0.24
TSS+	0.62	0.31
Oil and grease	0.26	0.13
Fecal coliform	(1)	(1)
pH	(2)	(2)

[1] Maximum at any time 400 mpn/100 ml.
[2] Within the range 6.0 to 9.0.

+The values for BOD*5* and suspended solids are for average plants, i.e., plants with a ratio of average weight of processed meat products to average LWK of 0.55. Adjustments can be made for high-processing packing-houses at other ratios according to the following equations:

$$\text{kg BOD}5/1000\text{ kg LWK} = 0.21+0.23 \quad \text{(v—0.4)}$$

$$\text{kg SS}/1000\text{ kg LWK} = 0.28+0.30 \quad \text{(v—0.4)}$$

where

v − kg processed meat products / kg LWK.

(b) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the processing (defleshing, washing and curing) of hides derived from animals slaughtered at locations other than the packinghouse, which may be discharged by a point source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD*5*	0.04	0.02
TSS	0.08	0.04
	English units (pounds per 1,000 lb ELWK)	
BOD*5*	0.04	0.02
TSS	0.08	0.04

(c) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the processing of blood derived from animals slaughtered at locations other than the packinghouse, which may be discharged by a point source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD*5*	0.04	0.02
TSS	0.08	0.04
	English units (pounds per 1,000 lb ELWK)	
BOD*5*	0.04	0.02
TSS	0.08	0.04

(d) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the wet or low temperature rendering of material derived from animals slaughtered at locations other than the packinghouse, which may be discharged by a point source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD5	0.06	0.03
TSS	0.12	0.06
	English units (pounds per 1,000 lb ELWK)	
BOD5	0.06	0.03
TSS	0.12	0.06

(e) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the dry rendering of material derived from animals slaughtered at locations other than the packinghouse, which may be discharged by a point source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
BOD5	0.02	0.01
TSS	0.04	0.02
	English units (pounds per 1,000 lb ELWK)	
BOD5	0.02	0.01
TSS	0.04	0.02

[39 FR 7897, Feb. 28, 1974, as amended at 60 FR 33965, June 29, 1995]

§ 432.43 [Reserved]

§ 432.44 Pretreatment standards for existing sources.

Any existing source subject to this subpart that introduces process wastewater pollutants into a publicly owned treatment works must comply with 40 CFR part 403. In addition, the following pretreatment standard establishes the quantity or quality of pollutants or pollutant properties controlled by this section which may be discharged to a publicly owned treatment works by a point source subject to the provisions of this subpart.

Pollutant or pollutant property	Pretreatment standard
pH	No limitation.
BOD5	Do.
TSS	Do.
Oil and grease	Do.
Fecal coliform	Do.

[40 FR 6447, Feb. 11, 1975, as amended at 60 FR 33965, June 29, 1995]

§ 432.45 Standards of performance for new sources.

(a) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to on-site slaughter or subsequent meat, meat product or by-product processing or carcasses of animals slaughtered onsite which may be discharged by a new source subject to the provisions of this subpart: The limitations shall be as specified in § 432.42(a), with the exception that in addition to the pollutants or pollutant properties controlled by that subsection, discharges of ammonia shall not exceed the limitations set forth below:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg LWK)	
Ammonia	0.80	0.40
	English units (pounds per 1,000 lb LWK)	
Ammonia	0.80	0.40

(b) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the processing of blood derived from animals slaughtered at locations other than the packinghouse, which may be discharged by a new source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section and § 432.42(c):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
Ammonia	0.06	0.03
	English units (pounds per 1,000 lb ELWK)	
Ammonia	0.06	0.03

(c) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the wet or low temperature rendering of material derived from animals slaughtered at locations other than the packinghouse, which may be discharged by a new source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section and § 423.42(d):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
Ammonia	0.10	0.05
	English units (pounds per 1,000 lb ELWK)	
Ammonia	0.10	0.05

(d) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section and attributable to the dry rendering of material derived from animals slaughtered at locations other than the packinghouse, which may be discharged by a new source subject to the provisions of this subpart, in addition to the discharge allowed by paragraph (a) of this section and § 432.42(e):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg ELWK)	
Ammonia	0.04	0.02
	English units (pounds per 1,000 lb ELWK)	
Ammonia	0.04	0.02

[39 FR 7897, Feb. 28, 1974; 39 FR 26423, July 19, 1974]

§ 432.46 Pretreatment standards for new sources.

Any new source subject to this subpart that introduces process wastewater pollutants into a publicly owned treatment works must comply with 40 CFR part 403.

[60 FR 33965, June 29, 1995]

§ 432.47 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT): The limitations shall be the same as those specified for conventional pollutants (which are defined in § 401.16) in § 432.42 of this subpart for the best practicable control technology currently available (BPT).

[51 FR 25001, July 9, 1986]

Subpart E—Small Processor Subcategory

SOURCE: 40 FR 905, Jan. 3, 1975, unless otherwise noted.

§ 432.50 Applicability; description of the small processor subcategory.

The provisions of this subpart are applicable to discharges resulting from

the production of finished meat products such as fresh meat cuts, smoked products, canned products, hams, sausages, luncheon meats, or similar products by a small processor.

§ 432.51 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR part 401 shall apply to this subpart.

(b) The term ''small processor'' shall mean an operation that produces up to 2730 kg (6000 lb) per day of any type or combination of finished products.

(c) The term ''finished product'' shall mean the final manufactured product as fresh meat cuts, hams, bacon or other smoked meats, sausage, luncheon meats, stew, canned meats or related products.

§ 432.52 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kg/kkg of finished product)	
BOD5	2.0	1.0
TSS	2.4	1.2
Oil and grease	1.0	0.5
pH	(1)	(1)
Fecal coliforms	(2)	(2)
	English units (lb/1,000 lb of finished product)	
BOD5	2.0	1.0
TSS	2.4	1.2
Oil and grease	1.0	0.5
pH	(1)	(1)
Fecal coliforms	(2)	(2)

[1] Within the range 6.0 to 9.0.
[2] No limitation.

[40 FR 905, Jan. 3, 1975, as amended at 60 FR 33965, June 29, 1995]

§§ 432.53—432.54 [Reserved]

§ 432.55 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kg/kkg of finished product)	
BOD5	1.0	0.5
TSS	1.2	0.6
Oil and grease	0.5	0.25
pH	(1)	(1)
Fecal coliforms	(2)	(2)
	English units (lb/1,000 lb of finished product)	
BOD5	1.0	0.5
TSS	1.2	0.6
Oil and grease	0.5	0.25
pH	(1)	(1)
Fecal coliforms	(2)	(2)

[1] Within the range 6.0 to 9.0.
[2] No limitation.

§ 432.56 Pretreatment standards for new sources.

Any new source subject to this subpart that introduces process wastewater pollutants into a publicly owned treatment works must comply with 40 CFR part 403. In addition, the following pretreatment standard establishes the quantity or quality of pollutants or pollutant properties controlled by this section which may be discharged to a publicly owned treatment works by a new source subject to the provisions of this subpart:

Pollutant or pollutant property	Pretreatment standard
BOD5	No limitation.
TSS	Do.
Oil and grease	Do.
pH	Do.
Fecal coliform	Do.

[40 FR 905, Jan. 3, 1975, as amended at 60 FR 33965, June 29, 1995]

§ 432.57 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology.

Except as provided in §§ 125.30 through 125.32, the following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best conventional pollutant control technology:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kg/kkg of finished product)	
BOD5	1.0	0.5
TSS	1.2	0.6
Oil and grease	0.5	0.25
pH	(1)	(1)
Fecal coliforms	(2)	(2)
BOD5	1.0	0.5
TSS	1.2	0.6
Oil and grease	0.5	0.25
pH	(1)	(1)
Fecal coliforms	(2)	(2)

[1] Within the range 6.0 to 9.0.
[2] No limitation.

[51 FR 25001, July 9, 1986]

Subpart F—Meat Cutter Subcategory

SOURCE: 40 FR 906, Jan. 3, 1975, unless otherwise noted.

§ 432.60 Applicability; description of the meat cutter subcategory.

The provisions of this subpart are applicable to discharges resulting from the fabrication or manufacture of fresh meat cuts such as steaks, roasts, chops, etc. by a meat cutter.

§ 432.61 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR part 401 shall apply to this subpart.

(b) The term ''meat cutter'' shall mean an operation which fabricates, cuts, or otherwise produces fresh meat cuts and related finished products from livestock carcasses, at rates greater than 2730 kg (6000 lb) per day.

(c) The term ''finished product'' shall mean the final manufactured product as fresh meat cuts including, but not limited to, steaks, roasts, chops, or boneless meats.

§ 432.62 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kg/kkg of finished product)	
BOD5	0.036	0.018
TSS	0.044	0.022
Oil and grease	0.012	0.000
pH	(1)	(1)
Fecal coliforms	(2)	(2)
	English units (lb/1,000 lb of finished product)	
BOD5	0.036	0.018
TSS	10.044	0.022
Oil and grease	0.012	0.006
pH	(1)	(1)
Fecal coliforms	(2)	(2)

[1] Within the range 6.0 to 9.0.
[2] Maximum at any time 400 mpn/100 ml.

[40 FR 906, Jan. 3, 1975, as amended at 60 FR 33965, June 29, 1995]

§ 432.63 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a

point source subject to the provisions of this subpart after application of the best available technology economically achievable:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Milligrams per liter—effluent	
Ammonia	8.0 mg/l	4.0

[44 FR 50748, Aug. 29, 1979]

§ 432.64 [Reserved]

§ 432.65 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kg/kkg of finished product)	
BOD5	0.036	0.018
TSS	0.044	0.022
Oil and grease	0.012	0.006
pH	(1)	(1)
Fecal coliforms	(2)	(2)
	English units (lb/1,000 lb of finished product)	
BOD5	0.030	0.015
TSS	0.036	0.018
Oil and grease	0.012	0.006
pH	(1)	(1)
Fecal coliforms	(2)	(2)

[1] Within the range 6.0 to 9.0.
[2] Maximum at any time 400 mpn/100 ml.

§ 432.66 Pretreatment standards for new sources.

Any new source subject to this subpart that introduces process wastewater pollutants into a publicly owned treatment works must comply with 40 CFR part 403. In addition, the following pretreatment standard establishes the quantity or quality of pollutants or pollutant properties controlled by this section which may be discharged to a publicly owned treatment works by a new source subject to the provisions of this subpart:

Pollutant or pollutant property	Pretreatment standard
BOD5	No limitation.
TSS	Do.
Oil and grease	Do.
pH	Do.
Fecal coliform	Do.

[40 FR 906, Jan. 3, 1975, as amended at 60 FR 33965, June 29, 1995]

§ 432.67 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT): The limitations shall be the same as those specified for conventional pollutants (which are defined in § 401.16) in § 432.62 of this subpart for the best practicable control technology currently available (BPT).

[51 FR 25001, July 9, 1986]

Subpart G—Sausage and Luncheon Meats Processor Subcategory

SOURCE: 40 FR 907, Jan. 3, 1975, unless otherwise noted.

§ 432.70 Applicability; description of the sausage and luncheon meat processor subcategory.

The provisions of this subpart are applicable to discharges resulting from the manufacture of fresh meat cuts, sausage, bologna, and other luncheon meats by a sausage and luncheon meat processor.

§ 432.71 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR part 401 shall apply to this subpart.

(b) The term ''sausage and luncheon meat processor'' shall mean an operation which cuts fresh meats, grinds, mixes, seasons, smokes or otherwise produces finished products such as sausage, bologna and luncheon meats at rates greater than 2730 kg (6000 lb) per day.

(c) The term ''finished product'' shall mean the final manufactured product as fresh meat cuts including steaks, roasts, chops or boneless meat, bacon or other smoked meats (except hams) such as sausage, bologna or other luncheon meats, or related products (except canned meats).

§ 432.72 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kg/kkg of finished product)	
BOD5	0.56	0.28
TSS	0.68	0.34
Oil and grease	0.20	0.10
pH	(1)	(1)
Fecal coliforms	(2)	(2)
	English units (lb/1,000 lb of finished product)	
BOD5	0.56	0.28
TSS	0.68	0.34
Oil and grease	0.20	0.10
pH	(1)	(1)
Fecal coliforms	(2)	(2)

[1] Within the range 6.0 to 9.0.
[2] Maximum at any time 400 mpn/100 ml.

[40 FR 907, Jan. 3, 1975, as amended at 60 FR 33966, June 29, 1995]

§ 432.73 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

[Milligrams per liter—effluent]

Effluent characteristics	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
Ammonia	80 mg/l	4.0

[44 FR 50748, Aug. 29, 1979]

§ 432.74 [Reserved]

§ 432.75 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new sources subject to the provisions of this subpart:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kg/kkg of finished product)	
BOD5	0.56	0.28
TSS	0.68	0.34
Oil and grease	0.20	0.10
pH	(1)	(1)
Fecal coliforms	(2)	(2)
	English units (lb/1,000 lb of finished product)	
BOD5	0.48	0.24
TSS	0.58	0.29
Oil and grease	0.20	0.10
pH	(1)	(1)
Fecal coliforms	(2)	(2)

[1] Within the range 6.0 to 9.0.
[2] Maximum at any time 400 mpn/100 ml.

§ 432.76 Pretreatment standards for new sources.

Any new source subject to this subpart that introduces process wastewater pollutants into a publicly owned treatment works must comply with 40 CFR part 403. In addition, the following pretreatment standard establishes the quantity or quality of pollutants or pollutant properties controlled by this section which may be discharged to a publicly owned treatment works by a new source subject to the provisions of this subpart:

Pollutant or pollutant property	Pretreatment standard
BOD5	No limitation.
TSS	Do.
Oil and grease	Do.
pH	Do.
Fecal coliform	Do.

[40 FR 907, Jan. 3, 1975, as amended at 60 FR 33966, June 29, 1995]

§ 432.77 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT): The limitations shall be the same as those specified for conventional pollutants (which are defined in § 401.16) in § 432.72 of this subpart for the best practicable control technology currently available (BPT).

[51 FR 25001, July 9, 1986]

Subpart H—Ham Processor Subcategory

SOURCE: 40 FR 908, Jan. 3, 1975, unless otherwise noted.

§ 432.80 Applicability; description of the ham processor subcategory.

The provisions of this subpart are applicable to discharges resulting from the manufacture of hams alone or in combination with other finished products by a ham processor.

§ 432.81 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR part 401 shall apply to this subpart.

(b) The term ''ham processor'' shall mean an operation which manufactures hams alone or in combination with other finished products at rates greater than 2730 kg (6000 lb) per day.

(c) The term ''finished products'' shall mean the final manufactured product as fresh meat cuts including steaks, roasts, chops or boneless meat, smoked or cured hams, bacon or other smoked meats, sausage, bologna or other luncheon meats (except canned meats).

§ 432.82 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kg/kkg of finished product)	
BOD5	0.62	0.31
TSS	0.74	0.37
Oil and grease	0.22	0.11
pH	(1)	(1)
Fecal coliform	(2)	(2)
	English units (lb/1,000 lb of finished product)	
BOD5	0.62	0.31
TSS	0.74	0.37
Oil and grease	0.22	0.11
pH	(1)	(1)
Fecal coliform	(2)	(2)

[1] Within the range 6.0 to 9.0.
[2] Maximum at any time 400 mpn/100 ml.

[40 FR 908, Jan. 3, 1975, as amended at 60 FR 33966, June 29, 1995]

§ 432.83 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

[Milligrams per liter—effluent]

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
Ammonia	8.0 mg/l	4.0

[44 FR 50748, Aug. 29, 1979]

§ 432.84 [Reserved]

§ 432.85 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kg/kkg of finished product)	
BOD5	0.62	0.31
TSS	0.74	0.37
Oil and grease	0.22	0.11
pH	(1)	(1)
Fecal coliform	(2)	(2)
	English units (lb/1,000 lb of finished product)	
BOD5	0.62	0.31
TSS	0.74	0.37
Oil and grease	0.22	0.11
pH	(1)	(1)
Fecal coliform	(2)	(2)

[1] Within the range 6.0 to 9.0.
[2] Maximum at any time 400 mpn/100 ml.

§ 432.86 Pretreatment standards for new sources.

Any new source subject to this subpart that introduces process wastewater pollutants into a publicly owned treatment works must comply with 40 CFR part 403. In addition, the following pretreatment standard establishes the quantity or quality of pollutants or pollutant properties controlled by this section which may be discharged to a publicly owned treatment works by a new source subject to the provisions of this subpart:

Pollutant or pollutant property	Pretreatment standard
BOD5	No limitation.
TSS	Do.
Oil and grease	Do.
pH	Do.
Fecal coliform	Do.

[40 FR 908, Jan. 3, 1975, as amended at 60 FR 33966, June 29, 1995]

§ 432.87 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT): The limitations shall be the same as those specified for conventional pollutants (which are defined in § 401.16) in § 432.82 of this subpart for the best practicable control technology currently available (BPT).

[51 FR 25001, July 9, 1986]

Subpart I—Canned Meats Processor Subcategory

SOURCE: 40 FR 909, Jan. 3, 1975, unless otherwise noted.

§ 432.90 Applicability; description of the canned meats processor subcategory.

The provisions of this subpart are applicable to discharges resulting from the manufacture of canned meats alone

or in combination with any other finished products, by a canned meats processor.

§ 432.91 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR part 401 shall apply to this subpart.

(b) The term ''canned meat processor'' shall mean an operation which prepares and cans meats (such as stew, sandwich spreads, or similar products) alone or in combination with other finished products at rates greater than 2730 kg (6000 lb.) per day.

(c) The term ''finished products'' shall mean the final manufactured product as fresh meat cuts including steaks, roasts, chops or boneless meat, hams, bacon or other smoked meats, sausage, bologna or other luncheon meats, stews, sandwich spreads or other canned meats.

§ 432.92 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kg/kkg of finished product)	
BOD5	0.74	0.37
TSS	0.90	0.45
Oil and grease	0.26	0.12
pH	(1)	(1)
Fecal coliform	(2)	(2)
	English units (lb/1,000 lb of finished product)	
BOD5	0.74	0.37
TSS	0.90	0.45
Oil and grease	0.26	0.13
pH	(1)	(1)
Fecal coliform	(2)	(2)

[1] Within the range 6.0 to 9.0.
[2] Maximum at any time 400 mpn/100 ml.

[40 FR 909, Jan. 3, 1975, as amended at 60 FR 33966, June 29, 1995]

§ 432.93 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

[Milligrams per liter—effluent]

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
Ammonia	8.0 mg/l	4.0

[44 FR 50748, Aug. 29, 1979]

§ 432.94 [Reserved]

§ 432.95 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kg/kkg of finished product)	
BOD5	0.74	0.37
TSS	0.90	0.45
Oil and grease	0.26	0.13
pH	(1)	(1)
Fecal coliform	(2)	(2)
	English units (lb/1,000 lb of finished product)	
BOD5	0.74	0.37
TSS	0.90	0.45
Oil and grease	0.26	0.13
pH	(1)	(1)
Fecal coliform	(2)	(2)

[1] Within the range 6.0 to 9.0.
[2] Maximum at any time 400 mpn/100 ml.

§ 432.96 Pretreatment standards for new sources.

Any new source subject to this subpart that introduces process wastewater pollutants into a publicly owned treatment works must comply with 40 CFR part 403. In addition, the following pretreatment standard establishes the quantity or quality of pollutants or pollutant properties controlled by this section which may be discharged to a publicly owned treatment works by a new source subject to the provisions of this subpart:

Pollutant or pollutant property	Pretreatment standard
BOD5	No limitation.
TSS	Do.
Oil and grease	Do.
pH	Do.
Fecal coliform	Do.

[40 FR 909, Jan. 3, 1975, as amended at 60 FR 33966, June 29, 1995]

§ 432.97 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology.

Except as provided in §§ 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT): The limitations shall be the same as those specified for conventional pollutants (which are defined in § 401.16) in § 432.92 of this subpart for the best practicable control technology currently available (BPT).

[51 FR 25001, July 9, 1986]

Subpart J—Renderer Subcategory

SOURCE: 40 FR 910, Jan. 3, 1975, unless otherwise noted.

§ 432.100 Applicability; description of the renderer subcategory.

The provisions of this subpart are applicable to discharges resulting from the manufacture of meat meal, dried animal by-product residues (tankage), animal oils, grease and tallow, perhaps including hide curing, by a renderer.

§ 432.101 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR part 401 shall apply to this subpart.

(b) The term ''renderer'' shall mean an independent or off-site rendering operation, conducted separate from a slaughterhouse, packinghouse or poultry dressing or processing plant, which manufactures at rates greater than 75,000 pounds of raw material per day of meat meal, tankage, animal fats or oils, grease, and tallow, and may cure cattle hides, but excluding marine oils, fish meal, and fish oils.

(c) The term ''tankage'' shall mean dried animal by-product residues used in feedstuffs.

(d) The term ''tallow'' shall mean a product made from beef cattle or sheep fat that has a melting point of 40 °C or greater.

(e) The term ''raw material'' or as abbreviated herein, ''RM'', shall mean the basic input materials to a renderer composed of animal and poultry trimmings, bones, meat scraps, dead animals, feathers and related usable by-products.

§ 432.102 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

(a) Except as provided in §§ 125.30 through 125.32, and subject to the provisions of paragraph (b) of this section, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kg/kkg of raw material)	
BOD5	0.34	0.17
TSS	0.42	0.21
Oil and grease	0.20	0.10
pH	(1)	(1)
Fecal coliform	(2)	(2)
	English units (lb/1,000 lb of raw material)	
BOD5	0.34	0.17
TSS	0.42	0.21
Oil and grease	0.20	0.10
pH	(1)	(1)
Fecal coliform	(2)	(2)

[1] Within the range 6.0 to 9.0.
[2] Maximum at any time 400 mpn/100 ml.

(b) The limitations given in paragraph (a) of this section for BOD5 and TSS are derived for a renderer which does no cattle hide curing as part of the plant activities. If a renderer does conduct hide curing, the following empirical formulas should be used to derive an additive adjustment to the effluent limitations for BOD5 and TSS.

BOD5 Adjustment (kg/kkg RM) = [8.0 × (number of hides) / kg of raw material] (lb/1,000 lb RM) = [17.6 × (number of hides) /lbs of raw material]

TSS Adjustment (kg/kkg RM) = [11.0 × (number of hides)/kg of raw material] (lb/1,000 lb RM) = [24.2 × (number of hides)/lbs of raw material]

[40 FR 910, Jan. 3, 1975; 40 FR 11874, Mar. 14, 1975, as amended at 60 FR 33966, June 29, 1995]

§ 432.103 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kg/kkg of raw material)	
Ammonia	0.14	0.07
	English units (lb/1,000 lb of raw material)	
Ammonia	0.14	0.07

[44 FR 50748, Aug. 29, 1979]

§ 432.104 [Reserved]

§ 432.105 Standards of performance for new sources.

(a) Subject to the provisions of paragraph (b) of this section, the following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart:

Effluent characteristics	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of raw material)	
BOD5	0.18	0.09
TSS	.22	.11
Oil and grease	.10	.05
Ammonia	.14	.07
pH	(1)	(1)
Fecal coliforms	(2)	(2)
	English units (pounds per 1,000 lb of raw material)	
BOD5	0.18	0.09
TSS	.22	.11
Oil and grease	.10	.05
Ammonia	.14	.07
pH	(1)	(1)
Fecal coliforms	(2)	(2)

[1] Within the range 6.0 to 9.0.
[2] Maximum at any time 400 mpn/100 ml.

(b) The standards given in paragraph (a) of this section for BOD5 and TSS are derived for a renderer which does no cattle hide curing as part of the plant activities. If a renderer does conduct hide curing, the following empirical formulas should be used to derive an additive adjustment to the standards for BOD5 and TSS.

BOD5 adjustment (kilograms per 1,000 kg of raw material) = 8.0×(number of hides)/kilograms of raw material (pounds per 1,000 lb of raw material) = 17.6×(number of hides)/pounds of raw material

TSS adjustment (kilograms per 1,000 kg of raw material) = 11.0 × (number of hides)/kilograms of raw material (pounds per 1,000 lb of raw material) = 24.2 × (number of hides)/pounds of raw material

[42 FR 54419, Oct. 6, 1977]

§ 432.106 Pretreatment standards for new sources.

Any new source subject to this subpart that introduces process wastewater pollutants into a publicly owned treatment works must comply with 40 CFR part 403. In addition, the following pretreatment standard establishes the quantity or quality of pollutants or pollutant properties controlled by this section which may be discharged to a publicly owned treatment works by a new source subject to the provisions of this subpart:

Pollutant or pollutant property	Pretreatment standard
BOD5	No limitation.
TSS	Do.
Oil and grease	Do.
pH	Do.
Fecal coliform	Do.

[40 FR 910, Jan. 3, 1975, as amended at 60 FR 33966, June 29, 1995]

§ 432.107 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollution control technology.

(a) Except as provided in §§ 125.30 through 125.32, and subject to the provisions of paragraph (b) of this section, the following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best conventional pollutant control technology:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kg/kkg of raw material)	
BOD5	0.18	0.09
TSS	0.22	0.11
Oil and grease	0.10	0.05
Fecal coliforms	(1)	(1)
pH	(2)	(2)
BOD5	0.18	0.09
TSS	0.22	0.11
Oil and grease	0.10	0.05
Fecal coliforms	(1)	(1)
pH	(2)	(2)

[1] Maximum at any time: 400 mpn/100 ml.
[2] Within the range 6.0 to 9.0.

(b) The limitations given in paragraph (a) of this section for BOD5 and TSS are derived for a renderer which does no cattle hide curing as part of the plant activities. If a renderer does conduct hide curing, the following empirical formulas should be used to derive an additive adjustment to the effluent limitations for BOD5 and TSS.

BOD5 Adjustment (kg/kkg RM) = 3.6 × (number of hides)/kg of raw material (lb/1,000 lb

RM) = 7.9 × (number of hides)/lbs of raw material

TSS Adjustment (kg/kkg RM)=6.2×(number of hides)/kg of raw material (lb/1,000 lb RM) = 13.6 × (number of hides)/lbs of raw material

[51 FR 25001, July 9, 1986]