ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 451

[FRL–7602–5]

Effluent Limitations Guidelines and New Source Performance Standards for the Concentrated Aquatic Animal Production Point Source Category; Notice of Data Availability

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of data availability.

SUMMARY: In 2002, EPA proposed technology-based effluent limitations and new source performance standards for the concentrated aquatic animal production (CAAP) point source category. The proposal applied to new and existing CAAP facilities that discharge pollutants directly to waters of the United States.

This notice summarizes the data received since proposal and describes how the Agency may use the data to address comments and develop the final rule. The notice also discusses refinements EPA may make to its methods for estimating costs, load reductions and financial impacts. It also presents revised results for these analyses reflecting the refinements and incorporating new data.

DATES: Submit comments on or before February 12, 2004.

ADDRESSES: Public comments regarding this document should be mailed to Water Docket, Environmental Protection Agency, Mailcode 4101T, 1200 Pennsylvania Avenue, NW., Washington, DC 20460, Attention Docket ID No. OW–2002–0026 (formerly W–02–01), or submitted electronically at *http://www.epa.gov/edocket*. For additional information on how to submit comments, *see* section B in the **SUPPLEMENTARY INFORMATION** section.

FOR FURTHER INFORMATION CONTACT: For technical information concerning today's proposed rule, contact Ms. Marta Jordan at (202) 566–1049. For economic information, contact Mr. Christopher Miller at (202) 566–0395.

SUPPLEMENTARY INFORMATION:

A. Regulated Entities

Entities potentially regulated by this action include:

Category	Examples of regulated entities	Primary NAICS codes
Industry and Government	Facilities engaged in concentrated aquatic animal production, which may include these sectors:	
	Finfish Farming and Fish Hatcheries	112511
	Other Animal Aquaculture	112519

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your facility would be regulated by this action, you should carefully examine the applicability criteria in 40 CFR 451.1, 451.10, 451.20 and 451.30 of the proposed rule. If you have questions regarding the applicability of this proposed action to a particular entity, contact the person listed for technical information in the preceding **FOR FURTHER INFORMATION CONTACT** section.

B. How Can I Get Copies of This Document and Other Related Information?

1. *Docket*. EPA has established an official public docket for this action under Docket ID No. OW–2002–0026. The official public docket consists of the documents specifically referenced in this action, any public comments received and other information related to this action. Although a part of the official docket, the public docket does not include information as Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. The official public docket is the collection of materials that is available for public viewing at the Water Docket in the EPA Docket Center, (EPA/DC) EPA West, Room B102, 1301 Constitution Avenue, NW., Washington, DC. The EPA Docket Center Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the Water Docket is (202) 566–2426. For access to docket materials, please call ahead to schedule an appointment. Every user is entitled to copy 266 pages per day before incurring a charge. The Docket may charge 15 cents a page for each page over the page limit plus an administrative fee of $25.00.

2. *Electronic Access*. You may access this **Federal Register** document electronically through the EPA Internet under the ''**Federal Register**'' listings at *http://www.epa.gov/fedrgstr/*.

An electronic version of the public docket is available through EPA's electronic public docket and comment system, EPA Dockets. You may use EPA Dockets at *http://www.epa.gov/edocket/* to submit or view public comments, access the index listing of the contents of the official public docket, and to access those documents in the public docket that are available electronically. Once in the system, select ''search,'' then key in the appropriate docket identification number.

Certain types of information will not be placed in the EPA Dockets. Information claimed as CBI and other information whose disclosure is restricted by statute, which is not included in the official public docket will not be available for public viewing in EPA's electronic public docket. EPA's policy is that copyrighted material will not be placed in EPA's electronic public docket, but will be available only in printed, paper form in the official public docket. To the extent feasible, publicly available docket materials will be made available in EPA's electronic public docket. When a document is selected from the index list in EPA Dockets, the system will identify whether the document is available for viewing in EPA's electronic public docket. Although not all docket materials may be available electronically, you may still access any of the publicly available docket materials through the docket facility identified in Section B.1. EPA intends to work towards providing electronic access to all of the publicly available docket materials through EPA's electronic public docket.

For public commenters, it is important to note that EPA's policy is that public comments, whether submitted electronically or in paper, will be made available for public viewing in EPA's electronic public docket as EPA receives them and without change, unless the comment contains copyrighted material, information claimed as CBI, or other information whose disclosure is

restricted by statute. When EPA identifies a comment containing copyrighted material, EPA will provide a reference to that material in the version of the comment that is placed in EPA's electronic public docket. The entire printed comment, including the copyrighted material, will be available in the public docket.

Public comments submitted on computer disks that are mailed or delivered to the docket will be transferred to EPA's electronic public docket. Public comments that are mailed or delivered to the Docket will be scanned and placed in EPA's electronic public docket. Where practical, physical objects will be photographed, and the photograph will be placed in EPA's electronic public docket along with a brief description written by the docket staff.

For additional information about EPA's electronic public docket, visit EPA Dockets online or *see* 67 FR 38102, May 31, 2002.

C. How and To Whom Do I Submit Comments?

You may submit comments electronically, by mail, or through hand delivery/courier. To ensure proper receipt by EPA, identify the appropriate docket identification number in the subject line on the first page of your comment. Please ensure that your comments are submitted within the specified comment period. Comments received after the close of the comment period will be marked ''late.'' EPA is not required to consider these late comments. If you wish to submit information you claim as CBI or information that is otherwise protected by statute, please follow the instructions in Section D. Do not use EPA Dockets or e-mail to submit information you claim as CBI or information protected by statute.

1. *Electronically.* If you submit an electronic comment as prescribed below, EPA recommends that you include your name, mailing address, and an e-mail address or other contact information in the body of your comment. Also include this contact information on the outside of any disk or CD ROM you submit, and in any cover letter accompanying the disk or CD ROM. This ensures that you can be identified as the submitter of the comment and allows EPA to contact you in case EPA cannot read your comment due to technical difficulties or needs further information on the substance of your comment. EPA's policy is that EPA will not edit your comment, and any identifying or contact information provided in the body of a comment will be included as part of the comment that is placed in the official public docket, and made available in EPA's electronic public docket. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment.

i. *EPA Dockets.* Your use of EPA's electronic public docket to submit comments to EPA electronically is EPA's preferred method for receiving comments. Go directly to EPA Dockets at *http://www.epa.gov/edocket*, and follow the online instructions for submitting comments. To access EPA's electronic public docket from the EPA Internet Home Page, select ''Information Sources,'' ''Dockets,'' and ''EPA Dockets.'' Once in the system, select ''search,'' and then key in Docket ID No. OW–2002–0026. The system is an ''anonymous access'' system, which means EPA will not know your identity, e-mail address, or other contact information unless you provide it in the body of your comment.

ii. *E-mail.* Comments may be sent by electronic mail (e-mail) to *OW-Docket@epa.gov*, Attention Docket ID No. OW–2002–0026. In contrast to EPA's electronic public docket, EPA's e-mail system is not an ''anonymous access'' system. If you send an e-mail comment directly to the Docket without going through EPA's electronic public docket, EPA's e-mail system automatically captures your e-mail address. E-mail addresses that are automatically captured by EPA's e-mail system are included as part of the comment that is placed in the official public docket, and made available in EPA's electronic public docket.

iii. *Disk or CD-ROM.* You may submit comments on a disk or CD-ROM that you mail to the mailing address identified in Section C.2. These electronic submissions will be accepted in Word Perfect, Microsoft Word, or ASCII file format. Avoid the use of special characters and any form of encryption.

2. *By Mail.* Send an original and three (3) copies of your comments and enclosures as well as any references cited in your comments to: Water Docket, Environmental Protection Agency, Mailcode: 4101T, 1200 Pennsylvania Avenue, NW., Washington, DC 20460, Attention Docket ID No. OW–2002–0026.

3. *By Hand Delivery or Courier.* Deliver your comments to: Water Docket, EPA Docket Center, EPA West, Room B102, 1301 Constitution Avenue, NW., Washington, DC, Attention Docket ID No. OW–2002–0026. Such deliveries are only accepted during the Docket's normal hours of operation as identified in Section B.1.

D. How Should I Submit CBI to the Agency?

Do not submit information that you consider to be CBI electronically through EPA's electronic public docket or by e-mail. Send information identified as CBI by mail only to the following address: Engineering and Analysis Division, Mail Code 4303T, U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460, Attention: Marta Jordan, Docket ID No. OW–2002–0026. For hand delivery or courier deliver the information to the Engineering and Analysis Division, EPA West, Room 6233M, 1301 Constitution Avenue, NW., Washington, DC, Attention: Marta Jordan, Docket ID No. OW–2002–0026.

You may claim information that you submit to EPA as CBI by marking any part or all of that information as CBI (if you submit CBI on disk or CD–ROM, indicate on the outside of the disk or CD–ROM that it contains information claimed as CBI and then identify electronically within the disk or CD–ROM the specific information that is CBI). Information so marked will not be disclosed except in accordance with procedures set forth in 40 CFR part 2.

In addition to one complete version of the comment that includes any information claimed as CBI, a copy of the comment that does not contain the information claimed as CBI must be submitted for inclusion in the public docket and EPA's electronic public docket. If you submit the copy that does not contain CBI on disc or CD–ROM, mark the outside of the disk or CD–ROM to clearly indicate that it does not contain CBI. Information not marked as CBI will be included in the public docket and EPA's electronic public docket without prior notice. If you have any questions about CBI or the procedures for claiming CBI, please consult the person identified in the **FOR FURTHER INFORMATION CONTACT** section.

E. What Should I Consider as I Prepare My Comments for EPA?

You may find the following suggestions helpful for preparing your comments:

1. Explain your views as clearly as possible.

2. Describe any assumptions that you used.

3. Provide any technical information and/or data you used that support your views.

4. If you estimate potential burden or costs, explain how you arrived at your estimate.

5. Provide specific examples to illustrate your concerns.

6. Offer alternatives.

7. Make sure to submit your comments by the comment period deadline identified.

8. To ensure proper receipt by EPA, identify the appropriate docket identification number in the subject line on the first page of your response. It would also be helpful if you provided the name, date, and **Federal Register** citation related to your comments.

Table of Contents

I. Purpose of This Document

Today's document has several purposes. First, EPA is summarizing new data and information we received during public comment on the proposed concentrated aquatic animal production (CAAP) regulations (67 FR 57872, September 12, 2002). The document also describes data EPA collected since it published the proposed rule. For example, EPA evaluated the data from detailed industry surveys, EPA's Permit Compliance System (PCS) database, Discharge Monitoring Reports (DMRs), National Pollutant Discharge Elimination System (NPDES) permits and the industry. This notice summarizes major issues raised in comments on the proposal and how the additional data and comments affect EPA's thinking on these issues. Finally, this document discusses possible changes in our methodology for estimating costs, removals, economic impacts, and benefits associated with the modified options, and includes revised estimates for costs, removals, and economic impacts.

Today's document includes six main components:

1. Discussion of new data and information.

2. Discussion of comments and EPA's preliminary assessments based upon these comments.

3. Possible Modifications to the Proposed Options and Technologies.

4. Possible Revisions to Costs, Loadings, Economic, and Benefits Models.

5. Revised Estimates of Costs, Loadings, and Economic Impacts.

6. Solicitation of Comments.

Through this NODA, EPA seeks further public comment on any and all aspects of the specific data and issues it has identified here. EPA continues to review the comments we received on the proposed rule and will address those comments and the comments submitted in response to this notice in the final action.

II. New Data and Information

This section provides a brief overview of new data from these general sources:

- EPA post-proposal sampling.
- National Pollutant Discharge Elimination System (NPDES) permits, permit fact sheets, and Discharge Monitoring Report (DMR) data for facilities that responded to the detailed survey.
- Information submitted with comments on the proposed rule.
- Detailed surveys of aquatic animal production (AAP) facilities.
- Literature searches.
- Data from a study that evaluated the effect of sample holding times on subsequent chemical analysis.

A. EPA Site Visits and Sampling Episodes

During the comment period and at the public meetings on the proposal, commenters raised concerns about the representativeness of the data EPA used as the basis for the proposed rule. In response to these concerns, EPA undertook additional wastewater sampling at a State trout hatchery using flow-through system technology (one of the technology options evaluated for the proposal) and visited 17 additional sites, including flow-through systems raising warm water species.

1. Sampling Episode

The facility selected for post-proposal wastewater sampling was a State hatchery in Pennsylvania producing cold water species (trout for stocking enhancement) using flow-through system technology. EPA considered this facility a good candidate for sampling because it used wastewater treatment similar to the treatment systems on which EPA based the proposed limitations. Those systems rely on primary settling of solids generated during cleaning of quiescent zones in an offline settling basin, and secondary settling of the primary effluent, and full or bulk flow from the raceways. Primary settling generally involves physical separation of particles through either quiescent zones and offline settling or a full-flow basin. Secondary settling is sequential solids removal after primary by using a second settling basin (*i.e.*, polishing pond) or a technology unit such as a microscreen. EPA considers this facility to be representative of a well operated facility with effective wastewater treatment. EPA sampled wastewater for five days at this facility during a time of year when the facility approached a maximum stocking density. For more information, refer to the sampling episode report for this facility (Document Control Number (DCN) 62386).

2. Site Visits

EPA selected 17 additional sites to visit based, in part, on public comments regarding specific gaps in the information EPA considered at proposal. Commenters raised concerns about the production of warm water aquatic animals and the use of green water production systems and the ability of these types of production facilities to achieve the proposed effluent limits. Commenters also raised concerns about EPA's assumptions concerning the application of

microscreen treatment to achieve proposed limits for Total Suspended Solids (TSS).

To address comments about the lack of representation of warm water and green water systems, EPA visited two facilities that use warm water culture systems and four facilities that use green water systems. Warm water culture systems refer to the culture of aquatic animals such as catfish, tilapia, or shrimp, that normally live in warmer water. These species can survive water temperatures that exceed 70–75°F for extended periods. Cold water species, such as salmonids, live and are cultured in much colder water and would become severely stressed or die in warmer water. Green water systems contain algae and zooplankton in the water with the cultured fish. Although most green water systems are warm water, some may be used for cold water species. Some green water systems are used to grow species, such as marine fish (*e.g.*, cod or flounder), crustaceans (*e.g.*, shrimp), and freshwater fish (*e.g.*, larval striped bass, walleye or yellow perch) that consume the algae and/or zooplankton as a major part of their diets. Other facilities use green water cultures to remove metabolic wastes from the aquatic animals in the process water. Green water systems could contain measurable amounts of TSS in effluents, primarily because of the plankton present in the culture water.

To address public comments about the effectiveness of microscreen treatment, especially in cold temperatures, EPA visited four facilities reporting the use of microscreen technology to treat wastewater. We chose these four facilities from a population of 13 facilities that reported in their responses to the detailed survey that they used microscreen technology as a primary or secondary solids removal treatment system. During the visits to these four facilities, EPA observed microscreens being used to remove solids from effluent streams. EPA also evaluated how these facilities incorporated microscreens into the daily operation and maintenance activities. *See* Section III.A. for further discussion of this issue.

Other facilities that EPA visited included several State and Federal hatcheries in California, Washington, Idaho, Pennsylvania, and Utah. EPA looked at the differences in mission, operation, and management of government facilities compared to commercial facilities.

B. Monitoring and Permit Data From the Permitting Authorities

To further assess facilities with NPDES permits, EPA asked the EPA regional offices for updated copies of permits, fact sheets, and DMR data for many of the 125 facilities. EPA evaluated NPDES permits and DMR data for 43 of the 125 facilities identified as having a NPDES permit. EPA used the detailed surveys and NPDES permit information to identify discharge points and the nature of discharges (*e.g.*, full flow from raceways or solids collection decant water) in the DMR data.

To better evaluate the quality of current facility discharges compared to the proposed limits, EPA used the detailed surveys to determine the number of facilities reporting NPDES permits. Of the 203 facilities that responded to the detailed survey, EPA found 125 potentially in-scope facilities (*i.e.*, facilities that are subject to the proposed regulation) with existing NPDES permits. The facilities with NPDES permits use these systems:

- 108 flow-through systems.
- 6 recirculating systems.
- 8 pond systems.
- 3 mixed flow-through and recirculating systems.

EPA found that 78 facilities did not report having NPDES permits,

- 9 facilities that are not discharging or indirectly discharge.
- 9 net pen facilities.
- 25 pond facilities.
- 4 recirculating system facilities.
- 31 flow-through system facilities.

Many of these facilities are not subject to existing requirements for NPDES permits (*i.e.*, ponds that discharge less than 30 days, warm water facilities producing less than 100,000 pounds, and cold water facilities producing less than 20,000 pounds).

EPA was primarily interested in getting information on the permit requirements and effluent monitoring data to better assess the baseline performance of facilities (*i.e.*, current effluent treatment conditions) that are in-scope for the proposed regulation. A listing of the NPDES permit numbers for the facilities identified for additional data gathering is available in the record (see DCN 70264). See Section III.G. for discussion of the analysis on the NPDES permits and DMR data.

EPA was also interested in getting information about best management practices (BMPs) required in NPDES permits to compare with the BMPs required in the proposed regulation. For those facilities that have BMP requirements in the NPDES permit, EPA observed that the requirements were primarily related to developing overall facility BMP plans and to practices that addressed drugs and chemicals.

C. Information Submitted With Comments

In the proposal, EPA asked for data and information from commenters. EPA received about 300 public comments on the proposed rule. A wide range of stakeholders representing Federal, State, and local government agencies, industry associations, environmental groups, individual facilities, and members of the public provided comments. Comments addressed many aspects of the proposed regulation and EPA's supporting analysis, including scope of the rule, environmental impacts, regulatory authority, cost, economic impact, and benefit analyses. In some cases, commenters submitted supporting materials (in the form of engineering, economic, scientific, or regulatory reports or journal articles; data summaries or compilations of engineering, economic, scientific, or regulatory data; or references to such information). *See* Section 7.5 of the Public Docket for this rulemaking for these materials.

The comments included information on the costs associated with flow-through systems for the structural, labor, and land components described in each proposed flow-through option. In preparing this notice, EPA used this cost information to help fill gaps in the detailed survey data and to better understand industry diversity. EPA plans to use this additional cost information in refining its estimates of compliance costs for the final rule. The Agency included this information in developing the revised cost estimates presented in this notice. You can find non-confidential cost information in Section 6.5.3 of the public record. Several comments provided monitoring data, used in conjunction with the DMR data described in Section II.B.

The Joint Subcommittee on Aquaculture (JSA) has a task force known as the Aquaculture Effluents Task Force (AETF) that concentrates on the effluent guidelines efforts. The AETF is a group of interested parties representing Federal, State and local governments, academia, industry and environmental organizations. The AETF submitted detailed comments on aspects of the proposed rule such as the use of drugs and chemicals, production systems, costs and economic analyses. In response to EPA's follow-up requests, the AETF provided additional information, primarily papers that were referenced by their comments, or that supported statements made in their

comments. Reviewers can find this additional information at DCN 45232 and we cited it often in this notice.

Additional information included:

- References documenting the presence of viral hemorrhagic septicemia in west coast salmonids.
- Documents on the fate and environmental effects of copper sulfate as a treatment for catfish ponds.
- Feed conversion rates including the effect that feed formulation has on the excretion and discharge of various pollutants.
- Information on BMPs and permit requirements for net pen systems.
- Information on the economic impacts of additional costs for aquatic animal production to the farm operations and nearby communities.

This notice also addresses questions and concerns raised during three public meetings on the proposed rule held in late October to mid-November of 2002. EPA used the public meetings to update the public on the status of the CAAP effluent guidelines and to discuss the proposal. Several attendees submitted comments to EPA after the meetings. DCNs 40520, 40521, 40522 summarize the discussions and comments at those meetings.

D. Detailed Survey Results

In August 2001, EPA mailed about 6,000 screener surveys to aquatic animal production facilities. EPA received responses from 4,900 facilities, of which about 2,300 facilities reported that they produce aquatic animals. EPA based its proposed regulations on the data collected from the screener questionnaire.

Consistent with EPA's intentions described in the preamble to the proposed rule, EPA based its analyses for this notice on data collected from the detailed questionnaire. The preamble described the detailed questionnaire (DCN 62452) and EPA's plans to recalculate estimates for costs and benefits associated with the proposed regulatory options. The preamble also stated that the Agency would describe these data and analyses in this notice. (67 FR 57881, September 12, 2002). EPA reviewed the responses from the detailed questionnaire, performed follow-up activities on the detailed questionnaires resulting from inconsistencies or questions from an initial review of responses, and completed analyses of the data contained in these responses. This section describes the facilities that EPA selected to receive the detailed questionnaire and those that responded.

EPA used the screener responses to select a stratified random sample to receive the detailed questionnaire. Sample criteria were designed to primarily capture facilities that produce aquatic animals and are likely to be covered by the proposed rule. EPA also developed sample criteria to capture facilities that are out of scope (based on information in the screener survey) to validate its assumptions about the applicability of the proposed regulation. For example, the sample criteria includes facilities with ponds, which are out of scope in the proposed regulation, to confirm that additional regulations for ponds are unnecessary. The Technical Development Document (TDD), page A11, describes in detail the criteria and includes facilities that are in-scope and out of scope. The facilities selected met one of these criteria:

- Aquariums.
- Production includes alligators and total biomass exceeds 100,000 pounds.
- Production includes trout or salmon and total biomass exceeds 20,000 pounds.
- Predominant production method is ponds; predominant species is catfish; and total biomass exceeds 2,200,000 pounds.
- Predominant production method is ponds; predominant species is shrimp, tilapia, other finfish, or hybrid striped bass; and total biomass exceeds 360,000 pounds.
- Predominant production method is any method except ponds, and total biomass exceeds 100,000 pounds.

Applying these criteria resulted in 539 facilities from the screener questionnaire responses with these characteristics. We then classified the 539 facilities into 44 groups defined by facility type (commercial, government, research, or tribal), the predominant species, and predominant production. A sample was drawn from the 539 facilities ensuring sufficient representation of facilities in each of the 44 groups. The sample drawn consisted of 263 facilities. From these 263 facilities EPA excluded 11 facilities that were duplicates on the mailing list or, after revising production estimates, did not meet the production thresholds for a CAAP facility. Detailed questionnaires were finally sent to 252 facilities.

EPA received responses on 215 of the 252 questionnaires. A few responses contained information on more than one facility. Subsequently, EPA separated that information into several questionnaires so that a single questionnaire represented an individual facility. EPA also excluded data from 12 facilities that returned incomplete responses. Because these facilities would not have been subject to the proposed limitations, EPA did not ask for more information. After separating multiple responses and excluding incomplete responses, information is available from 205 facilities. Table II.D.1, Questionnaire Summary, provides a breakdown of this information.

TABLE II.D.1.—QUESTIONNAIRE SUMMARY

Information identifier	Number of questionnaires
Sample frame	263
Mailed	252
Received	215
Incomplete and not followed-up	12
Received and usable	203
Received and usable + separated	205

Because we selected the 205 facilities using a statistical design (see Appendix A of the Technical Development Document for more information), the responses allowed us to build a database to be used for estimating population characteristics reflecting the above criteria. For national (*i.e.*, population) estimates, EPA applied survey weights to the facility responses that incorporate the statistical probability of a particular facility being selected to receive the detailed questionnaire and adjust for non-responses. (The response rate was about 80 percent for the detailed questionnaire. Appendix A of the proposed TDD addresses the non-response adjustments for the screener questionnaire.) In this case, a survey weight of 3 means that the facility represents itself and two others in the population. EPA will continue its analysis to refine the survey weights for the detailed questionnaire.

From the sample for the detailed survey, EPA estimated the distribution of facilities by: production systems, ownership type, species produced, and geographic regions. We describe the distribution here and in Tables II.D.2, II.D.3, II.D.4, and II.D.5.

For production systems, EPA estimates that 14 percent of the surveyed population use multiple production system types, 70 percent use flow-through systems, 11 percent use ponds, 3 percent use recirculating systems, and 2 percent use net pens.

For ownership type, EPA estimates that 34 percent of the surveyed population are State-owned facilities, 14 percent are Federal facilities, 1 percent are academic facilities, 2 percent are Tribal facilities, 1 percent are private non-profit facilities, and 48 percent are private commercial facilities.

For species produced, EPA estimates that 78 percent of the surveyed population grow trout and/or salmon, 11 percent grow catfish, 3 percent grow tilapia, 2 percent grow striped/hybrid bass, 1 percent grow shrimp, 5 percent grow ''other'' species such as walleye, sturgeon, sunfish, ornamentals, baitfish. We estimate that about 16 percent of the population produce more than one species.

For geographic regions, EPA found that the surveyed population is widely distributed throughout the United States. We estimate that 10 percent of the population are located in Region 1, 1 percent in Region 2, 6 percent in Region 3, 16 percent in Region 4, 13 percent in Region 5, 8 percent in Region 6, 5 percent in Region 7, 11 percent in Region 8, 11 percent in Region 9, and 19 percent in Region 10.

TABLE II.D.2.—PRODUCTION SYSTEMS

Production system	Percentage of facilities
Flow-through	70
Recirculating	3
Ponds	11
Net Pens	2
Multiple production systems	14

TABLE II.D.3.—OWNERSHIP TYPE

Ownership type	Percentage of facilities
State governments	34
Federal facilities	14
Academic facilities	1
Tribal facilities	2
Private non-profit	1
Private commercial	48

TABLE II.D.4.—SPECIES IDENTIFIED AT FACILITY IN SURVEY SAMPLE

Species*	Percentage of facilities
Trout/Salmon	78
Catfish	11
Tilapia	3
Hybrid Striped Bass	2
Shrimp	1
Other (walleye, sturgeon, sunfish, etc.)	5

*Based on predominant species, facility may produce more than one species.

TABLE II.D.5.—GEOGRAPHICAL DISTRIBUTION

EPA region	Percentage of facilities
1 (CT, ME, MA, NH, RI, VT)	10
2 (NJ, NY, PR, VI)	1
3 (DE, DC, MD, PA, VA, WV)	6
4 (AL, FL, GA, KY, MS, NC, SC, TN)	16
5 (IL, IN, MI, OH, WI)	13
6 (AR, LA, NM, OK, TX)	8
7 (IA, KS, MO, NE)	5
8 (CO, MT, ND, SD, UT, WY)	11
9 (AZ, CA, HI, NV, AS, GU)	11
10 (AK, ID, OR, WA)	19

Although EPA received and used responses from 205 surveys for various analyses, we use only a subset to estimate national CAAP costs for the industry sectors affected by the proposed rule. From the cost analyses, we excluded eight responses from facilities that discharge indirectly or do not discharge, because these facilities are not affected by the rule. For salmon net pens, the detailed questionnaire responses confirmed our assumptions at proposal (*i.e.*, no costs would be incurred in eight net pen facilities as a result of the proposed option). EPA will continue to evaluate cost and impacts for other net pen systems. We excluded pond data from the costs analyses because ponds were not within the scope of the proposed rule. However, EPA is using the pond information from 33 detailed questionnaires to validate assumptions on the applicability of the proposed regulation to ponds. EPA generated cost and loadings information for 13 facilities, but we excluded these from the economic analysis because the facilities produced less than 20,000 pounds of aquatic animals per year. As a result of these exclusions, EPA used the data from 143 facilities in its costs and loading analyses to evaluate economic impacts presented in this notice.

E. Literature Searches and Other Information Collection Activities

EPA continued to collect technical, scientific, and regulatory information from many sources on key issues about the CAAP industry, including those described in the preceding subsections of Section II of today's notice. In some cases, EPA started targeted literature searches or other types of investigations to assess issues raised by stakeholders and commenters (*see* Section III for a summary of major issues raised in comments). Several of these efforts are:

1. Net Pens

EPA received several comments about the relative significance of environmental impacts from net pen operations, as well as whether or not there is a need to establish requirements to mitigate environmental impacts (*see* Section III.B.2. of today's notice). To address these comments, EPA is updating its literature evaluation for net pen impacts and current practices and requirements. We placed a draft preliminary reference list in the public record (DCN 62399). EPA is examining new and re-examining previously available literature on the environmental impacts of discharges of solids, nutrients, BOD, and drugs and chemicals from net pen facilities. This updated literature search will examine existing permit requirements and other practices used by net pen facilities. This new information will improve EPA's understanding of environmental concerns with net pen systems and the actual impacts of present-day operations in the U.S., in light of existing State requirements and industry practices. However, current EPA analysis indicates that practices to minimize solids released at most net pen facilities are at least as stringent as the requirements we are considering. EPA does not expect further reductions in solids and pollutants associated with solids from net pens to result from this rule.

2. Chemicals, Including Therapeutants, Used at CAAP Facilities

EPA also received comments about the application of chemicals, including therapeutic substances, at CAAP facilities. These comments address:

- Antibiotics (residues in fish, antibiotic resistance, estimated volumes of antibiotic use in the U.S. CAAP industry).
- Regulatory authority and need for action (asserting that EPA should or should not include requirements about the use of chemicals, including therapeutants, at CAAP facilities; that FDA, American Veterinary Medical Association, and other entities' requirements or guidelines already ensure environmental safety of therapeutant applications).
- Chemicals in fish feed (including color additives).

These comments are further discussed in Section III.C. In some cases, supporting materials and referenced literature were also provided to EPA.

To address these comments, EPA is updating its literature search about environmental fate and effects studies of chemicals/therapeutic substances

reported in the public comments, detailed surveys, and literature as used at CAAP facilities in the U.S. These chemical/therapeutic substances include anaesthetics, antibiotics, pesticides, antifungals, disinfectants, algicides, antifoulants, feed additives, and hormones used under EPA-approved, FDA-approved, and veterinary prescribed extra-label use, and FDA's investigational new animal drug (INAD) provisions. For several of the more commonly used substances, EPA collected information on quantities used from the detailed survey and industry-supplied data. EPA also has environmental assessments from the FDA docket for oxytetracycline, formalin, Romet, and canthaxanthin (see DCNs 40417, 40477, 40492, 40567). In addition, EPA obtained and is evaluating studies of the fate and effects of these chemical/therapeutic substances, when available. We placed a draft preliminary reference list in the public record (DCN 62454). EPA will work with appropriate internal and external experts to interpret these studies.

Second, EPA met with FDA to clarify FDA's environmental assessment requirements for the substances over which FDA has jurisdiction (DCN 31126). EPA met with USDA's Animal and Plant Health Inspection Service (APHIS) to discuss how the requirements and objective of the CAAP rule relate to authorities under their jurisdiction (DCN 31123). At the meeting, USDA discussed the Animal Health Protection Act (''2002 Farm Bill''), which gives APHIS the authority to develop and implement aquatic animal health programs. This law gives authority to APHIS for aquatic farm-raised animal disease management including emergency responses actions to invasive pathogen outbreaks. APHIS is also authorized to implement control programs using drugs or chemicals and biosecurity practices to reduce disease risk and impact on the industry.

EPA is also reviewing, industry and professional association guidelines on using antimicrobial agents responsibly (*e.g.*, DCN 70720). EPA will continue to work closely with the JSA National Aquatic Animal Health Task Force and other Federal, State, and scientific experts to better understand the relationships between current technical and regulatory aspects of chemical applications at CAAP facilities and EPA's proposed requirements.

3. Non-Native Species

EPA also received comments about non-native species (described in more detail in Section III.D). Briefly, comments included:

- Arguments supporting or opposing the establishment of controls on non-native species.
- EPA's regulatory involvement with non-native species issues.
- Specific scientific information to correct or supplement data on potential impacts of CAAP non-native species that EPA considered in developing the proposed rule.
- Descriptions of specific Federal, State, local, or industry requirements and programs to reduce or mitigate non-native concerns at CAAP facilities.

First, EPA is evaluating the comments and the supplementary literature submitted with them. Second, we continue our dialogue with Federal agencies that set policy for non-native species to facilitate coordination among relevant programs. EPA met with the APHIS, which has a broad mandate to address import and interstate movement of exotic species under the Federal Plant Pest Act and the Plant Quarantine Act (DCN 31123). EPA is also communicating with the National Invasive Species Council (NISC) regarding the non-native species aspects of the CAAP rule. Third, as some commenters urged, EPA is also more closely examining State, regional, and other requirements and programs designed to reduce or mitigate concerns about non-native species and that may already apply to facilities within the scope of the CAAP rule. One source of information of which EPA has become aware since proposal is the Environmental Law Institute's August 2002—*Halting the Invasion—State Tools for Invasive Species Management.* This publication analyzes legal tools available at the State level to address non-native species (including aquatic invasive species), identifies critical components of such tools and discusses examples of effective programs. The document also describes specific legal tools in each State (DCN 40637).

EPA is also considering supplemental information provided by members of the National Association of State Aquaculture Coordinators (NASAC). NASAC gave EPA a summary of information from their members regarding non-native species requirements and State regulating agencies (DCN 40607). Several States recognize and actively implement measures to address potential risks about non-native aquatic species. For example, the California Department of Fish and Game (CDFG) instituted several requirements to prevent the introduction of non-native species into bodies of water and to prevent the dissemination of fish diseases and parasites to wild populations and cultured stocks (DCNS 40593, 40594). A forthcoming report (*Non-native Oysters in the Chesapeake Bay*) by the National Research Council (NRC) may also provide insight into the effectiveness of existing regulations and programs, and recommendations for more effective approaches to non-native species issues (DCN 62456). While this study targets an industry sector EPA is not proposing to regulate (molluscan shellfish), certain discussions and findings regarding approaches for addressing non-native species concerns may be informative.

EPA has identified several non-North American species currently raised at CAAP facilities that might pose an environmental threat if they were to escape and become established (*e.g.*, several species commonly referred to as tilapia) (DCN 40649). To identify species of interest, EPA reviewed the database of facility responses to EPA's 2001 screener survey (DCN 10001). The database includes information on facility location and species raised for each of over 2,300 respondents who produce aquatic animals. Although this is a much larger population than the facilities covered by the proposed rule, EPA used this information to identify general trends in the production of non-native fish that could become invasive. EPA compared species and facility location with a State-by-State list of invasive fish derived from the United States Geologic Survey (USGS) (Fuller *et al.*, 1999).

We faced several challenges with using this information for our evaluation. Most of the facilities contained in the screener survey database did not provide enough taxonomic detail to determine if cultured species were non-native and potentially invasive. In several cases where we had enough taxonomic detail, the species being cultured had already been widely introduced throughout North America. In addition, several facilities in the database raise fish hybrids, and evaluating the invasive potential of hybrids poses a unique challenge because the characteristics may not be a simple blending of parent species' characteristics. Genetic effects may influence the ecological niche of a hybrid, making it difficult to predict its possible geographic distribution. Such genetic effects include dominance, polygenic inheritance (where traits are influenced by the cumulative effects of multiple genes), epistasis (where one gene influences the expression of another), and pleiotropy (where a single gene influences the multiple traits).

For several of these species, EPA is using an ecological niche model (DCN 40650) to predict their possible geographic distributions in the United States. EPA is also examining the geographic distribution of CAAP facilities raising these non-North American species, potential habitat for these species, and existing requirements (*e.g.*, those contained in State regulations) for reducing escapes of non-natives that already apply to CAAP facilities producing non-natives. There are many limitations on data in such an evaluation (*e.g.*, limited information on escape rates, the likelihood of escapes, and the consequences of escapement), but this analysis provides some insight into the scope of non-native species concerns at CAAP facilities. EPA will consider this analysis as one factor to assess the need, if any, for reporting, BMP implementation, or other requirements regarding non-native species in the final regulation. You can find a draft memorandum describing EPA's preliminary analysis in the record for this notice (DCN 40649). EPA will continue to collect and evaluate data to assess concerns associated with escaped non-native aquatic animals from CAAP facilities and the effectiveness of technologies and management practices to prevent animals from escaping in the effluents from CAAP facilities.

Finally, EPA is also performing literature searches to collect examples of risk and cost-benefit analyses that have been performed for non-native or invasive species. Such analyses include:

• Leung, B., D.M. Lodge, D. Finoff, J.F. Shogren, M.A. Lewis, and G. Lamberti. 2002. ''An ounce of prevention or a pound of cure: bioeconomic risk analysis of invasive species.'' *Proceedings of the Royal Society of London, Series B 269:* 2407–2413. This paper describes a quantitative modeling framework to analyze risks from non-indigenous species to economic activity and the environment. The model identifies the best allocation of resources to prevention vs. control, acceptable invasion risks and consequences of invasion to optimal investments. The paper reports on an application of this model to a non-CAAP invasive species (zebra mussels), but the quantitative and systematic risk analysis approach may be useful for its examples (DCN 40568).

• Kolar, C.S. and D.M. Lodge. 2002. ''Ecological predictions and risk assessment for alien fishes in North America.'' *Science* 298: 1233–1236. This paper uses a risk assessment approach and statistical models of fish introductions into the Great Lakes to develop a quantitative approach for targeting prevention efforts on species most likely to cause damage (DCN 40569).

• **Federal Register**. 2003. Ballast Water Management Program for U.S. Waters, proposed rule. 68 FR 44691–44696. The U.S. Department of Homeland Security/Coast Guard recently proposed mandatory ballast water management practices for vessels equipped with ballast tanks to address possible threats to marine and freshwater resources, biological diversity, and coastal infrastructures from unintentional introduction of nonindigenous species. The Coast Guard performed a regulatory evaluation including an estimate of the proposed rule's effects on invasion rates. The regulatory evaluation also included monetized damages from invasions, but did not attempt to monetize the benefits of their proposed rule (DCN 40570).

These examples describe tools that could potentially be used to assess risks and benefits of control options for escapes. Even if EPA can not conduct assessments of risks and benefits from controls on CAAP facility escapes, examples such as those mentioned above may provide useful context for a qualitative discussion and highlight data needs.

4. Water Quality Impacts

At proposal, EPA described data and literature it compiled on water quality impacts of CAAP facilities in the United States. EPA drew on several sources to characterize these impacts, including open literature publications reporting on water quality and biological observations downstream of CAAP facilities. Another resource EPA evaluated was the National report of State listings of impaired waters (TMDL listings or State 303(d) reports). EPA also used a water quality model (QUAL2E) to simulate potential downstream water quality impacts under baseline and proposed regulatory scenarios. EPA's proposal estimated that the regulatory requirements would create pollutant load reductions at 23 flow-through and recirculating facilities in the scope of the proposed regulation, leading in turn to water quality improvements valued at $22,000 to $113,000 annually. Based upon these sources and its water quality modeling, EPA concluded that some CAAP facilities may have measurable adverse downstream impacts.

EPA will use materials submitted with public comment on the proposed rule (*see* Section III.E. of today's notice) and other data and literature to improve our characterization of the likelihood for CAAP facilities to affect water quality and aquatic ecosystems. Key highlights of this new information include:

First, the National Association of State Aquaculture Coordinators (NASAC) submitted a report describing NASAC's close examination of the States' listings of impaired waters that EPA used in analyses supporting the proposal to help characterize the prevalence of water quality impairments in the U.S. due to aquaculture (DCN 70583). (*See* Section III.E. for details.) NASAC found that of the seven States listing aquaculture as a possible source of impairment to certain specific waterbodies within their borders, only two verified that aquaculture facilities actually were a source of impairment. NASAC also found that for the two States that did confirm aquaculture as the source of reported impairments for the listed waterbody, changes at the facilities had been undertaken to address the source of impairments. (Refer to Section III.E. for a discussion of the NASAC report.)

Second, EPA received more publications and unpublished technical reports of which it was not aware at proposal and which describe studies of downstream water quality and biological impacts of CAAP facility effluents. Covering a range of facilities and geographic regions, some of the studies report adverse water quality and ecological impacts; others report limited or no impacts. These reports will help characterize the potential range of environmental impacts of CAAP facilities and we have put them in the record supporting this action. Examples include:

• Fries, L.T. and D.E. Bowles. 2002. ''Water quality and macroinvertebrate community structure associated with a sportfish hatchery outfall.'' *North American Journal of Aquaculture* 64: 257–266. These authors examined aquatic impacts associated with a large CAAP facility (four million largemouth bass fingerlings, one million channel catfish fingerlings, 12,000 kg live forage for captive broodstock, and 67,000 rainbow trout (winter only)). Based on the data covering a period from October 1996 to July 1998, the authors concluded that ''the hatchery effluent did not substantially affect downstream water quality and benthic communities, despite the relatively high total suspended solids and chlorophyll-a levels in the effluent.'' Their data showed ''* * *that sportfish hatchery operations can have negligible effects on receiving waters, even in environmentally sensitive systems'' (DCN 40621).

• Loch, D.D., J.L. West, and D.G. Perlmutter. 1996. ''The effect of trout farm effluent on the taxa richness of benthic macroinvertebrates.'' *Aquaculture* 147: 37–55. These authors studied three large trout flow-through facilities in North Carolina. Their data ''* * * indicate that trout farm effluent has a definite effect on stream insect communities, suggesting that water quality is reduced just below their outfalls, and to a lesser extent, 1.5 km further downstream. We were able to demonstrate quite clearly that taxa richness was significantly lower just below the outfalls compared to the control, and that although richness did increase further downstream, the recovery was not complete.'' The authors noted that impacts were seasonal, and that water quality and taxa richness improved during the winter. The authors also noted that sewage fungus (which they defined as a community of organisms that consist mainly of bacteria and ciliated protozoans and is the product of concentrated organic matter) ''was present in great abundance at Site 2 of each trout farm'' (DCN 61497).

• The Virginia Water Resources Research Center. *Benthic TMDL Reports for Six Impaired Stream Segments in the Potomac-Shenandoah and James River Basins,* Submitted by the Virginia Department of Environmental Quality, (Richmond, VA: Virginia Department of Conservation and Recreation, 2002), 207 pp. This document reports on a Total Maximum Daily Load (TMDL) calculation performed for six impaired stream segments in Virginia (*see* Section III.E. of today's notice). The report states that aquaculture effluents were confirmed as the primary source of the organic solids that impaired these short segments (0.02 to 0.8 miles), constituting from 86 percent to 99 percent of the organic solids loading in these largely first-order, spring-fed streams (DCN 40571). You can find this document on the Internet at *http://www.deq.state.va.us/tmdl/apptmdls/shenrvr/trout.pdf.*

• Memoranda, correspondence, and discussion with staff of the South Central Region of the Pennsylvania Department of Environmental Protection (PA DEP) regarding reports of environmental impacts at several CAAP facilities (200,000 to 400,000 lbs annual production) in Pennsylvania. PA DEP provided data and reports documenting adverse impacts of hatchery effluents in receiving spring-fed streams. The materials described observations and/or concerns including those about discharges of carbonaceous BOD and TSS and other pollutants, and results of aquatic biological surveys showing adverse impacts in hatchery receiving waters. While recognizing unique characteristics of these hatcheries (all located on limestone spring creeks and all capture most, if not all, of the streamflow) and seasonality of these impacts, staff biologists were concerned about adverse environmental impacts observed at several sites (DCNS 40596, 40597, 40598, 40599, 40600, 40601, 40602, 40603, 40604, 40605, 40606).

F. Holding Time Study

EPA took samples at aquatic animal facilities for a holding time study. The holding time study consisted of analyzing samples at different time intervals prior to analysis (*i.e.*, holding times) to determine whether varying holding times for the samples yielded comparable results to samples analyzed within the required time specified in the analytical method. EPA conducted the holding time study (1) to evaluate the data collected during sampling episodes at aquatic animal facilities and (2) for possible revisions to current holding time requirements. We assessed changes in target bacterial (total coliforms, fecal coliforms, *Escherichia coli, Aeromonas,* fecal streptococcus, and *Enterococcus*) concentrations over time (between 8 and 48 hours holding time) in wastewater samples.

When EPA designed the holding time study, we considered a range of model technologies for treating CAAP effluents, including some that would provide reductions in bacterial concentrations. EPA found the costs associated with using disinfection technologies at CAAP facilities to treat effluents are economically burdensome to the industry. The disinfection cost assessment is described in the preamble to the proposal (67 FR 57872, September 12, 2002). Because of the cost, EPA did not include technologies that reduce bacterial concentrations (such as disinfection) in the technology basis for the proposed rule. The TSS removal technologies we considered at proposal are not designed to reduce bacterial concentrations in effluents. Therefore, the original purposes for the study are no longer relevant for this rulemaking. However, study results may be useful for facilities, permit writers, and others. For this reason, this NODA summarizes the results and DCN 62398 in Section 6.20 of the rule-making record provides the complete results.

In summary, EPA conducted the study to evaluate sample concentrations at 8, 24, 30, and 48 hours after sample collection. Table II in 40 CFR part 136 specifies a maximum holding time of six hours for fecal coliforms, total coliforms, and fecal streptococci tests used for compliance with NPDES regulations. As a matter of practicality, EPA generally considers eight hours acceptable because the analytical laboratories require some sample preparation time before a sample can be processed. In addition, Section 9060B (Preservation and Storage) of *Standard Methods*, 20th Edition, recommends that nonpotable water samples be held below 10°C for a maximum of 6 hours transport plus 2 hours to begin analysis for bacterial analyses performed for compliance purposes.

As holding times increase, we expect that bacteria concentrations will change. Many CAAP facilities are remotely located and would have difficulty meeting the required 6 hour transport time to a laboratory. In conducting the study, EPA hoped to gain insight into the length of time that would still give comparable results to samples held for eight hours.

The study results for *Aeromonas* and fecal coliforms indicate that holding times over 8 hours did not provide comparable results to results at 8 hour holding times. For total coliforms, *E. coli*, fecal streptococcus, and *Enterococcus* holding times of 30 hours or less provided results comparable to results at 8 hour holding times.

III. Summary of Comments and EPA's Preliminary Assessment

In these sections, we discuss some of the major comments received on the proposed rule and EPA's current thinking on the issues.

A. Representativeness of EPA's Sampling Database

During the comment period and at the public meetings on the proposal, commenters raised concerns over the representativeness of the sampling and DMR data (EPA's sampling database) used to evaluate options and determine limits.

Some of the commenters were concerned about the lack of representation of green water systems that produce warm water species, which they claim have very different water characteristics, especially regarding the effluent concentrations of TSS. Commenters were concerned about the ability of both green water and warm water types of production systems to be able to comply with the proposed limitations for TSS. With assistance from industry representatives and detailed survey responses, EPA identified and visited six warm water or green water production facilities. To assess these concerns, EPA obtained and examined DMR data for two of the six

warm water facilities we visited, data for the remaining four facilities was not available. For both facilities, the data indicate that the discharges are lower than the proposed limits when evaluating TSS on a net basis (*i.e.*, which accounts for the concentrations in the source water). These discharges are consistent with the facilities' current NPDES permits. The second warm water facility also consistently meets its NPDES permit limits for phosphorus. Although these two warm water species production facilities differ in many ways from facilities engaged in the production of cold water species, the data confirms that these facilities can achieve the proposed effluent TSS concentrations. Thus, the proposed limits for recirculating systems may be achievable for green water/warm water facilities generally. Therefore, based on current data, there is no basis for differentiating between warm water and cold water production systems for any limitations for TSS in the final rule. (*See* the site visit reports DCNs 62393, 62394, 62395 and DMR data DCNs 31093, 30850). EPA seeks comment on this issue and requests any additional data for these types of systems to supplement EPA's current data set.

Other commenters questioned whether the database we used is sufficiently representative to evaluate the effectiveness of microscreen treatment, especially in cold temperatures. (Microscreens are one component of the Option 3 technology that was the basis for the proposed limitations and standards for certain subcategories.) EPA identified 13 facilities from the detailed surveys that reported using microscreen technology as a primary or secondary solids removal system. To observe the operation of the microscreen, EPA also made site visits to five facilities (three with recirculating systems and two with flow-through systems) that use microscreens. We visited facilities in areas that experience freezing temperatures in winter and concluded that operating a microscreen filter year round is possible because the facilities demonstrated satisfactory performance.

However, unlike our assumptions for the proposal, these facilities operate the microscreen filters in indoor spaces that are protected from freezing. Their microscreens are installed in existing heated spaces or, in one case, in a recently-constructed building that houses other effluent treatment system components. The facilities using microscreens were satisfied with their performance and at least one was planning renovations that included additional microscreens (*see* site visit reports DCN 62388, 62389, 62390, 62391, 62392). For the NODA and in its evaluation of the costs of second stage solids removal technology, EPA adjusted costing to include either full-flow settling basins where appropriate or microscreens in heated spaces of existing buildings. Our analysis shows that, based on available data, either of these technologies, the full-flow settling basin or microscreen, can achieve the proposed limits so we used the lower cost option for each facility in our analysis.

B. Production Systems

1. Flow-Through and Recirculating Systems

Based on comments, EPA may combine the two separate subcategories for flow-through and recirculating systems into a single subcategory. We received comments with engineering descriptions for identifying recirculating systems, including assertions that EPA had not adequately evaluated green water systems; however, the commenters did not give a specific regulatory definition that EPA could use. While we found that a widely-accepted formal definition for recirculating systems does not exist, these systems are generally distinguished by some form of engineered biological treatment, that allows for extended water reuse. (EPA uses the term ''engineered'' biological treatment to distinguish a recirculating system from a pond, having a ''natural'' biological treatment process that allows for extended water reuse.) A green water system, in turn, takes advantage of the algae's and bacteria's ability to improve water quality. The commenters based the distinction between the categories on hydraulic residence time or cumulative feed burden, which they define as the feed application rate divided by the flushing rate. Based on comments, we realize that the distinction between the two systems is less obvious than we assumed for the proposal. Further, some facilities may commingle components of both systems. Therefore, EPA may combine the two subcategories into a single subcategory and we seek comment on this approach.

Regardless of whether the subcategories are combined, EPA is considering the same modified BMP plan for both systems (Section III.F describes this BMP plan and Section III.G. presents potential TSS limitations.

2. Net Pens

EPA proposed best management practices, rather than numeric limits, for facilities raising fish in net pens. At proposal, we stated that net pen facilities discharged pollutants into receiving waters. We also noted that researchers had documented environmental impacts due to discharges in limited areas near and beneath some U.S. net pen facilities. EPA found reports documenting rapid recoveries of benthic areas impacted by net pen operations. We are also aware that State regulatory programs have addressed a number of concerns associated with these discharges and require regular benthic monitoring at sites to identify problems early so they can be corrected. Public comments on the proposal also asserted that State regulatory programs effectively address environmental concerns associated with pollutant discharges from net pen operations and no further environmental benefits from additional effluent guideline requirements are likely (DCN 70236, 70283, 70104). However, we also received comments that asserted the proposed requirements were not adequate or reflective of scientific understanding of environmental impacts (including impacts from solids deposition and from the use of drugs and chemicals). These comments also suggested how such impacts might be managed (*e.g.*, DCNs 70253, 70269, and 70270).

In light of these comments, EPA tried to collect more information to support evaluation of regulatory options for controlling pollutant discharges from net pen systems. EPA updated its literature search on the environmental effects of discharges of solids, nutrients, BOD, and drugs and chemicals from net pen facilities. The search included examining existing permit requirements and other practices currently used by net pen facilities. It also involved recognizing modeling tools that were developed and described in research literature that may be useful in translating pollutant load reductions into environmental responses. We do not expect to use these models to estimate environmental benefits for the net pen subcategory because our analysis suggests that practices relating to minimizing releases of solids at most net pen facilities would already meet the requirements we are considering (see Section II.E and DCN 62399).

EPA is also aware of a recently-updated major scientific review of non-native Atlantic salmon at net pen farms in the Pacific Northwest. This review updates an assessment that was considered at proposal (DCN 40149) and appears in a group of six articles published in Volume 62 (2003) of the journal, *Fisheries Research.* The updated information helps EPA better

understand environmental concerns with net pen systems and the actual impacts of current operations in the U.S. in the context of existing State and other requirements. At present, EPA concludes that net pens should continue to be included in the CAAP rule. Again, it appears that most net pen operations potentially in the scope of the regulation are already using practices and technologies at least as stringent as those EPA is considering for this subcategory.

One commenter questioned the need for a national regulation when the extent and size of the net pen industry is small. Data regarding in-scope facilities indicate that net pen facilities are used to raise salmon in three States (Alaska, Maine and Washington). A limited number of net pen facilities also produce other fish species as well. While net pen systems in Maine and Washington raise salmon to harvestable weights, net pen systems in Alaska also rear salmon before their release in the ocean.

Offshore aquatic animal production is another new area under development. The National Marine Fisheries Service (NMFS) proposed codes of conduct for these offshore operations announced in an August 2002 **Federal Register** notice (67 FR 54644). NMFS held six regional workshops in the fall of 2000 to discuss the codes of conduct for these types of operations. In 2002, NMFS published *Current and Future Regulation of Marine Aquaculture,* which describes best management practices similar to those we are considering in this rule. These include feed management to minimize waste, minimizing escapes, and minimizing negative effects of escapees on wild populations. The NMFS report also states that disease prevention through vaccinations is preferred over using antibiotics. NMFS has five research stations of which three have aquatic animals. Demonstration projects include sea cages in Puerto Rico, Hawaii, Gulf of Mexico, and eastern Gulf of Maine. EPA did not identify quantitative estimates of future U.S. mariculture activity. However, as research efforts move forward, offshore aquatic animal production may be of greater interest and provide opportunities for future industry growth in this area (*see* DCN 20428 for information about programs and future prospects). EPA is considering whether to identify as new sources subject to these requirements new offshore production facilities located in the territorial seas (*e.g.*, three to eight miles from shore) that use open water net-like structures.

3. Molluscan Shellfish Operations

EPA did not propose to include certain categories or types of facilities within the scope of the proposed rule. Floating or bottom culture molluscan shellfish operations were among the production systems not within the scope of the proposal. Although these operations were excluded, the proposed regulation did not specifically address nursery operations for molluscan shellfish, whose shellfish nurseries tend to be flow-through systems. We received requests to clarify the scope of the proposal and exclude shellfish nurseries from the regulation. We reviewed the information provided in the comments on this issue (*see* DCNs 70147, 70218, 70236, 70238, and 70268). Based on our review, EPA determined that these operations (*e.g.*, shellfish hatcheries, nursery operations, shore based wet storage (live holding) facilities and depuration (cleaning shellfish of impurities) facilities) discharge or add very little, if any pollutants to the receiving water. In some cases, they may remove some of the materials in source water. Some of these comments (DCNs 70147 and 70236) also indicated that shellfish hatcheries and nurseries produce less than 100,000 pounds annually and thus would not be subject to the proposed regulations.

Two comments indicated that adverse environmental effects, primarily accumulation of silt and solids, of excessively large and densely seeded molluscan shellfish operations were reported in the scientific literature (*e.g.*, DCN 70270, 70511). However, these sources acknowledge that adverse impacts are unusual and have not been reported in the United States.

EPA is, however, aware of concerns about deliberately introducing non-native shellfish into coastal waters of the United States. For example, there is ongoing debate about the comparison of possible benefits compared to the possible risks of introducing non-native pacific oysters (*Crassostrea ariakensis*) in the Chesapeake Bay. The National Academy of Sciences (NAS) issued a report (DCN 62456) summarizing the potential risks and benefits of introducing *C. ariakensis* in the Chesapeake Bay. The NAS report also recommends that States and regional authorities develop protocols to reduce the possibility of release of reproductively viable non-native oysters into the bay, including hatchery biosecurity. Although the National Academy of Sciences concludes that there is not an adequate group of laws and regulations in the United States to address the introduction of non-native shellfish into marine waters, the Academy does recommend that the Chesapeake Bay Program be evaluated as a model for interjurisdictional decision-making system with binding authority over introductions that might affect the coastal areas of several States.

C. Drugs and Chemicals

EPA's proposal and technical literature in the record identified several human and aquatic life health and environmental issues of potential concern related to using drugs and chemicals at AAP facilities. These issues included evidence of drug and/or chemical residues in sediments in the receiving waters of AAP facilities or in non-target organisms in the receiving waters (*e.g.*, DCN 20141). The Agency proposed limited reporting requirements for certain types of drug applications. It also proposed establishment and implementation of BMP plans that would help reduce the unintended release of covered drugs and chemicals. EPA could not, however, quantify either baseline loadings of drugs and chemicals, or expected reductions in these loadings due to proposed requirements. Consequently, we did not try to quantify environmental benefits for measures addressing drugs and chemicals.

Some comments asserted that those who apply drugs and chemicals at CAAP facilities consider environmental safety in their decision-making process (DCNs 70236 and 70263). Other commenters added that EPA did not provide evidence that drugs and chemicals used at aquatic animal production facilities lead to environmental problems. They also argued that FDA is the appropriate Federal agency to assess the environmental safety of drugs used in aquatic animal culture (DCNs 70165, 70192, 70216, 70228, 70230, 70236, 70239, 70262, 70263, 70273, 70286). EPA also received other comments arguing that the proposed reporting and BMP requirements relating to drugs and chemicals should be more stringent (DCN 70145).

In addition to drugs and chemicals used as therapeutants or to maintain process water quality, some commenters believe that EPA should regulate the discharge of feeds that contain pigments (such as astaxanthin or canthaxanthin). They believe that these color additives are harmful to humans, especially in the fish flesh of cultured fish that consume the feed. Astaxanthin and canthaxanthin, two widely used color additives in fish feed, are approved by FDA as color additives in fish feed when used in accordance with

prescribed conditions on the label. FDA found that these additives would not have a significant impact on human health and the environment (DCN 40417 and 40421).

EPA also collected more information about CAAP drugs and chemicals (*see* Section II.E of today's notice). EPA has met with other Federal authorities such as USDA/APHIS and FDA to clarify and coordinate regulatory and program goals. EPA will work closely with Federal, State, and other appropriate scientific experts to fully consider the available information described here.

Based on our consideration of public comments and information described in Section II.E relating to chemicals applied at CAAP facilities, EPA believes that further evaluation is needed to fully understand the potential for adverse environmental impacts from discharges of chemicals, including therapeutants, applied at CAAP facilities. However, the information we have reviewed to date suggests that the FDA environmental assessment process and site-specific regulatory, professional, or industrial requirements or practices address adverse impacts to a significant degree. We will continue to evaluate this information and consult with relevant authorities.

In addition, EPA and FDA are working on a formal agreement that would address environmental concerns about the discharge of drugs used at aquatic animal production facilities. This agreement, which might help protect the aquatic environment from harm, would facilitate information sharing about effluent concentrations of active drug ingredients. When appropriate, FDA would include in the labeling of approved new animal drugs, effluent concentrations of the active drug ingredient which should not be exceeded in wastewater discharges. EPA would notify permitting authorities who would incorporate these effluent concentrations into the NPDES permits as enforceable requirements. EPA seeks comments on including these labeling concentrations into NPDES permits.

EPA identified research on the use of activated carbon filtration to treat and remove active ingredients in drug and pesticides from CAAP facility wastewater. We also estimated the cost of applying this treatment at facilities (DCN 62451). Based on the information we collected, EPA estimated the cost of applying wastewater treatment to remove drugs and chemicals from CAAP effluent before discharge. EPA considers these costs to be economically unachievable, (see Section V.C. of this notice). However, management practices intended to ensure proper storage, use and disposal of drugs and chemicals and to minimize the need for their use may be an effective approach for minimizing their discharge. To address this issue, EPA is evaluating an additional option (Option A) that would be similar to Option 1 but would substitute a drugs and chemicals BMP plan for the solids control BMP plan proposed in Option 1. The Option A BMP plan would also have to address potential escapes of non-native species.

In developing this option, EPA evaluated practices that involve the early identification of health problems, recordkeeping, and proper use and storage of drugs and chemicals by employees. In addition, EPA found that biosecurity practices that contain and prevent the spread of disease throughout the facility are effective at reducing the use of drugs at CAAP facilities. Health screening involves observing the normal behavior of aquatic animals at a facility (*e.g.*, feeding behavior and abnormal activities). EPA recognizes that more intensive screening activities, such as diagnostic tests for specific pathogens, may not be technologically feasible or economically achievable. Recordkeeping and the regular review of the records should help facilities evaluate the effectiveness of health management and modify their practices to further reduce health problems in the aquatic animals that may lead to greater use and disposal of drugs and chemicals.

D. Non-Native Species

EPA received comments presenting discussions about CAAP as a pathway for the introduction of non-native species. Some commenters feel that existing State and local permitting programs and regulations provide adequate protection. Several State agencies commented that while they concur that measures to address potential risks associated with aquatic nuisance or invasive species are important, such measures are most appropriately and effectively developed at a State or Tribal level and that in many cases, specific requirements and policies already exist. Some of these States briefly described their relevant programs and regulations. We also received comments from States suggesting that proposed new national requirements might threaten existing State efforts addressing invasive species.

However, a State permitting authority (DCN 70067) and a State coastal resources agency (DCN 70225) commented that EPA should require CAAPs to report escapes of non-native species to the permitting authority. They gave their rationale for this requirement, including arguing that timely notification of escapes would allow State natural resource and environmental agencies to evaluate and, if necessary, control the spread of the non-natives. These agencies also recommended that EPA prohibit the intentional release from CAAPs of non-native species that might harm wild species. One of these agencies suggested that facilities should be equipped with physical barriers to prevent the incidental discharge of all life stages of non-native species. One agency supported a Federal regulation corresponding to existing State rules that would prohibit unauthorized release of harmful or potentially harmful exotic and non-native species.

Other commenters urged more coverage (*e.g.*, ponds, molluscan shellfish) and control for escapes. They identified several specific concerns: escapes of the cultured organisms themselves (*e.g.*, Atlantic salmon in the Pacific Northwest), including genetically modified species, and escapes of pathogens and parasites potentially associated with the cultured organisms. Commenters also proposed potential control requirements (*e.g.*, prohibitions on reproductively viable non-native species; containment requirements). Some commenters believe that current practices to minimize or prevent the release or escape of non-native species are effective.

EPA also received comments questioning our interpretations of technical literature about non-native species concerns. The JSA pointed out that EPA cited a comprehensive 2001 NOAA technical memorandum on the net pen salmon farming industry in the Pacific Northwest in its discussions on possible concerns with escapes of non-native species (DCN 40149) but that EPA did not also cite the conclusions of the report regarding the ''very low or no'' risk of interactions or problems from accidental releases of Atlantic salmon in the Pacific Northwest. That report states that the escape of Atlantic salmon, a non-native species, is ''deemed to carry very little or no risk'' with respect to potential for hybridization with other salmonids, colonization of salmonid habitat, competition with native species for forage, predation on indigenous species, and serving as vectors for the introduction of exotic pathogens. The report reviews and discusses scientific evidence and reasoning to support this conclusion. The report also states that ''[t]he possible negative consequences of such [accidental escape] events have

been limited in part by implementation of pre-prepared recovery plans, some of which have included deregulating catch limits for public fishing on escaped farm fish, and by programs to monitor the background populations of fish in nearby watersheds. These responses will continue to be effective management practices to minimize impact, together with further advances in the technology. Improvements in the design and engineering of net pens and their anchorages, and the use of new net materials, are continuing to reduce the incidents of loss following structural failure or damage from large predators.''

In addition, JSA gave references updating information contained in earlier sources we cited in developing the proposed rule addressing viral hemorrhagic septicemia (VHS) on the West Coast. In contrast to that earlier information, the more recent references provided by JSA demonstrate that VHS was a pre-existing condition in marine fish throughout the Pacific Northwest. These references are:

• Amos, K.H., J. Thomas, B. Stewart, and C.J. Rodgers. 2001. ''Pathogen transmission between wild and cultured salmonids: risk avoidance in Washington State, United States of America.'' *Risk Analysis in Aquatic Health: Proceedings of an International Conference,* Paris, France, 8–10 February, 2001:83–89 (DCN 40609).

• Amos, K.A., J. Thomas, and K. Hopper. 1998. ''A case history of adaptive management strategies for viral hemorrhagic septicemia virus (VHSV) in Washington State.'' *Journal of Aquatic Animal Health* 10:152–159. (DCN 70732)

• Meyers, T.R. and J.W. Winton. 1995. ''Viral hemorrhagic septicemia virus in North America.'' *Annual Review of Fish Diseases* 5:3–24. (DCN 40592)

Some commenters urged EPA to more effectively and appropriately align any considerations about invasive species with existing Federal (*e.g.*, the National Invasive Species Council), State, and other authorities and requirements. Other comments asserted that EPA should not regulate non-native species because they are already regulated by other agencies.

Commenters further stated that EPA should better define some of the terms we used in the proposal (such as ''non-native species'' and ''biological pollutants''). The proposed non-natives definition applies to an individual, group or population of a species that is introduced into an area or ecosystem outside its historic or native geographic range and that was identified by the appropriate authority as non-native or invasive. Most States have, by statute or regulation, identified certain species of plants and animals as non-native, invasive or exotic species that could threaten native aquatic biota. The term excludes species raised for stocking by public agencies in a given State. EPA excluded these species because the action of stocking a species in public waters provides a sanctioned opportunity for the species to become established. In any given State, if an aquatic animal species that is otherwise defined as non-native is raised to be stocked in public waters, then any commercial facilities producing the same species, by definition, would not be producing a non-native species. EPA defers to the States to determine what species are considered non-native in their State.

EPA recognizes that non-native species do not always present a problem. The problem lies in a species becoming invasive or established in an area to the point where it creates adverse human health, economic or ecological/environmental impacts. EPA is evaluating the information described in Section II.E.3 of today's notice and comments on the proposal and will assess whether the requirements for minimizing and/or reporting on escapes of non-native species are appropriate. EPA is particularly interested to learn about prevention measures that reduce the likelihood that species or pathogens will become invasive or established (*e.g.*, regular inspection and maintenance of escape prevention devices). For the final rule, EPA will also consider costs, economic impacts, effectiveness, and possible benefits, and existing relevant Federal, State, Tribal, and other requirements or practices.

E. Water Quality Impacts From TSS, BOD, and Nutrients

EPA received several comments about water quality impacts from CAAP facilities. (This section addresses comments on discharges from flow-through and recirculating facilities. Section III.B.2 discusses comments on water quality impacts at net pen systems. Elsewhere in Section III. you will find discussions on impacts from other discharges.) As discussed in Section II.E.4, some information indicated that CAAP facilities may be a significant part of local water quality impacts. Commenters were especially concerned with one source of information EPA considered in developing the proposed rule (State CWA section 303(d) reports on the causes and status of impaired water bodies) and questioned whether water quality impacts from CAAP facilities were of sufficient national scope to warrant a national effluent guideline.

Commenters also discussed situations where CAAP effluents might contribute to positive water quality impacts. In addition, commenters reviewed existing regulatory structures that, they asserted, provided adequate water quality protection. Following public comment, EPA received materials from a State agency drawing attention to what they characterized as serious adverse water quality impacts at several CAAP facilities in their jurisdiction (Section II.E.4. describes additional information about water quality EPA compiled since proposal).

Two stakeholder groups (JSA and NASAC) argued that there is no evidence that CAAP is a ''significant threat to our Nation's waters.'' They asserted that ''[t]o justify promulgating national effluent rules for the U.S. aquaculture industry, EPA must provide scientific documents irrefutably identifying that most of the U.S. aquaculture facilities are compromising the water quality of the receiving waters from aquaculture facilities.'' These groups offered the results of a NASAC study documenting that a far smaller number of States (two) than discussed in EPA's proposal documents (seven) identified aquaculture as a major source of impairment in the 1998 and 2000 303(d) lists they submitted to EPA (DCN 70583).

EPA reviewed this information and concurs with several key findings of the NASAC 303(d) report. First, NASAC's analysis correctly shows that although seven States listed aquaculture as a possible source of impairment to water bodies within their borders, only two of these States (North Carolina and Virginia), when contacted by NASAC, verified that aquaculture facilities were a source of impairment. The remaining States indicated to NASAC that aquaculture was not a known source of impairment on the impaired stream segments reported to EPA. However, one of the States noted that aquaculture had subsequently been identified as a possible source of impairment on a different stream segment. EPA also concurs that, for the reported aquaculture-related water body impairments, local authorities reported that impairments are being addressed by site-specific solutions. In the case of North Carolina, according to the NASAC report, the State addressed water quality impairment in the affected arm of Santeetlah Lake by structuring a buy out that will remove the trout farms contributing to the impairment. In the case of the six stream segments that Virginia reported impaired due to trout

farm effluents, a 2001 benthic macroinvertebrate survey confirmed that all six streams were still impaired. In 2002, the State prepared a TMDL for these six stream segments. The State affirmed that aquaculture effluents were the primary source of organic solids that impaired these short stream segments (ranging from 0.02 to 0.8 miles). They constitute from 86 to 99 percent of the organic solids loading in these largely first-order, spring-fed streams (DCN 40571).

F. Best Management Practices

Many commenters stated that EPA did not have enough information to develop best management practices that would apply to all CAAP facilities alike. Commenters also did not want the BMPs to be prescriptive. They wanted language changes to allow for flexibility and innovative technologies. Commenters asked EPA to consider alternatives to the preferred options selected for the proposal for certain subcategories. As a result, EPA is considering several changes to the BMP requirements in the proposed rule.

Among the comments received on BMPs are:

- Commenters preferred BMPs over direct monitoring to comply with numerical limits. One commenter reported that testing (including shipping) took about 600 employee hours and $40,000 per year. The commenter also stated that reliance on BMPs would ease the burden and allow them to shift the hours and dollars spent on testing to implementing BMPs.
- Other concerns should be addressed in developing a BMP plan, but the appropriate personnel at the facility should identify the selected practices or control options, subject to regional or State review. Commenters also stated that the BMPs should not be prescriptive due to regional and State variations in aquatic animal production operations as well as possible misinterpretation by permit writers.
- EPA should better define the term ''BMPs'' and the requirements of a BMP plan.
- EPA underestimated time and costs for development of BMPs.
- Some commenters supported BMPs but did not believe that EPA should issue a final guidance document (an updated version of the proposal document). Instead, EPA should give references to other sources such as land grant universities that have researched this area.
- The proposed BMPs would control effluent discharges poorly. Some commenters indicated that BMPs should not be used as a replacement for discharge limitations but as an added tool to achieve discharge reductions.

Based on comments, EPA is considering a simplified guidance document to identify recommended components of a BMP plan. In EPA's view, a list of these components may help guide producers in developing their own BMP plans. Such guidance might also help reduce the burden on producers of developing a plan and allow flexibility in meeting the facility's specific goals. (Section IV.C. describes these components)

G. Proposed TSS Limitations

EPA received comments stating that it lacked information to develop numerical limitations relevant to all CAAP facilities. Commenters stated that regional differences (among facilities) and effluent characteristic differences (between cold water and warm water species) would make it impractical for all facilities to meet the proposed limits.

The National Association of State Aquaculture Coordinators (*see* DCN 62387) asserted that there is no evidence to show that using best professional judgment to develop limitations associated with NPDES permits is not already protecting water quality effectively and that a national effluent guidelines regulation is not necessary. They later provided information on recent developments in some State programs on the use of BMPs in NPDES permits for CAAP facilities. EPA will consider this information with other information the Agency collected to further evaluate current wastewater treatment practices in the industry.

In response to these comments, EPA performed a preliminary assessment of the TSS limitations and found that most flow through facilities already have relatively low discharges of TSS in full flow or recombined flow effluents. The BMP approach will provide an additional control of TSS discharges. Thus, EPA is reconsidering whether monitoring of TSS concentrations is necessary for this industry. EPA seeks comment on this issue.

EPA proposed that, in the case of flow-through systems, TSS limitations would apply on a net basis (67 FR 57927). That is, the discharge limitation would apply to the amount of TSS added by the production system. This approach is consistent with the NPDES general permit conditions for CAAP facilities in at least one State (Idaho). For recirculating systems, by contrast, EPA proposed that TSS limitations would apply on a gross basis, without accounting for TSS in the source water. EPA's supporting documentation for the proposal shows that the data used to establish the proposed limitations for both subcategories was based on gross TSS concentrations.

The NPDES permit regulation provides a procedure for adjusting limitations to reflect credit for pollutants in intake source water in certain circumstances. These include a demonstration that a discharger's control system would meet the applicable limitations in the absence of pollutants in the intake water (*see* 40 CFR 122.45(g)). EPA is now considering whether to promulgate limitations for both subcategories that leave the decision of establishing permit limits on a net or gross basis to the permit writer. A requirement to establish limitations on a net basis could be interpreted to require all CAAP facilities to collect samples from both their effluent and influent, thus doubling the number of samples required and the analytical costs, which may be unnecessary under many circumstances. For example, facilities whose source water is spring fed may have very little TSS in the source water. Likewise, some recirculating facilities may use public water supplies that also have low TSS concentrations in their source water. Another approach would require monitoring of influent only where effluent monitoring shows a possible exceedence of the limit.

EPA asked for updated copies of NPDES permits, fact sheets, and DMR data for 125 permitted facilities from the EPA regional offices. EPA was able to get NPDES permits for 49 facilities in the detailed survey. EPA also obtained DMR data directly from facilities and PCS for 47 facilities. EPA got DMR data and permits for 43 facilities. There were six facilities for which EPA had NPDES permits but not DMR data and four facilities for which EPA had DMR data but not NPDES permits.

EPA used the detailed surveys and NPDES permit information to identify discharge points and the nature of discharges (*e.g.*, full flow from raceways or solids collection decant water) in the DMR data. EPA found reported TSS data in the DMR set from 31 of the 47 facilities for which it had DMR data. Sixteen facilities in the DMR set did not have TSS data. EPA concluded that 28 of the 31 facilities with TSS data use at least primary settling treatment. Two of the 31 facilities indicated that they have no treatment, and EPA was not able to verify in-place treatment for one facility.

To determine the ability of facilities to meet the primary treatment option, EPA then compared the reported TSS concentration data with the limits proposed for flow-through facilities that produce 100,000 to 475,000 pounds of

aquatic animals a year and for recirculating systems that produce more than 100,000 pounds of aquatic animals a year. For the 31 facilities with TSS data, the number of effluent measurements per facility ranged from 424 to 2, with the average for all 31 facilities being 68 measurements. EPA compared facility TSS monitoring data with the proposed limits for similar types of discharges and found:

- Recombined effluent—Two of the three facilities in this category exceeded the proposed daily maximum limit of 11 mg/L in 28 of 178 reported measurements. We did not find monthly average measurements for this group
- Full flow settling basin discharges—Two of six facilities exceeded the proposed daily maximum limit of 11 mg/L in 15 of 110 reported measurements, and exceeded the proposed monthly average limitation of 6 mg/L in 10 of 113 reported measurements
- Bulk flow effluent—One of three facilities exceeded the proposed daily maximum limit of 11 mg/L in four of 104 reported measurements and exceeded the proposed monthly average limitation of 6 mg/L in six of 104 reported measurements
- Offline settling basins—Neither of the two facilities with TSS data exceeded the proposed daily maximum limit of 87 mg/L or the proposed monthly average limitation of 67 mg/L in 81 reported measurements
- Recirculating system combined effluent—The one facility with reported TSS data exceeded in one of nine reported measurements the proposed daily maximum limit of 50 mg/L, and they exceeded in three of 87 reported measurements the proposed monthly average limitation of 30 mg/L.

EPA found that all of the reported TSS measurements that exceeded the proposed limits occurred in the earlier data reported by an individual facility. The time periods varied by facility from 1990 through 2001 for the data used to compare proposed limits with reported monitoring data. Facility data in the most recent year were all within the proposed TSS limits for the corresponding outfall type. The record discusses the analysis in these data (*see* DCNs 62641 and 31137).

EPA also compared sampling data from the four sampling episodes with the proposed daily maximum limits and found:

- Full flow settling basin discharges—Neither of the two facilities with full flow discharges exceeded the proposed daily maximum limit of 11 mg/L in any of the 10 sample measurements.
- Bulk flow effluent—One facility with a bulk discharge did not exceed the proposed daily maximum limit of 11 mg/L in any of five sample measurements.
- Offline settling basins—One of three facilities with offline settling basins exceeded the proposed daily maximum limit of 87 mg/L in four of the total 21 sample measurements taken at the three facilities.
- Recirculating system combined effluent—The one facility sampled exceeded the proposed daily maximum limit of 50 mg/L in one of five reported measurements.

H. Feed Conversion Ratios

Improving the conversion of feed to live weight positively affects water quality, generating less wastes by reducing the amount of uneaten feed. Some commenters raised a concern about the feed conversion ratios (FCRs) EPA assumed in the cost model and the frequency factor adjustment (*see* Section III.I.). The FCR is the weight of feed used to produce a unit weight of aquatic animals. Commenters said the FCRs we used for proposal were too high, and most facilities are achieving better feed conversion ratios than assumed.

Many facilities responding to the detailed survey estimated their FCR or submitted detailed information on feed use and production. EPA found reported FCRs to be quite variable, even among facilities with similar systems, ownership-types, and species. EPA calculated FCRs facility-by-facility from the detailed survey to estimate possible load reductions. For the purpose of estimating costs and pollutant load reductions, EPA assigned target FCRs as the 25th percentile value for facilities in each combination of species, production system, and ownership type group. EPA does not currently plan to establish any limits on FCRs. We used facility-specific FCRs to estimate baseline loads and compare them to the target FCR to estimate possible load reductions from implementation of solids control BMPs.

In comparing FCRs with effluent concentration data on a facility basis, EPA found that the raw wastewater pollutant loading at a facility is still largely linked with feed inputs. To address comments about the impact of the FCR values, EPA will perform sensitivity analyses to compare the target FCR and resulting pollutant load reduction estimates.

I. Cost Analyses

Comments stated that the proposed model facility approach used was not adequate. Many of the comments suggested that EPA's cost estimates were not accurate, but only a few commenters (*e.g.*, JSA AETF, NASAC, and the U.S. Trout Growers Association) provided detailed cost data. These commenters also suggested that EPA's model facilities were an inaccurate representation of the industry because the model facilities do not capture the diversity of actual facilities. One commenter stated that the labor rates for managers and laborers were too low. To address these concerns, EPA used facility-specific information from the detailed survey to perform the analyses for the NODA. *See* Section V.A.2.

Commenters also criticized our use at proposal of the frequency factor approach to major national estimates. For this approach, EPA applied a ''frequency factor'' to the cost for each model facility to estimate the national cost for all facilities represented by the single model facility. EPA estimated frequency factors based on these sources: EPA site visits, screener surveys, observations by industry experts, USDA's 1998 Aquaculture Census, USDA APHIS National Animal Health Monitoring System, and State regulatory programs. Commenters argued that the frequency factors underestimated compliance costs, so EPA may have underestimated impacts.

For the NODA, EPA changed its approach by using data from the detailed survey to estimate facility-level compliance costs and associated loads. Instead of applying the frequency factors used at proposal, we applied statistically-derived weights from the survey design to scale detailed survey facility estimates to national estimates based on the probability that a facility was selected for the detailed survey sample. Because not all sampled facilities would be within the scope of the rule, we used a subset of the detailed survey sample to estimate national CAAP costs for industry sectors affected by the proposed rule (*see* Section II.D. for a description of the survey weights and the subset).

IV. Regulatory Options Considered for the Proposal and Modifications Being Considered for the Final Rule

A. Proposed Regulatory Options

In subcategorizing the industry for the proposal, EPA considered several factors (*e.g.*, age of the equipment and facilities, location, processes employed, and the available types of treatment technology.) We identified the types of production systems (*e.g.*, flow-through systems, recirculating systems, net pens) to create subcategories with similar operating practices, quality and quantity

of effluent type and discharge frequency.

We then proposed limitations based on these CAAP subcategories: flow-through, recirculating, and net pen systems. Flow-through systems tend to have high effluent flows that can exceed a complete system volume exchange per hour. Some flow-through facilities may treat two discharges: a bulk discharge and a discharge from a settling basin referred to as off-line settling. The bulk discharge is large volume and flows directly from the areas where the animals are confined. The off-line settling discharge is water drawn from, without disturbing, the solids collected from the production process that are treated in a basin through settling. Compared to the bulk flow discharge, the volume of discharge from the off-line settling basin is small but more concentrated in pollutants such as TSS, BOD, or nutrients. Other flow-through facilities choose to treat their entire discharge through a single treatment system (full-flow settling) that includes the solids generated from the production process and the entire production volume of water. Facilities that use full-flow settling with a single discharge point usually have relatively low concentrations of TSS, BOD, and nutrients.

Some recirculating systems have single discharges with relatively small volumes (often a fraction of the system volume per day) of treated effluent with concentrations of TSS, BOD, and nutrients comparable to the off-line settling basin discharge at some flow-through facilities. Other recirculating systems (called dual discharge) may have two discharges, one from a solids treatment process and one often described as ''overtopping'' water. Overtopping water is process water that drains from production tanks or process water treatment units as a result of continually adding a small amount of water to the recirculating system. This practice provides make-up water that offsets losses and some dilution for a ''margin of safety'' that ensures adequate process water quality. The overtopping water effluent TSS, BOD, and nutrients are typically less concentrated than solids treatment system effluent, but they are more concentrated than bulk discharges from flow-through systems. Solids treatment effluents from a dual discharge recirculating system are similar in concentration to flow-through offline settling basin and single discharge recirculating systems. Net pen systems release TSS, BOD, and nutrients directly to receiving waters.

EPA then divided the subcategories by facility size (*i.e.*, the amount of aquatic animals produced) because of differences in economic factors related to production size. The proposal did not include facilities with annual production below 100,000 pounds due to economic achievability concerns. We also proposed less stringent requirements for flow-through facilities with production between 100,000 and 475,000 pounds a year (again based on concerns about economic achievability). EPA based its proposed conclusions on economic achievability of limitations based on the model technology and model facility analysis. The proposed model facilities represented specific size ranges in pounds produced. Pounds produced were derived from annual revenue ranges and price data from the 1998 Census of Aquaculture. Most of the impacts that EPA identified would adversely affect trout producers below an annual threshold of 94,000 pounds production. Therefore, EPA proposed to establish the applicability threshold for the effluent guideline at 100,000 pounds a year to avoid projected impacts in the trout sector. Production of other species also faced similar economic stress at lower production levels. EPA proposed the same applicability threshold for other species because doing otherwise would add needless complexity to the regulation, with little corresponding environmental benefit.

EPA identified technology options for each of the system/size subcategories based on technologies and practices found at facilities in the subcategory. We evaluated the options in order of increasing stringency, both in the degree of pollutant reduction achieved as well as in cost. Each successive option incorporates the technologies and practices of the previous option.

Option 1 for flow-through systems includes primary settling (*e.g.*, quiescent zones and settling basins) and developing and implementing a BMP plan for solids control. Option 1 for recirculating systems includes similar technologies/practices to those for flow-through systems. Option 1 for net pens includes feed management and BMP plan development for solids control.

Option 2 for all subcategories combined the Option 1 requirements with identifying and implementing BMPs to control discharges of drugs, chemicals, and non-native species. Option 2 also included a reporting requirement for the use of Investigational New Animal Drug (INAD) and extra-label use drugs. Option 3 combines Option 2 requirements with solids polishing (*e.g.*, microscreen filtration) for flow-through and recirculating systems and active feed monitoring for net pens.

EPA selected the proposed regulatory options for each subcategory based, in part, on the costs and economic impacts of installing and implementing these options. The proposed regulation for flow-through systems applied a two-tiered approach reflecting economic achievability concerns. For facilities that produce between 100,000 and 475,000 pounds of aquatic animals a year, EPA proposed to base BPT, BCT, BAT and NSPS on Option 1. For facilities that produce more than 475,000 pounds of aquatic animals per year, we proposed BPT, BCT, BAT and NSPS requirements on Option 3. For recirculating systems, EPA proposed Option 3 as the basis for the BPT, BCT, BAT and NSPS requirements. For net pen systems, EPA also proposed Option 3 as the basis for BPT, BCT, BAT and NSPS. The components for each option for flow-through and recirculating systems are summarized in Table IV.B.1.

EPA is still considering a no further regulation option. EPA received many comments supporting a no rule option for this industry. Comments referred to programs within the Federal and State governments such as the NPDES permitting process and TMDLs, indicating that these programs are better equipped to address local problems than national guidelines. They also argued that the baseline discharge loadings do not warrant national guidelines. The Agency will fully consider this option and the comments when it issues the final action.

B. Modifications Being Considered for the Final Rule

The following sections discuss several alternatives EPA is considering. We present the revised costs, pollutant reductions, and economic impact estimates for both the proposed options (1 to 3) and two new options (A&B) (*see* Section VI of today's notice). These revised estimates reflect:

- Data from EPA's detailed surveys.
- Data received with comments to the proposed rule.
- Effluent monitoring (DMR) data received from EPA regional and State permitting authorities.
- Changes resulting from methodological revisions to EPA's analytical approach. Before final action, EPA will consider these and any further revisions resulting from comment on today's notice. The following sections describe alternatives we are considering for the different regulatory levels of control (*e.g.*, BPT, BCT, BAT, NSPS).

1. Description of Modified Options—Flow-through and Recirculating System Subcategories

As a result of the facility-level analysis from detailed surveys and comments, EPA re-evaluated the flow-through and recirculating system technology options for BPT, BCT, BAT, and NSPS limitations or standards from proposal. In addition to the three proposal options, EPA is considering two new options that represent changes to the proposed options. We will also continue to consider a no further regulation option.

The first new option (Option A) would, like Option 1, include primary settling. It would also include the requirement to develop and implement a BMP plan that minimizes both the discharge of drugs and chemicals and the possible escape of non-native species. Option A would also include the requirement for reporting Investigational New Animal Drugs (INADs) and extra-label use drugs as included in the proposed Option 2. The only difference between Option A and the proposed Option 2 is that Option A does not require the development and implementation of BMPs to address solids control.

Like Option 1, Option A would ensure that all covered facilities remove solids by primary settling. Based on the detailed survey data, primary settling is used at 468 out of 506 (92.5%) of all flow-through and recirculating CAAP facilities. However, where Option 1 would require using BMPs to control solids, Option A does not. Option A would instead require BMPs to (1) address the use, storage, and disposal of drugs and chemicals and (2) minimize or prevent the release or escape of non-native species. This substitution may be appropriate for two reasons. First, many facilities have already established these practices. The detailed survey indicates that drug and chemical management practices are in use at 44% of flow-through and recirculating CAAP facilities. The practices are also used at 46% of flow-through facilities with annual production between 100,000 and 475,000 pounds. Over 90 percent of facilities producing species that would be considered non-native use escape prevention practices. Second, EPA thinks this change may be appropriate because it addresses the environmental effects that most concerned commenters. Therefore, EPA will consider Option A as the basis for BPT, BCT, BAT, and NSPS for the flow-through and recirculating subcategories with annual production greater than 100,000 pounds in the final rule. Option A would identify aspects of the facility operation that must be addressed with appropriate management practices but not specify the particular practices.

The proposed Option 3 specified additional solids removal requirements that could be accomplished through secondary solids removal treatment technologies such as microscreen filtration or a solids polishing pond. Option 3 included a numeric TSS concentration limit of 10 mg/L maximum daily and 6 mg/L monthly average for full-flow, flow-through facilities; 69 mg/L maximum daily and 55 mg/L monthly average for offline settling at flow-through facilities; and 50 mg/L maximum daily and 30 mg/L monthly average for recirculating facilities. EPA estimates that solids polishing technologies (or some equivalent) are currently used at 264 of 506 (52.2%) of all flow-through and recirculating CAAP facilities.

The second modified option (Option B) being considered is similar to the proposed Option 3 in that it would require a greater degree of solids removal than achieved under Option A. However, Option B would offer facilities the choice to develop and implement a solids control BMP as included in Option 1 in lieu of installing secondary solids control technology, such as a second stage settling pond or a microscreen filter, and meeting numeric TSS limits. Facilities could still choose to install solids polishing technology and monitor TSS to achieve a numeric limit, but they could alternatively choose to instead implement solids control BMPs such as feed management.

Table IV.B.1 identifies the components or technologies we are considering for the proposed and modified options for flow-through and recirculating systems.

TABLE IV.B.1.—TECHNOLOGIES OR PRACTICES CONSIDERED FOR THE PROPOSED AND MODIFIED OPTIONS

Options	Technologies or practices				
	Primary settling	Solids control BMPs	Drugs and chemicals BMPs	Escape prevention	Secondary solids removal
1	√	√			
2	√	√	√	√	
3	√	√	√	√	√
A	√		√	√	
B*	√	√	√	√	√

*Option B would include primary settling, drugs and chemicals BMPs, escape prevention, and a choice between solids control BMPs or secondary solids removal technology.

EPA seeks comment on establishing BPT, BCT, BAT, and NSPS based on any one of these options for both flow-through and recirculating systems. We also seek comment on whether EPA should establish limitations and associated BMPs.

2. Continual Discharge Subcategory

Public comment (DCNs 70137 and 70236) suggests that EPA's proposal did not clearly define recirculating systems. A variety of systems are used to produce aquatic animals spanning a continuum from completely flow-through (single pass of water through culture tanks) to nearly complete recirculating (only small amounts of make-up water are added to offset evaporation and other losses). Closed ponds (*i.e.*, systems that do not regularly discharge) and net pens (systems located directly in the receiving water), are outside of this continuum. Many facilities operate flow-through systems with multiple uses of the water before discharge. Oxygen may be added and solids collected between uses to provide better quality of reused water. Some facilities operate flow-through systems with process treatments that are similar to some used in recirculating systems (*e.g.*, enhanced solids removal, extensive oxygenation, and carbon dioxide stripping).

Recirculating systems may have concentrated solids effluents from solids removal processes that require additional treatment prior to discharge.

These concentrated solids effluents from recirculating systems may be similar in quality to those discharged from quiescent zones in flow-through systems. Many recirculating systems also have an overflow or overtopping water discharge that is combined with the solids treatment effluent. Overtopping water quality is essentially the same as that of the process water in the recirculating system. The quality of the overtopping water is usually more concentrated in constituents (such as TSS, BOD, nitrogen, and phosphorus) than flow-through system bulk discharges. However, it is less concentrated in these constituents than effluents from solids treatment processes such as offline settling basins. Daily volume of discharged overtopping water is also typically less than 10% of the system volume compared to the multiple system volume exchanges per day in typical flow-through systems. Our proposal did not clearly state how the rule would cover overtopping water from recirculating systems. EPA intended overtopping water discharges to be treated like solids treatment water or combined effluents. That is, all discharges from recirculating systems would be subject to the same proposed effluent limits.

EPA may revise its proposed subcategorization scheme by combining the flow-through and recirculating subcategories into a single subcategory, called the ''continual discharge'' subcategory (*see* Section III.B.1). Both proposed subcategories operate with a continuous or frequent discharge of wastewater containing similar wastewater pollutants. The recirculating system wastewater discharge typically comes from two sources, backwash from solids removal and overflow water from production tanks, and has similar pollutant concentrations as offline treatment system effluents from flow-through systems. Combined recirculating system discharges (backwash from solids removal and overflow water from production tanks) are also like the wastewater discharged from offline treatment at a flow-through system.

The detailed survey data indicate that nationally 11 facilities use both flow-through and recirculating system technologies. Depending on the facility layout, wastewater from both systems may be commingled for discharge in a single effluent stream. Under the proposal, facilities that commingle recirculating and flow-through system wastewater would be subject to the recombined effluent limits that are the same as the full flow requirements for primary settling.

By combining the flow-through and recirculating systems into a single subcategory, EPA would basically apply two sets of effluent limits. One set would apply to the discharge of full flow effluents, and the other would apply to offline treatment or recirculating system effluents. The flow-through facilities would be subject to the proposed requirements (*i.e.*, remain unaffected by combining the separate subcategories into one), whereas the recirculating systems would be subject to offline treatment requirements. Offline treatment requirements had higher (less stringent) effluent concentration-based limits than the proposed recirculating system limits. They operate with a frequent continual discharge that contain similar wastewater characteristics.

EPA is also considering the same modified options (A & B) for the continual subcategory as for the separate flow-through and recirculating subcategories. Because the continual subcategory would include limits from the separate flow-through and recirculating systems, the results of the analyses for the continual subcategory would be similar to those presented for the separate subcategories. EPA would apply the same requirement for TSS in a continual discharge subcategory to discharges from stand-alone recirculating facilities and offline settling basins. EPA seeks comment on combining these two subcategories into a single subcategory.

3. Net Pen Subcategory

EPA is not considering changes to the proposed options for the net pen subcategory. For facilities that produce more than 100,000 pounds of aquatic animals per year, EPA proposed BPT limits based on:

- Option 3 active feed monitoring (*i.e.*, additional solids removal).
- Developing a BMP plan for solids control.
- General reporting requirements for use of certain drugs and chemicals for facilities.

EPA also proposed to establish BAT equal to BPT because no more stringent options representing BAT were available. EPA proposed to establish BCT equal to BPT because EPA did not identify any more stringent technologies representing BCT were available. Finally, EPA proposed NSPS equal to BAT because the proposed effluent limitations guidelines would be affordable and would not pose a barrier to entry for new source net pens.

V. Revisions to the Cost, Loadings, Economic, and Benefits Models

A. Revisions to Assumptions and Methodology Used in EPA's Cost Analyses

1. Proposed Costing Approach

At proposal, EPA used a model facility approach to estimate the cost of installing or upgrading wastewater treatment to achieve the proposed requirements. As described in the preamble to the proposed regulation (67 FR 57872), EPA developed 21 model facilities (based on the USDA's Census of Aquaculture and EPA's screener survey) characterized by different combinations of production systems, size categories, species and ownership types. We developed regulatory technology options based on screener survey responses, site visits, industry and other stakeholder input, and existing permit requirements.

EPA estimated the cost for each option component for each model facility. We then calculated costs for each regulatory option at each model facility based on model facility characteristics and the costs of the option's technologies or practices corresponding to the option.

EPA estimated frequency factors for treatment technologies and existing BMPs based on screener survey responses, site visits, and sampling visits (*see* Section III.1). Baseline frequency factors represented the portion of the operations that would not incur costs to comply with the proposed requirements because they were already using the technology or practice. EPA adjusted the component cost for each model facility represented by the model to account for those facilities then EPA derived national estimates of costs by aggregating the component costs applicable to each model facility across all model facilities.

2. Revised Costing Approach

EPA's detailed surveys captured information on the treatment in-place at the facility and other site-specific information (such as labor rates). EPA got additional cost information from data supplied from public comments and site visits. With the new data, EPA revised the method to estimate compliance costs. Instead of a model facility approach, EPA is presenting facility-level costs based on the available facility-specific data contained in the detailed survey responses. We then apply statistically-derived survey weights instead of the frequency factors used at proposal to estimate costs to the CAAP industry as a whole.

On the detailed survey, facilities operating flow-through and recirculating production systems reported a variety of BMPs that are used today. These BMPs include:

- Feed management.
- Cleaning of quiescent zones.
- Inventory control.
- Health screening.
- Cleaning screens in tanks or raceways.
- Mortality removal.
- Use of dam boards.
- Flow diversion during harvest and cleaning activities.

The detailed survey did not ask for detailed descriptions of the steps in the BMPs. Therefore, except for the feed management practice (see below), when a facility indicated a particular BMP in place, EPA assumed no additional cost to the facility for implementing that BMP.

The costs associated with BMP plan development include a one-time labor cost of 40 hours to develop and write the plan. The plan that EPA costed included (1) identifying all waste streams, wastewater structures, and wastewater and manure treatment structures at the site, (2) identifying and documenting standard operating procedures for all BMPs used at the facility, and (3) management and staff responsibilities for implementing the plan. We included an annual cost for four hours of management labor to maintain the plan and eight hours of management labor for an annual review of BMP performance. We included the cost of developing a solids control and drugs and chemicals BMP plan in the estimates for all facilities, except those in Idaho and Washington. (Facilities in Idaho and Washington would not incur this cost because NPDES permits in these States already require solids control and drugs and chemicals BMP plans.) EPA found that the components of the BMP plans required in Idaho and Washington are similar to those being considered for the final rule.

In evaluating facilities for solids controls, EPA first checked for evidence of a good feed management program. If the facility reported they practice feed management, EPA looked for evidence of solids management and good operation of the physical plant, including regular cleaning and maintenance of feed equipment and solids collection devices (*e.g.*, quiescent zones, sedimentation basins, screens, etc.). To evaluate the effectiveness of a facility's solids control practices, we calculated feed conversion ratios (FCRs) using pounds of feed per pound of live product (as reported in the detailed survey) and considered existing solids control equipment. We assumed facilities lacking evidence of good feed management or solids control programs would incur additional costs to improve or establish them.

EPA estimated FCRs from data in the detailed survey and follow-up with some facilities and compared FCRs for groups of facilities (*i.e.*, combinations of ownership, species and production system types such as commercial trout flow-through facilities or government salmon flow-through facilities). We found a wide range of FCRs (reported by facilities in their detailed surveys, which were validated by call backs to the facility) among apparently similar facilities within ownership-species-production system groupings.

For example, we had good data for 24 of 60 government trout producers using flow-through systems. They reported a range of FCRs of 0.79 to 1.80 with a median FCR of 1.30. If an individual facility's reported FCR was significantly greater than the median, EPA further evaluated the facility to ascertain the reason for the higher FCR. Facilities that produce larger fish, such as broodstock, might have higher FCRs because the larger fish produce less flesh per unit of food. Facilities with fluctuating water temperatures could also be less efficient than facilities with constant water temperatures. We did not apply costs for solids control BMPs for facilities with reasonable explanations for the higher FCRs. We evaluated facilities that did not report FCRs or provide enough data for an estimate using the methodology described in section III.H.

Costs for the solids control BMP component include staff time for recordkeeping for feed delivery and daily feeding observations. Management activities associated with the solids control plan were weekly data reviews of feeding records, regular estimates of changes to feeding regimes for each group of aquatic animals, and staff consultations about feeding. For facilities with no solids control equipment, we also estimated the costs for primary and secondary solids control. EPA evaluated each facility to identify the configuration of the existing treatment units and what upgrades would be required. We found that most flow-through systems not having any treatment structures can comply with Option 1 by adding a combination of quiescent zones and off-line settling basins. We assume quiescent zones can be retrofitted into existing raceways without expanding them and without impacting production levels in the raceways.

EPA also used industry cost information provided through public comment and the detailed survey to estimate costs for design and installation of primary settling equipment for effective settling of suspended solids. For example, we used the facility-level data included in the detailed survey responses to place and size the off-line settling basins on the facility site. For facilities that use earthen flow-through technologies, EPA estimated costs to construct and operate full flow settling structures rather than quiescent zones and off-line settling.

EPA classified each facility's wastewater treatment system based on the description provided in its survey response and available monitoring data, including DMR data. We assumed that treatment technologies indicated by a facility on the detailed survey are properly sized, installed, and maintained. EPA estimated facility-specific costs for each of the responding direct dischargers and used these estimates as the basis for national estimates. Because the survey did not collect information about many specific parameters used in individual facilities' production processes and treatment systems, EPA supplemented the facility-specific information with typical specifications or parameters from literature, survey results, and industry comments. For example, EPA assumed that facilities have pipes of typical sizes for their operations.

As a consequence of such assumptions, a particular facility might need a different engineering configuration from those modeled if it installed equipment that varies from the equipment or specifications we used to estimate costs. EPA nonetheless considers that costs for these facilities are generally accurate and representative, especially industry-wide. EPA applied typical specifications and parameters representative of the industry to a range of processes and treatment systems. We contacted facilities to get site-specific configuration information where possible.

In revising cost estimates, EPA paid particular attention to:

- Size of tanks, raceways, and culture units.
- Labor rates.
- Treatment components in place.
- BMPs and plans in place.
- Daily operations at the facility.

Site visits and analysis of the detailed surveys indicated that raceways and quiescent zones are cleaned as necessary to maintain system process water quality.

The effective operation of microscreen filters require that they be enclosed in heated buildings to prevent freezing when located in cold climates. EPA's revised estimates of costs for Option 3 are not based on the application of microscreen filters unless the detailed survey response indicated that such a structure existed at the site. When the detailed survey did not indicate a structure at the site, EPA estimated costs for a second stage settling structure rather than a microscreen filter. Based on data from two of EPA's sampling episodes at CAAP facilities, this technology will achieve the proposed limits for Option 3.

EPA agrees with concerns raised in comments that the cost associated with enclosing the filter in a heated structure would be prohibitive. Option B would allow facilities to choose between solids polishing treatment (*e.g.*, second stage settling) and solids control BMPs. For estimating compliance costs, EPA assumes that facilities will choose the least costly method which, in all cases, proved to be using the BMPs. Thus, EPA based Option B costs on the application of solids control BMPs.

To estimate costs for the drugs and chemical component of the BMP plan, EPA first looked at the detailed survey to determine if the facility reported using drugs, chemicals, or medicated feed. The detailed survey also asked if the facility has adopted health management BMPs. Although responses indicated that nearly half of the regulated population has some form of health management practices, we do not have information on the specific activities associated with these practices. Therefore, EPA assumed that all facilities reporting drugs and chemicals would incur additional costs to implement management practices (except in Idaho and Washington). These States have already issued NPDES permits that include requirements for drug and chemical management BMPs similar to those in our cost estimates. (EPA found evidence of other states with similar requirements, but no facilities in these states were in the group of in-scope facilities that responded to the detailed survey.) Costs include staff time for:

- Initial and annual plan review.
- Weekly inspections of storage facility.
- Completion of an application program worksheet (recordkeeping).
- Completion of a disposal worksheet (for out-of-date drugs or chemicals).
- Marking of production units being treated.
- Annual training sessions.

Management activities include:

- Initial plan development.
- Annual review and update of plan.
- Review of application worksheets.
- Leading facility training sessions.
- Quarterly inspections of entire facility.
- Management of veterinary assistance (*e.g.*, implementing vet recommendations).
- Biweekly review of drug and chemical records.
- Staff management consults.

Because therapeutic treatments vary considerably at a facility from year-to-year and also among facilities, EPA estimated the BMP costs based on monthly drug applications throughout the year. We estimated costs for a few hatcheries that produce only eggs and larvae for regular treatments to control fungus during the egg incubation period.

We also considered the use of activated carbon filtration to treat and remove drug or pesticide active ingredients from wastewater. Research indicates that this technology is effective at treating these compounds, and at least one aquatic animal production facility installed this technology. EPA estimated the costs for activated carbon treatment as a stand-alone technology. We estimated costs on a site-specific basis for facilities which reported using drugs and then added these costs for options A, B, 2, and 3 (*see* Section V.C.) to assess the economic achievability of this technology.

EPA estimated the costs to develop and implement escape management practices at facilities where (1) the cultured species was not commonly produced or regarded as native in the State, (2) the facility was a direct discharger, and (3) the species was expected to survive if released. (In contrast, producers of a warm water species in a cold climate, such as tilapia producers in Minnesota or Idaho, would not incur costs for this practice.) Costs for escape prevention include staff time for production unit and discharge point inspections and maintenance of escape prevention devices. We applied these costs to facilities that installed equipment conforming with State requirements for facilities producing non-native species (identified by the State). Management time includes quarterly production unit and discharge point inspections, eight hours a year to review applicable State and Federal regulations, and quarterly staff consultations.

EPA revised estimates for all labor costs using the employee and wage information supplied in the detailed surveys. For those facilities indicating they use unpaid labor for all or part of the facility operation or did not supply useable wage information, we used average State or regional wages.

B. Revisions to Assumptions and Methodology Used in Loadings Analyses

1. Proposed Approach

To estimate the baseline discharge loadings and load reductions for the proposal, EPA used the same model approach described in Section V.A.1. for the costing analyses. We first estimated pollutant loadings for untreated wastewater based on several factors for each model facility. Feed offered to the CAAP species contributed to pollutant discharges in three ways: feces, urine-contributing dissolved ammonia, and uneaten feed (dissolved and particulate forms). These byproducts of feed contribute to the pollutant load in the untreated culture water. EPA used typical efficiency rates of removing specific pollutants from water for the technology options and BMPs we are considering. Using the same frequency factors for technologies in place that were used to estimate costs, we estimated the baseline pollutant loads discharged. We then calculated load reductions for the options.

2. Revised Loadings Approach

Rather than using the proposed model approach, EPA revised the loadings approach to incorporate a facility-level approach using data primarily from the detailed surveys, but also taking into account suggestions concerning appropriate feed conversion ratios (FCRs) provided by commenters. EPA also applied statistically-derived survey weights to get national estimates.

Since pollutant loads are proportional to feed inputs, improving feeding efficiency and reducing wasted (uneaten) feed will reduce pollutants discharged from CAAP facilities. EPA expects that using feed management BMPs will reduce pollutant loads by improving the efficiency of converting feed to the final product (*i.e.*, less feces and uneaten feed). EPA determined pollutant loadings from revised estimates of pollutant loads for a unit of feed input. EPA's re-evaluation of the baseline or current practices changed the loading estimates, reflecting survey responses on practices or treatment-in-place at facilities. The revised results also reflect the estimated FCRs we used in the facility-level analyses (*see* Section III.H).

In its evaluation of data from the facilities responding to the detailed survey, EPA found no apparent relationships that explain why some

facilities use drugs or medicated feeds and others do not. EPA also evaluated the amounts of drugs and medicated feed reported in the detailed survey as used at facilities and found no basis for predicting how much drugs or medicated feed would be used at a given facility. Information reported by facilities did not provide enough detail for EPA to estimate pollutant reductions associated with drug and chemical BMPs.

C. Revisions to Assumptions and Methodology Used in Economic Analyses

Due to new information and comments, EPA is considering several changes in the approaches for economic analysis. EPA seeks comments on the changes. Section VI describes new data and results for the revised economic analyses.

1. Economic Analysis Approach for the Proposed Rule

For the proposed rule, EPA evaluated projected economic impacts using screener questionnaire data which did not include financial or economic information beyond revenues and limited firm-level production data. As a consequence, the impact analysis was based on compliance costs for model facilities, frequency factors for extrapolating costs to a group of facilities represented by a model, and sales or revenue tests. Revenue tests involve simple comparisons of compliance costs with facility revenues. For non-commercial facilities, in lieu of revenues, we imputed a value to their production based on annual harvest and commercial prices. Similar revenues tests were applied to both commercial and non-commercial facilities. We estimated the number of small businesses from a special tabulation of the United States Department of Agriculture (USDA) *Census of Aquaculture* (1998) (for details, see ''Economic and Environmental Impact Analysis of the Proposed Effluent Limitations Guidelines and Standards for the Concentrated Aquatic Animal Production Industry,'' EPA–821–R–02–015, September 2002, DCN 20141).

2. Clarifications Regarding Baseline Assumptions for Economic Analysis

Treatment in Place. In the proposed rule and this notice, EPA characterizes baseline conditions using existing compliance levels and treatment in place. This approach is consistent with past effluent guidelines and EPA's Guidelines for Preparing Economic Analyses (EPA 240–R–00–003, September 2003, DCN 20435) and Office of Management and Budget (OMB) guidelines. OMB guidelines state that '' * * * the baseline should be the best assessment of the way the world would look absent the regulation * * * You may often find it reasonable to forecast the world absent the regulation will resemble the present.'' (OMB. 2002. ''Guidelines to Standardize Measures of Costs and Benefits and the Format of Accounting Statements,'' memorandum from Jacob J. Lew, Director to Heads of Departments and Agencies, M–00–08, March 22, DCN 20385). Thus, EPA does not agree with some commenters' suggestions that baseline conditions for impact analysis should assume no treatment in place.

Consideration of Market Conditions, Market Forecasts, and International Competition. EPA assumed in the proposed rule that CAAP producers cannot pass cost increases through to consumers. We do not expect to change this assumption for the final rule (foreign competition is so strong that the domestic market cannot raise prices at all). EPA used the 1999–2001 data from the detailed questionnaire to reflect current market conditions. We also used several publicly-available data sources to develop market forecasts, ranging from pessimistic to slightly optimistic, for future prices (*see* Section V.C.3.b.i). This approach addresses comments suggesting the need to account for foreign competition and sluggish market outlooks for U.S. aquaculture in the economic analysis for this rule.

3. Revisions of the Approaches and Assumptions Used in the Economic Analysis

Data collected from the detailed questionnaire will form the basis for the economic analysis supporting the final rule. These financial analyses use the standard methodology for developing effluent limitations guidelines with some changes to address impacts to non-commercial (*e.g.*, State, Tribal or Federal government) facilities. Comments recommended changes to the proposed methodology. The following sections describe the revisions, based on comments and the availability of detailed questionnaire responses, to the economic analyses we are considering.

a. *Revisions to Estimates of Numbers of Small Business.* EPA received several comments questioning the number of facilities identified as small businesses in the proposed rule. EPA revised its estimates of affected small businesses based on the results of the detailed survey and designed the detailed questionnaire to collect revenue information for both individual facilities and the companies that own the facilities. We compared these data to Small Business Administration size standards for the industry (up to $750,000 annual revenues). If a facility earned more than the size standard, we did not consider it a small business. If a facility did not earn more than the size standards, EPA examined company revenues to determine whether the company was a small business as defined by SBA. EPA collected public information on company ownership and revenues as needed to complete each determination. At this time, EPA identified 117 facilities out of 522 facilities within the scope of the rule that are owned by small businesses, seven that belong to small organizations, and one that is an academic/research facility.

b. *Revisions to Economic Analyses for Commercial Facilities.* For the final rule, EPA intends to use (1) facility-specific data supplied by the detailed questionnaire, (2) results from forecasting methods (see Section V.C.3.b.i) to improve cost and price estimates, and (3) several economic impact measures that were not used in the proposal. In particular, the detailed questionnaire data should help us address comments suggesting that we underestimated costs and overestimated prices and that our extrapolation of impacts based on model facilities misstated the impacts on many facilities.

i. *Measures of Economic Impacts for Commercial Facilities.* For the final rule, EPA will use several measures to evaluate possible impacts on commercial facilities that we did not use for the proposed rule due to lack of data. These measures examine the possibility of closure, direct impacts on employment and communities, indirect and national impacts, and changes in financial health and borrowing capacity.

Closure Analysis. The closure analysis compares costs from 2005 to 2015 to earnings during the same period. We used two methods to estimate earnings: (1) cash flow and (2) net income. We discounted both costs and earnings with a 7 percent real discount rate to account for the time value of money and place earnings and costs on a comparable basis. To be considered a closure as a result of this rule, a facility must show for two out of three forecasting scenarios (1) positive discounted cash flow (or net income) without the rule and (2) negative discounted cash flow (or net income) with the rule. In the detailed questionnaire, EPA asked commercial respondents whether their facility did more than raise fish. If they did, the questionnaire asked them to report the financial performance of both the

aquaculture enterprise and the entire farm/company. EPA will perform the closure analysis for the enterprise, facility, and company levels. These analyses involve several complexities (*e.g.*, what to consider as earnings, what costs are included, and the number and type of forecasting methods used). Section V.C.3.b.ii contains our detailed responses to comments on these and other aspects of the closure analysis.

Closure Analysis—Forecasting methods. EPA examines the possibility of closure under three forecasting methods to project future earnings. The first method uses U.S. Department of Agriculture (USDA) long-run baseline projections for the Consumer Price Index, Food at Home, Fish and Seafood Sector for 2004 through 2012 (USDA Agricultural Baseline Projections to 2012, Staff Report WAOB–2003–1. February, DCN 20363). This projection reflects the current industry downturn which then changes to a long-run annual increase of 1.5 percent. This index is used to adjust the revenue information in the detailed questionnaire to project revenue in future years.

The second method uses historic time-series data collected and published by several government agencies to estimate price trends and project them into the future. For trout, EPA uses USDA trout price data for 1994–2002 (Trout Production, Sales of fish 12″ or longer, U.S. Average price per pound). For all other fish, EPA uses U.S. Department of Labor, Bureau of Labor Statistics, Fish PPI, Producer Price Index—Unprocessed and packaged fish, not seasonally adjusted, (Series ID: WPU0223) from January 1980 through February 2003. EPA examined Series ID: WPU–223–1–3 (salmon) not seasonally adjusted but could find no trend in the data. EPA converts the data to constant dollars where needed. For time series with monthly observations, EPA converts the series to a 12-month centered moving average to smooth seasonal variations. We performed a regression analysis using this price data to derive kinked trend lines for prices (*e.g.*, Chow Breakpoint Test, see DCN 20366 and DCN 20371 for details). This type of regression allows the slope of the price line to differ before and after suggested breakpoints in time. Both data sets (trout and all fish) show downward trends for prices. We converted price level forecasts into an index using 2001 as the base period (this is the most recent year for which data were collected in the detailed questionnaire). We also applied this index to base year (2001) data from the detailed survey to project future revenues. The third forecasting method assumes constant future revenues using the average of 1999–2001 earnings collected in the detailed questionnaire.

For this notice, EPA projected impacts only when the same impacts occurred using two of the three forecasting methods. EPA seeks comment on basing its closure analysis for the final rule on impacts that occur using one of the three methods.

The forecasting methods give a range of trends (*i.e.*, upward (USDA), downward (estimated price indices), and no change (survey earnings average)). However, EPA expects to adjust the forecasts to reflect more recent data for the final rule, so this range of trends may change (*see* DCN 20450).

Closure Analysis—Baseline Industry Conditions. We can not analyze facilities with negative net earnings under 2 or 3 of the forecasting methods before they incur pollution control costs with the methodology used for the facility closure analysis. EPA seeks comment on omitting such facilities from the closure analysis. Such facilities represent situations such as:

- Start-ups (where the first year of income is negative but does not indicate future earnings)
- Cost centers (that transfer production to other facilities under the same ownership at no cost, or the cost is set to the operating costs)
- Facilities where the company does not record income statement information at the facility level.
- Facilities that are likely to fail with or without the rule.

Direct and Community Impacts. When the analysis projects that a facility will close as a result of the rule, EPA then tracks the direct and indirect impacts from that closure. We consider all associated revenues, production wages, and employment (both paid and unpaid labor and management) lost. We will also examine the increase in local unemployment resulting from the facility closure. These approaches respond to comments that suggested the need to determine how the CAAP industry impacts communities (*e.g.*, employment) in several areas of the country.

Indirect and National Impacts. Impacts on the CAAP industry are known as direct effects. Impacts due to lost CAAP output and employment in sectors that directly support the CAAP industry are known as indirect effects. Induced effects are overall changes in household and business spending due to direct and indirect effects. The U.S. Department of Commerce's Bureau of Economic Analysis (BEA) tracks these effects both nationally and regionally in large ''input-output'' tables, published as the Regional Input-Output Modeling System (RIMS II) multipliers (DCN 20386). EPA used the multipliers for the RIMS II industry number 1.0302 (miscellaneous livestock) because it includes all of SIC code 0273. EPA used national final demand multipliers for output (3.7163) and employment (45.2228) because they include direct, indirect, and induced effects. For example, for every $1 million in output lost due to the projected closure of a CAAP facility, nearly $3.8 million in output and 45 jobs are lost nationwide. When a facility is projected to fail as a result of the rule, EPA may estimate the loss in output associated with facility closure and then use the RIMS II multipliers to estimate national level impacts.

Impact on Financial Health. EPA will calculate impacts on financial health at the company level using USDA's four-state categorization of financial health based on a combination of net cash income and debt/asset ratio (*i.e.*, favorable, marginal solvency, marginal income, and vulnerable). EPA calculates the financial state of each company before and after incremental pollution control costs. EPA considers any change in categorization an impact of the rule.

Impact on Borrowing Capacity (''Credit Test''). Commenters suggested that impacts on borrowing capacity should be considered. Based on several measures used by USDA, EPA developed a method to examine whether a bank would lend a farm/company the amount needed to cover the costs of incremental pollution control. According to the USDA, ''Lenders generally require that no more than 80 percent of a loan applicant's available income be used for repayment of principle and interest on loans'' (DCN 20395, p. 19). EPA considered the income available for debt coverage as after-tax cash flow for 2001 for the farm or company (typically, the worst year represented in the questionnaire data). For sole proprietors, EPA collected data for aquatic animal production from Schedule F or Schedule C from the IRS tax forms submitted with a proprietor's Form 1040. EPA intentionally did not request information from the proprietor's Form 1040 (the Agency specifically excluded the collection of off-farm income data). We multiplied the after-tax cash flow by 80 percent to obtain a proxy for USDA's ''maximum feasible loan payment'' (MFLP). We then calculated the ratio of the pre-tax annualized cost of an option and the after-tax MFLP. We assumed that a bank would compare the pre-tax cost to the

MFLP to be conservative. To be more conservative, EPA identified any company with a ratio exceeding 80 percent of MFLP being impacted under this test (*i.e.*, the test threshold is actually 64 percent of the after-tax cash flow).

ii. *Economic Topics Raised in Comments to the Proposed Rule.* Commenters raised several issues about assumptions for closure analysis including (1) the definition of what constitutes earnings for the discounted cash flow analysis (including questions about how to incorporate depreciation, cash flow, net income, sunk costs, capital replacement, and unpaid labor), (2) forecasting methods used to project earnings, and (3) assumptions EPA makes to address trade impacts.

Cash Flow. In projecting closures, EPA estimated earnings using (1) cash flow and (2) net income. We calculated the difference between gross revenues and total expenses reported in the detailed questionnaire and reduced the value by the estimated federal and State taxes to calculate net income. We then added the non-cash expense of depreciation (when it was reported in the questionnaire) to net income to calculate cash flow. The difference between cash flow and net income is, therefore, depreciation, consistent with the guidance from the Farm Financial Standards Council (FFSC; *Financial Guidelines for Agricultural Producers,* DCN 20095) and several business financial references (DCNs, 20378, 20382, and 20388).

Some commenters were concerned about using cash flow analysis because of how earnings are calculated, the extent of the fixed costs, and, in older facilities, sunk costs. These comments are covered in the following discussions of: (1) Depreciation, (2) sunk costs, (3) capital replacement, and (4) unpaid family labor and management.

Depreciation. Depreciation is an annual allowance for the exhaustion, wear, and tear of a firm's fixed assets. Depreciation reflects a previous expenditure for a fixed asset to which the entity makes no payments in the current period. Although depreciation theoretically reflects wear and tear spread out evenly over the useful life of an asset, depreciation (as calculated for tax purposes) does not. First, the recovery period for costs is shorter than the asset lifetime and, second, accelerated recovery factors are skewed to the initial years of useful life. EPA identified information (*e.g.*, Financial Accounting Standards Board, DCN 20382, DCN 20378, DCN 20388) suggesting that cash flow may be appropriate for some types of economic analyses. EPA seeks comment on the appropriateness of cash flow and net income analyses as they apply to this rulemaking. Because depreciation reported on an accounting statement may or may not correspond to true ''economic'' depreciation, EPA estimated closure impacts with depreciation as an expense (*i.e.*, net income analysis) and without depreciation (*i.e.*, cash flow).

Sunk costs. Some commenters argued that the analysis should consider sunk costs. Comments characterized cash flow analysis as inappropriate because it does not account for sunk costs, particularly in older facilities. Sunk costs paid out of capital (as opposed to financing) already occurred and, therefore, are not incremental cash flows. They should not affect future investment or the economic viability of the firm. Therefore, EPA excludes this category of sunk costs from the closure analysis. Sunk costs that are financed have interest, and this interest is included in interest payments reported in the income statements. Unpaid principle from previously financed sunk costs is reflected in a farm's debt/asset ratio, and EPA will include it in our evaluation of farm financial health and the ability of facilities (or companies) to carry additional debt (*see* Section V.C.3.b.i).

Capital replacement. EPA received comments that the facility financial analysis should include an allowance for capital replacement. EPA evaluated data on capital expenditures and capital replacement. The Census Bureau collects data on annual capital expenditures including forestry, fishing, and agricultural services (U.S. Census Bureau, Annual Capital Expenditures Survey 1999, DCN 20384). However, Census Bureau capital expenditure data includes intra-company transfers of capital equipment and ownership changes (*see* DCN 20384, Appendix D–10, Instructions, Definitions, and Codes List).

As a consequence, it is difficult to know whether capital expenditures help maintain existing production or whether they support expanded production. Capital expenditures for an industry undergoing consolidation, such as salmon, include acquisitions reflecting transfers of capital rather than purchases of new or replacement capital. Further, the Census data includes expansion in productive capacity, whether in new plants or in existing plants. Aggregate industry data on capital expenditures cannot be used to specify the level of capital expenditure that is necessary to maintain productive capacity at an individual facility.

EPA includes costs for capital replacement as they occur within the depreciation and interest payments reported on income statement. When EPA relies on net income calculations, capital replacement costs (as approximated by financial depreciation, in addition to interest payments captured in cash flow) are considered in the closure analysis. Capital replacement costs that are capitalized and not expensed are reflected in the asset, debt, and equity components of the balance sheet as appropriate. Past capital replacement costs are represented in the farm financial health measures and credit tests that are based on balance sheet data. When estimating compliance costs, EPA includes replacement costs for pollution control capital. EPA's cost estimates include all capital expenditures (whether initial or replacement) that are projected to occur within the 10-year analytical time frame.

Unpaid family labor and management. EPA received suggestions that the financial analysis of aquatic animal production should include a ''proxy'' cost to reflect unpaid family labor and management. Unpaid family labor and management is ''unpaid'' only with respect to the income statement. Distributions from the business to cover family living and other personal expenses are generally referred to as ''family living withdrawals'' or ''owner withdrawals.'' These withdrawals are shown in the statement of owner equity in the balance sheet and not the income statement. As a consequence, the financial health and credit tests incorporate any withdrawals from equity for unpaid labor and management, because these tests are based on balance sheet data. Note that EPA includes estimates for labor costs when estimating compliance costs in order to include the effects of the additional labor and management in closure analysis. EPA also includes unpaid labor and management as lost jobs in the total count of lost employment from facilities projected to close as a result of the rule.

EPA reviewed USDA Economic Research Service data on off-farm income by farm category (USDA, 2003. Economic Research Service. Agriculture Income and Finance Outlook. AIS–80. March, DCN 20396). USDA data indicate that farm operation's contribution to total household income ranges from a substantial amount for ''Very Large Farms'' to a negative contribution that is subsidized by off-farm income for limited resource and

''small low-sales farms.'' These data indicate that it is possible for labor to earn a zero or negative return in the short run. EPA recognizes that, under standard economic theory, an enterprise in which labor is earning no return, either as wages or profit, is unlikely to be viable in the long run. The Farm Financial Standards Council also discusses the issue of unpaid labor (DNC 20095, pp. II–3 and II–22). EPA does not estimate a charge for unpaid labor when calculating farm income under discounted cash flow or net income analysis for this NODA. However, EPA seeks comment on whether it should impute a cost for unpaid labor and management in the closure analysis and, if so, on what data and methods the wage should be based.

c. Revisions to Economic Analyses for Non-commercial Facilities. EPA uses a methodology for non-commercial facilities where pre-tax annualized costs are compared with the operating budgets for Federal, State, Tribal (owned and operated by Tribal governments), and research facilities. For Alaskan non-profit facilities, EPA compares pre-tax annualized costs to reported salmon revenues. EPA is also considering calculations, such as the increased need for taxes or fees to cover the additional costs, that can be made as detailed questionnaire data permit. EPA seeks comment on methodologies for investigating impacts on non-commercial operations, including methods for characterizing the implications or consequences of percent reductions in facility budgets.

D. Revisions to Assumptions and Methodology Used in Benefits Analyses

The proposal established limits for total suspended solids (TSS) loads from flow-through and recirculating systems and required practices to minimize accumulation of excess feed from net pen systems. These requirements, according to EPA loadings calculations, would reduce facility discharges of TSS, total nitrogen (TN), total phosphorus (TP), and biochemical oxygen demand (BOD). The proposal also required facility operators to minimize releases of non-native species, pathogens, and therapeutants. At proposal, EPA did not quantify baseline or regulated loads for these latter parameters.

Reductions in these loadings (TSS, TN, TP, BOD, non-native species, pathogens, and therapeutants) could affect water quality, the uses supported by varying levels of water quality, and other aquatic environmental variables (*e.g.*, primary production and populations or assemblages of native organisms in the receiving waters of regulated facilities). EPA discussed several of these possible responses to loading reductions qualitatively at proposal. The proposal also estimated the monetized benefits based on changes in the recreational use value of freshwater streams affected by the rule.

EPA anticipates that its overall approach for characterizing benefits for the final rule will be similar to that used for the proposed rule. The proposal approach involved three efforts. First, EPA developed an estimate of national monetized benefits of the rule. We derived the monetized benefit estimate by applying (1) the QUAL2E (a water quality model) to a range of model facilities and receiving water conditions and (2) an economic monetization method that related water quality improvements to monetized benefits. Second, EPA discussed the possible impacts from rule-related reductions in BOD, TN, TP, and TSS loads on stream water quality relative to national water quality criteria. This discussion was primarily qualitative. Third, EPA included qualitative discussions of possible benefits of the rule that could not be quantified. Examples of such possible benefits include those that might arise from reductions in releases of non-native species or reductions in inadvertent spills of drugs and chemicals used at CAAP facilities. Again, these were qualitative discussions only, and EPA neither quantified nor monetized these possible benefit areas. While we expect to retain this overall approach, the Agency may revise inputs, methods, or information in each of these areas. Sections V.D.1–V.D.3 discuss these improvements further.

EPA's analysis of possible benefits of the final rule will address public comments about the proposal benefits analysis. We received some comments addressing the Agency's water quality-based monetized benefit estimate. One commenter criticized EPA's monetized benefit estimate as insufficiently reflecting the value of water quality. Other commenters asserted that EPA overestimated environmental benefits of the regulation. One of these commenters argued that EPA's use of frequency factors led to overestimation of benefits. Another commenter questioned whether EPA should extrapolate estimates of freshwater benefits for reductions in pollutant discharges to Alaska facilities that are discharging to marine environments. This commenter also asserted that, in many nutrient-poor streams where salmonid fish are found, hatchery-related nutrients lead to improved downstream fishing, and that a rule-related reduction in these nutrient inputs should be subtracted from EPA's benefits estimate.

In addition to comments on EPA's monetized benefit estimate, EPA received some comments on whether and how to characterize benefits from rule-related reductions in discharges of non-native species, pathogens, antibiotics or other therapeutants, and other chemicals. One commenter argued that it is extremely complex and controversial to make statements about benefits as a result of controlling non-native species, pathogens, antibiotics, or chemical releases is extremely complex and controversial.

1. Revisions to Monetized Benefits Estimate

At proposal, EPA used an approach for estimating national benefits from rule-related improvements in water quality that relied on (1) simulating improvements in downstream water quality parameters for model facilities, and (2) applying a monetization method that related changes in water quality to ''willingness to pay'' (WTP) values for water quality improvements. For the monetization method, we combined four simulated water quality parameters to generate a water quality index (WQI–4). The parameters were dissolved oxygen (DO), biochemical oxygen demand (BOD), total suspended solids (TSS), and fecal coliform (FC). Because we do not expect loadings for FC to be discharged from CAAP facilities, we assumed that background levels of this parameter remain unchanged. The WQI is a 0–100 scale that weighs each water quality parameter to reflect its significance for determining the suitability of water for progressively more demanding uses. We converted changes in the WQI–4 to monetary values based on a contingent valuation survey (Carson and Mitchell, 1993, DCN 20157).

At proposal, data were not available for site-specific estimates of water quality responses to reduced pollutant loadings. Neither were they available for facility-specific estimates of pollutant loadings and loading reductions nor individual facility locations for all potentially regulated facilities. Therefore, to simulate possible ranges in downstream water quality improvements for regulated facilities, we used estimates of pollutant loadings and loading reductions for representative (''model'') facilities and a hypothetical receiving water with a wide range of assumed background water quality and flow conditions. We used the Enhanced Stream Water Quality (QUAL2E) model to perform these simulations. We then applied the

monetization method described above to calculate WTP values for the simulated water quality improvements for each model facility. Finally, we estimated and summed WTP values for other potentially regulated facilities of that model facility type to produce a national benefit estimate. (For more details of the methodology, see DCN 20141).

We expect to apply a similar water quality modeling and monetization approach for estimating water quality-related benefits. However, we expect that the final methodology will address certain limitations that we did not recognize at proposal. We will take advantage of refined estimates of facility loads. That is, we will improve the water quality-related benefits analysis using:

- Significantly improved facility-specific loadings estimates based on new data from the detailed surveys and new information on feed conversion ratios (FCRs). These improved loadings estimates help us evaluate contributions of specific facilities to improved water quality (*see* Section V.B).
- Site-specific water quality simulations using new information from the survey on the geographical distribution of facilities. EPA intends to use specific facility receiving water simulations when data are available, and model receiving water conditions when data are unavailable, for an individual site.
- A more refined method for selecting a subset of QUAL2E application sites from which we can develop a national benefits estimate. Sites will be selected based on the availability of data (*e.g.*, water quality and discharge data) for model calibration. The sites should represent geographic regions and environmental conditions where most of the facilities are located. We expect to select between five to ten QUAL2E application sites.
- An improved method for calculating the WQI that better reflects water quality changes associated with CAAP discharges. The WQI that EPA used previously included four water quality parameters (WQI–4). EPA more recently developed a six-parameter WQI (''WQI–6'') based on TSS, BOD, DO, FC, plus nitrate (NO_3) and phosphate (PO_4). The new index more completely reflects the type of water quality changes that will result from loading reductions for TSS, total nitrogen (TN), total phosphorus (TP), and BOD. We may present results from both the WQI–4 and WQI–6 indices in the final benefits analysis for the CAAP rule.
- An improved method for monetizing water quality benefits. We based the water quality benefits monetization method we used for the proposed rule on results from a stated-preference survey conducted by Carson and Mitchell (1993) (DCN 20157). We divided household willingness-to-pay (WTP) values for changes in recreational water ''use classes'' by the number of WQI–4 points in each use class. We assigned a portion of the value for each unit change to achieving the whole step. Recently, EPA developed an alternative approach, also based on Mitchell and Carson's work. The authors also expressed their results as an equation relating a household's WTP for improved water quality to the change in the water quality index and household income. An important feature of this approach is that it is less sensitive to the baseline use of the water body. This approach is also consistent with economic theory in that it exhibits a declining marginal WTP for water quality. (See more information on this approach in DCNS 40138 and 40595.) Caution must be used in manipulating valuations derived from stated preference surveys, but this valuation function approach helps address some concerns about earlier applications of the water quality benefits monetization method. (See DCN 40595 for a more detailed discussion.)

2. Other Revisions to Benefits Analysis About Reductions in BOD, TN, TP, and TSS Loads

At proposal, EPA examined additional ways of characterizing environmental benefits from rule-related reductions in BOD, TN, TP, and TSS loads using the same QUAL2E modeling results from the proposal monetized benefits estimate. Specifically, we compared water quality in receiving streams simulated by QUAL2E modeling with national water quality criteria for DO, ammonia, TN, and TP. EPA discussed this comparison in light of the possibility for rule-related reductions in exceedences of these criteria. We did not monetize the results of that evaluation. They were intended to illustrate an alternate indicator of possible rule-related changes in water quality (Section 10.5.1., DCN 20141).

For the final benefits analysis, EPA may update this evaluation in several ways. First, we expect to use the improved site-specific water quality modeling results described in Section V.D.1. for the comparison with national water quality criteria. We are also evaluating the possibility of using an aquatic ecosystem model to further translate load reductions and water quality changes at a subset of facilities into other ecosystem changes (*e.g.,* effects on benthic fauna, fish populations, and other ecosystem variables). The model, AQUATOX (*http://www.epa.gov/waterscience/models/aquatox/),* represents stream, river, lake, reservoir, and pond ecosystems by modeling:

- Periphyton.
- Moss.
- Macrophytes.
- Major guilds and taxonomic groups of invertebrates and fish, as well as phytoplankton.

The model can also simulate constant or time-varying discharges of BOD, nutrients, and TSS like those that might be discharged by a CAAP facility. Finally, we expect to update our discussions of research literature that describes water quality impacts. We will consider literature that we have compiled since the proposal as well as information from stakeholder comments (see Sections II.E and III.E). As at proposal, the purpose of these analyses is to provide supplemental information of possible rule-related benefits to receiving waters.

3. Other Revisions to Benefits Analysis

EPA concurs with one commenter's assertion that determining benefits of non-native species, pathogens, antibiotics, or chemical releases from facilities is complex and controversial. Ideally, an analysis of benefits from mandated reductions in such discharges would draw from an understanding of environmental impacts from each discharge; quantitative estimates of both baseline discharges and reductions in discharges under any regulatory regime; and the relationship between changes in discharges and environmental response. In some cases, economic valuation techniques can then be applied to monetize the environmental responses. In the case of water quality improvements due to reductions in TSS, BOD, and nutrients from flow-through and recirculating systems, this information is available for estimates of quantitative and monetized benefits of the rule.

In most other cases, EPA will not estimate monetized or even quantitative benefits. Rather, we will discuss qualitative benefit areas including:

- Possible benefits from reducing escapes of non-native species, recognizing existing State and other requirements for escapes and mitigation (see Section II.E.3), and
- Possible benefits from reducing inadvertent releases of applied chemicals (including therapeutic substances) from CAAP facilities (see Sections II.E.2 and III.C).

VI. Revised Estimates of Costs and Economic Impacts

EPA revised estimates of costs and economic impacts based on the detailed survey results, comments, information from States, and methodological changes (*see* Section V). In the tables presented in Section VI, the options labeled ''Option 1'', ''Option 2'', and ''Option 3'' correspond to the options presented in the proposal, but the revised costs are based on detailed questionnaire data and other factors. EPA also considered two additional sets of requirements listed as ''Option A'' and ''Option B'' in the economic analysis. These analyses incorporate costs and loadings that reflect assumptions for feed conversion ratios (FCR) and production for those facilities that did not report these in the detailed questionnaire (*see* Section V.A.2). For cost annualization and the closure analysis, we used a 7 percent discount rate. Results are in 2001 dollars. Additional details about costs and impacts are provided in the record (DCN 20446). EPA will consider these revised results for all options in its decisions for the final rule.

Table VI.1 summarizes the types of public and private organizations that operate facilities represented in the national population of in scope facilities (*i.e.*, after applying the survey weights). Facilities that might incur costs include all facilities in the proposed subcategories that are large enough to meet the current CAAP definition. At proposal, EPA proposed to exclude facilities with less than 100,000 pounds of annual production; however, for information purposes, we included these facilities in the Tables in this Section. At proposal, EPA indicated that it would continue to analyze the costs and impacts associated with including such facilities (meeting the CAAP definition) within the scope of the rule. Facilities listed in the tables as not incurring costs would still be within the scope of the rule if they exceed the final production thresholds; however, EPA does not expect that these facilities would have to do anything more to meet the requirements of the regulation.

TABLE VI.1.—ESTIMATED NUMBER AND TYPE OF ORGANIZATIONS

Organization	Estimated number of facilities		
	Would incur costs	Would not incur costs	Total
Commercial	181	15	196
Academic/Research	1	0	1
Government	302	1	303
Tribal	14	0	14
Alaska Non-profits	7	0	7
Total	506	16	522

Note: We calculated the national estimates with survey weights and rounded them to whole numbers in each cell. Numbers may, therefore, not sum due to rounding.

Table VI.2 provides more detailed information on the facilities estimated to incur costs under the rule. There are 141 unweighted facilities (questionnaire respondents) that correspond to a national estimate of 506 facilities (*see* Section II.D). Table VI.2 further differentiates facilities by production system, size (in terms of lbs/yr production), owner, and the number of facilities that are projected to be baseline closures (assuming cash flow analysis), before we include compliance costs (*see* Section V.C.3.b.i). Table VI.2 also shows the number of facilities we used to derive cost and facility closure results, assuming discounted cash flow analysis. EPA proposed different requirements for the size of facilities. You will find the proposed option for each category in the right-hand column in Table VI.2.

TABLE VI.2.—NUMBER AND TYPE OF FACILITIES

Production system	Size (lbs/yr)	Owner	Estimated number of facilities					Options at proposal
			Potentially in scope	Incur costs	Baseline closures [1]	In cost totals [2]	In closure analysis [3]	
Flow-Through	20,000 to 100,000 [4]	Commercial	75	75	25	50	45	
		Non-commercial	135	135	0	135	NA	
		Alaska Non-profit	7	7	0	7	NA	
	100,000 to 475,000	Commercial	62	62	8	54	54	Option 1.
		Non-commercial	121	121	0	121	NA	Option 1.
	475,000+	Commercial	26	26	15	11	11	Option 3.
		Non-commercial	46	46	0	46	NA	Option 3.
Recirculating	20,000 to 100,000 [4]	Commercial [4]	6	6	n.d.	n.d.	n.d.	
		Non-commercial	n.d.	n.d.	n.d.	n.d.	n.d.	
	100,000 to 475,000	Commercial	7	7	1	6	6	Option 3.
	475,000+	Commercial	n.d.	n.d.	n.d.	n.d.	n.d.	Option 3.
		Non-commercial	n.d.	n.d.	n.d.	n.d.	n.d.	Option 3.
Mixed Flow-Through Recirculating.	20,000 to 100,000	Non-commercial	11	11	0	11	NA	
Net Pen	20,000 to 100,000	Non-commercial	1	0	0	n.d.	NA	
	100,000 to 475,000	Commercial	n.d.	n.d.	n.d.	n.d.	n.d.	Option 3
	475,000+	Commercial	15	0	0	0	0	Option 3

TABLE VI.2.—NUMBER AND TYPE OF FACILITIES—Continued

Production system	Size (lbs/yr)	Owner	Estimated number of facilities					Options at proposal
			Potentially in scope	Incur costs	Baseline closures [1]	In cost totals [2]	In closure analysis [3]	
Total			522	506	59	452	447	

n.d. Not disclosed for reasons of confidentiality.
NA not applicable.
[1] Numbers of commercial facilities that are projected baseline closures assuming cash flow analysis. Section VI.B.1.a discusses baseline closures using net income.
[2] Facilities used to derive values in Table VI.A.1. Excludes baseline closures (based on cash flow analysis) which we assume will close before promulgation and, thus, incur no costs under the rule.
[3] Facilities used to derive values in Table VI.B.1. Excludes baseline closures (based on cash flow analysis), start-ups, and other facilities where we did not have enough information to conduct closure analysis.
[4] Facilities with less than 100,000 pounds annual production were not within the scope of the proposed rule.

Table VI.3 breaks out the estimated 181 commercial facilities with costs by financial organization. Slightly over half (55 percent) of the commercial facilities are organized as corporations. C and S corporations are named after the Subchapters in the IRS code under which they are organized and are taxed in different ways. C corporation earnings are taxed at the corporate rate. S corporation earnings are paid to individuals, who then pay taxes at the personal rate on those earnings.

TABLE VI.3.—COMMERCIAL FACILITIES WITH COSTS BY FINANCIAL ORGANIZATION

Financial organization	Estimated number of facilities
C Corporation	42
S Corporation	58
Sole Proprietorship	49
Limited Partnership	24
General Partnership	5
Other	5
Total	181

Note: Numbers do not sum due to rounding.

A. National Cost Estimates

Table VI.A.1 summarizes the cost of the rule by subcategory. We estimated national costs on the number of facilities we expect to incur compliance costs if they exceed the production threshold in the final rule. We assume that possible compliance costs will occur in all facilities that are not baseline closures. This includes some facilities for which EPA could not make baseline closure determinations (*e.g.*, start-up operations, facilities with insufficient data) that we excluded from the closure analysis. The number of baseline closures increases under net income analysis, implying that national costs decrease when we use net income analysis (*see* Table VI.B.2). Table VI.2 indicates that non-commercial flow-through facilities make up about two-thirds of the facilities projected to incur costs. They incur about 80 to 83 percent of the total cost for each option.

TABLE VI.A.1.—NATIONAL COSTS—TOTAL BY SUBCATEGORY AND OPTION [1]

Production system [2]	Owner	Pre-tax annualized costs [4] (thousands, 2001 dollars)				
		Option A	Option B	Option 1	Option 2	Option 3
Flow-through	Commercial 20–100K production	$45	$50	$22	$50	$89
	Commercial 100–475K production	151	371	315	362	779
	Commercial >475K production	17	17	7	17	53
	Non-commercial	1,351	2,796	2,528	2,794	5,612
	Alaska Non-profit	141	172	165	176	188
Recirculating	Commercial [3]	8	8	3	8	8
	Non-commercial	18	55	44	60	81
	Alaska Non-profit	0	0	0	0	0
Net Pen	Commercial	0	0	0	0	0
	Non-commercial	0	0	0	0	0
	Alaska Non-profit	0	0	0	0	0
Total	Pre-Tax	1,731	3,469	3,084	3,466	6,809
	Post-Tax	1,693	3,375	3,004	3,372	6,695

[1] Does not include costs for facilities projected to close before implementation of the rule, where baseline closures are determined using cash flow. Number of baseline closures increases if net income is used, implying decreased costs.
[2] Costs for facilities that use both flow-through and recirculating technologies were divided according to production and placed in the appropriate category. For example, for a facility that splits production equally between flow-through and recirculating, we would split costs equally and add to flow-through and recirculating costs.
[3] All costs for the recirculating commercial category in the table are incurred by facilities producing between 20,000 and 475,000 lbs. Due to the small number of facilities (*i.e.*, confidentiality) in the recirculating category, costs are not presented by size.
[4] Cost equaling zero ($0) in the table indicate that facilities already meet the requirements of the option. Zero cost does not imply that facilities are exempt.

Note: Numbers do not sum due to rounding.

Due to differences in option requirements for the various subcategories, as well as differences in facility counts between the proposed rule and this notice, it is difficult to compare costs in Table VI.A.1 directly to costs for the proposal (67 FR 57908). As a consequence, Table VI.A.2 facilitates comparisons between costs at proposal and costs summarized in this notice.

TABLE VI.A.2.—COMPARISON OF COSTS—PROPOSAL AND NOTICE OF DATA AVAILABILITY (NODA)

Production system	Total pre-tax annual costs (2001$)	
	Proposal	NODA
Flow-through	$1,032,942	$2,076,456
Recirculating	46,354	5,409
Net Pens	35,322	0

Note: Proposal costs, taken from Table IX.G.1 (67 FR 57908) of the preamble from the proposed rule, were inflated to 2001 dollars. For closest comparison to proposal results, NODA results in this table do not include costs for facilities that produce 20,000 to 100,000 lbs/year. We assume Option 1 for flow-through facilities in the size category 100,000 to 475,000 lbs/yr, and we assume Option 3 for all other flow-through and recirculating facilities.

B. Economic Analysis

Sections VI.B.1 and VI.B.2 provide details about the impact analysis for commercial and non-commercial facilities.

1. Economic Results for Commercial Facilities

EPA projects economic impacts based on two procedures for estimating earnings: (1) cash flow analysis and (2) net income analysis. Table VI.B.1 summarizes the economic impacts for commercial facilities based on cash flow analysis, and Table VI.B.2 summarizes results based on net income analysis. All impacts fall on flow-through systems: no impacts fall on recirculating or net pen systems. No impacts fall on facilities with flow-through systems that produce more than 475,000 lbs per year.

TABLE VI.B.1.—IMPACTS FOR COMMERCIAL FLOW-THROUGH FACILITIES (CASH FLOW BASIS) [1]

Analysis level [2]	Impact	Size (1,000 lbs/yr)	Number of entities in analysis [3]	Option				
				A	B	1	2	3
Facility	Closure	100–475	54	5	5	5	5	11
	Direct Employment Loss (lost jobs).	100–475	54	5	5	5	5	24
	Increase in County Unemployment Rate (%).	100–475	54	<0.2	<0.2	<0.2	<0.2	<1
	National Employment Loss	100–475	54	20	20	20	20	90
	National Loss in Output ($ millions).	100–475	54	$1.6	$1.6	$1.6	$1.6	$7.4
	Sales test: >1 percent	20–100	50	15	15	5	15	25
		100–475	54	13	23	21	23	29
	Sales test: >3 percent	20–100	50	10	10	0	10	10
		100–475	54	5	11	11	11	16
Company	Closure		32	1	1	1	1	2
	Farm Financial Health [4]		43	1A	1A	1A	1A	1A 1B
	Credit Test		32	1	1	1	1	2

[1] All impacts fall on flow-through systems; recirculating or net pen systems display no impacts. In addition, facilities with flow-through systems that produce more than 475,000 lbs per year display no impacts.

[2] Rows are shown only when there are impacts. The 20,000 to 100,000 size category shows impacts only under the 1 percent and 3 percent sales test. No impacts at enterprise level or for 475,000 lb/yr or more size category (see DCN 20446 for details); no closure analysis at the enterprise level was conducted for facilities that are projected to close.

[3] Number of entities projected to incur compliance costs and are not baseline closures, assuming cash flow analysis, and for which enough data were available. For closure analysis, this is the number of weighted facilities or the unweighted number of companies. The statistical procedure used to draw the sample and develop the facility survey weights do not allow us to make inferences about company characteristics at the national level. Of the facilities projected to incur costs in this NODA, more than 90 percent are single facility companies.

[4] 1A: one company shifts from marginal solvency to vulnerable.
1B: one company shifts from favorable to vulnerable.

TABLE VI.B.2.—IMPACTS FOR COMMERCIAL FACILITIES (NET INCOME BASIS) [1]

Analysis level [2]	Impact	Size (1,000 lbs/yr)	Number of entities in analysis [3]	Option				
				A	B	1	2	3
Facility	Closure	20–100	45	5	5	0	5	5 [6]
		100–475	50	5	5	5	5	11
	Direct Employment Loss (lost jobs).	20–100	45	14	14	0	14	14
		100–475	50	5	5	5	5	24

TABLE VI.B.2.—IMPACTS FOR COMMERCIAL FACILITIES (NET INCOME BASIS) [1]—Continued

Analysis level [2]	Impact	Size (1,000 lbs/yr)	Number of entities in analysis [3]	Option				
				A	B	1	2	3
.....	Increase in County Unemployment Rate (%).	20–100	45	<0.1	<0.1	0	<0.1	<0.1
		100–475	50	<0.2	<0.2	<0.2	<0.2	<1
	National Employment Loss	20–100	45	26	26	0	26	26
		100–475	50	20	20	20	20	90
	National Loss in Output ($ millions).	20–100	45	$2.1	$2.1	$0.0	$2.1	$2.1
		100–475	50	$1.6	$1.6	$1.6	$1.6	$7.4
	Sales test: >1 percent	20–100	50	15	15	5	15	25
		100–475	54	13	23	21	23	29
	Sales test: >3 percent	20–100	50	10	10	0	10	10
		100–475	54	5	11	11	11	16
Company [5]	Closure		26	2	2	1	2	3
	Farm Financial Health [4]		.....	2A	2A	2A	2A	2A
			43					1B

[1] All impacts fall on flow-through systems; recirculating or net pen systems display no impacts. In addition, facilities with flow-through systems that produce more than 475,000 lbs per year display no impacts.

[2] Rows are shown only when there are impacts. No impacts at enterprise level, recirculating, or net pen systems, or for flow-through facilities in the 475,000 lb/yr or more size category; we did not conduct closure analysis at the enterprise level for facilities that are projected to close.

[3] Number of entities projected to incur costs and are not baseline closures, assuming net income analysis, and for which enough data were available. For the closure analysis, this is the weighted number of facilities or the unweighted number of companies. The statistical procedures we used to draw the sample and develop the facility survey weights do not support inferences on a national level about company characteristics. Of the facilities projected to incur costs in this NODA, more than 90 percent are single facility companies.

[4] 2A: two companies shift from marginal solvency to vulnerable. 1B: one company shifts from favorable to vulnerable.

[5] Credit test not performed on net income basis because USDA methodology specifies maximum feasible loan payment (MFLP) be calculated from borrower's cash flow, without deducting depreciation.

[6] Due to rounding of survey weights, the total number of facilities (20,000 to 475,000 size categories) projected to close under Option 3 is 15, not 16.

a. Closure Analysis Results. For commercial facilities, EPA examined the possibility of closure on several levels: enterprise, facility, and company. Sixteen respondents to the detailed survey supplied enterprise level financial information in Question C9 of the detailed survey. EPA based the facility closure analysis on the facility financial data supplied in Question C.6 of the detailed survey. The company level analysis differs from the facility analysis in that it reflects costs for all aquatic animal production facilities owned by the company. To identify all sites belonging to each company, we compiled a list of companies from the costed facilities (45 companies) and examined the screener survey data and responses to Question 2. Where EPA did not have detailed survey data for a particular facility, we assigned the average cost for the other facilities owned by that company.

Section V.C.3.b describes the forecasting methods and closure methodology. The analysis predicts that about one-third of the facilities (*e.g.*, 64 of 181 commercial facilities) fall into the closure category under baseline conditions (*i.e.*, they show negative long-term earnings before the rule). This is consistent with comments indicating the industry has gone through difficult times in the recent past. We could analyze all sixteen enterprises for impacts (*i.e.*, none failed in the baseline). We did not conduct closure analysis at the enterprise level when the facility was projected to close. No impacts are estimated to occur at the enterprise level under any of the regulatory options. Thirteen of the 45 companies are projected as baseline failures.

Based on cash flow analysis, five flow-through facilities close as a result of the added costs under Options A, B, 1, and 2, (Table VI.B.1). We do not expect any other types of facilities to close under these options. The closures result in the direct loss of five jobs and an increase in the county unemployment rate of less than 0.2%. We estimate national impacts to be a loss of 20 jobs (includes the five jobs lost from facility closure) and $1.6 million in output (calculated with the Commerce Department, Bureau of Economic Analysis, Regional Input-Output Modeling System (RIMS II) final demand multipliers for the miscellaneous livestock industry (industry code 1.0302).

The analysis also shows that, under Option 3, eleven flow-through facilities close as a result of the added costs. We do not expect any other types of facilities to close under this option. These closures result in the direct loss of 24 jobs and an increase in the county unemployment rate of up to 1 percent, depending on the location. We estimate National level impacts to be a loss of 90 jobs and $7.4 million in output.

EPA also conducted a facility level closure analysis using net income rather than cash flow (Table VI.B.2). The difference between the two is depreciation, a non-cash charge theoretically representing the capital ''used up'' during operation. Cash flow is calculated as net income plus depreciation (see Section V.C.3.b for comparison of cash flow and net income). We predict 84 of the 181 facilities to be baseline closures before incurring incremental pollution control cost, representing 46% of the population. We estimate 35% of facilities to be baseline closures under the discounted cash flow analysis. The results are the same for Option 1 for net income analysis: five facilities are still projected to fail. A single unweighted facility represents the five facilities that fail under Option 1. This facility uses cash basis accounting and does not record depreciation as a cost. That is, the earnings estimate is the same for the cash flow and net income versions of the closure analysis. Under Options A, B, and 2, we project ten facilities to close (as opposed to five closures projected using discounted cash flow) with an associated loss of 19 jobs. The increase in the number of projected failures using net income is due to a

single unweighted facility failing the closure analysis. Under Option 3, we project that 15 facilities will close with an associated loss of 38 jobs. Using discounted cash flow analysis, we project that 11 facilities will close.

b. Financial Health Results. EPA uses the USDA farm financial health test (see Section V.C.3.b.i) that categorizes farms into four categories:

- Favorable (positive income and debt/asset ratio no more than 40 percent)
- Marginal income (negative income and debt/asset ratio no more than 40 percent)
- Marginal solvency (positive income and debt/asset ratio more than 40 percent)
- Vulnerable (negative income and debt/asset ratio more than 40 percent)

Two of the 45 companies did not supply complete balance sheet information in the detailed survey and were not analyzed using the farm financial health test. Under Options A, B, 1, and 2, one company shifts from marginal solvency to vulnerable. Baseline closures, based on the discounted cash flow and net income analyses, were not excluded from the financial health test. Under Option 3, a second company shifts from favorable to vulnerable under the cash flow analysis (Table VI.B.1). We conducted this analysis at the company level. Both companies that shift categories are small and produce between 100,000 and 475,000 lbs/yr. Financial health results under net income analysis (Table VI.B.2) are similar, except that two companies shift from ''marginal solvency'' to ''vulnerable'' instead of the one company under cash flow analysis.

c. Credit Test Results. EPA examined whether commercial companies would be unable to get credit for expenses associated with compliance (see Section V.C.3.b.i above), assuming cash flow analysis. We did not use the credit test under net income analysis as noted in Table VI.B.2. All 45 companies provided the data needed for the credit test. One company/facility fails the credit test under Options A, B, 1, and 2. Under Option 3, a second company fails the credit test. We also conducted this analysis at the company level. Both companies that fail the credit test are small and produce between 100,000 and 475,000 lbs/yr.

d. Sales or Revenue Test Results. The sales or revenue test is calculated on a facility basis. This test corresponds to the sales test performed at proposal but is calculated on the basis of detailed survey information for the facility. Impact results under the sales test, using cash flow analysis, are the same as sales test results using net income analysis. For the 20,000 to 100,000 lb/year category, five facilities ''fail'' the one percent sales test (*i.e.*, compliance costs that exceed one percent of sales) under Option 1 (see Table VI.B.2). Fifteen facilities fail under Options A, B, and 2, and 25 facilities fail under Option 3. For the 3 percent sales test for this size group, ten facilities ''fail'' (*i.e.*, compliance costs that exceed 3 percent of sales) under Options A, B, 2 and 3. No facilities fail under Option 1. For the 100,000 to 475,000 lb/year category, 13 facilities fail the 1 percent test under Option A, 21 facilities fail test under Option1, 23 facilities fail under Options B and 2, and 29 facilities fail under Option 3. For the 3 percent sales test for this size group, 5 facilities fail under Option A, 11 facilities fail under Options B, 1, and 2, and 16 fail under Option 3.

Due to differences in option requirements for the subcategories and differences in facility counts between the proposed rule and this NODA, it is difficult to compare sales test results in Table VI.B.1 with results in the proposed rule (67 FR 57906, Table IX.E.1). As a consequence, we present Table VI.B.3 to facilitate comparisons between proposal and NODA. The only test in both the proposal and NODA analyses is the 3 percent revenue test. Even this is not strictly comparable for non-commercial facilities because the denominator in the ratio changed from imputed revenues at proposal to operating budget for the NODA.

The threshold levels shown in Table VI.B.1 (*i.e.*, 1% and 3%) do not necessarily reflect the threshold levels that EPA will use to measure regulatory impacts for the final rule using a revenue test. For the Agency's final regulatory analysis, EPA anticipates using the same revenue test thresholds that were used to evaluate impacts for the proposed rule: greater than 3 percent, greater than 5 percent, and greater than 10 percent. EPA solicits comment on these thresholds.

TABLE VI.B.3.—COMPARISON OF 3% REVENUE TEST, NODA AND PROPOSAL RESULTS

Size	Facilities regulated	Facilities incurring costs greater than 3% of revenue or budget
Proposal:		
Commercial	78	25
Non-Commercial	57	0
NODA:		
Commercial	71	11
Non-Commercial	169	30

Notes: To allow for closest comparison to results at proposal, NODA results in this table do not include costs or loads for facilities that produce 20,000 to 100,000 lbs/year. We assume Option 1 for flow-through facilities in the size category 100,000 to 475,000 lbs/yr and Option 3 for all other flow-through and recirculating facilities. Alaska non-profit facilities that we previously thought produce greater than 100,000 pounds actually produce less than 100,000 pounds annually. They are, therefore, not included in the Table.

e. Sensitivity Analysis for Commercial Impacts. EPA estimated ranges of impacts (DCN 20430) based on minimum, mean, and maximum values for operating and maintenance (O&M) costs for Options B, 1, 2, and 3 (see Section V.A.2 for cost estimates and estimation procedures), assuming earnings based on cash flow analysis. There are no differences in impacts for commercial facilities between the minimum and mean O&M costs. Under maximum O&M costs, we project that another five facilities (weighted) will close under Options B, 2, and 3. Under the maximum O&M, weighted employment losses total 5 under Options A and 1, 22 under Options B and 2, and 40 under Option 3. There is no difference in the change in local unemployment rate among the minimum, mean, and maximum O&M costs.

EPA also examined other technology options, using activated carbon, for removing drugs. As part of sensitivity

analysis, EPA also examined the economic impacts for Options A, B, 2, and 3 with and without activated carbon costs (DCN 20443), assuming earnings based on cash flow analysis. These options include BMPs, but not treatment for drugs and chemicals. Activated carbon could be used to treat CAAP effluent for drugs. We estimated the costs for activated carbon treatment to analyze the impacts of requiring treatment as well. When we add activated carbon costs (costs for drug and chemical BMPs subtracted to avoid double-counting costs), direct employment losses are about four times higher, and company closure and financial health impacts are roughly double. About one in four companies would have difficulty raising the capital to meet the activated carbon costs (*e.g.*, six to nine companies fail the credit test with the activated carbon costs).

2. Economic Results for Non-commercial Facilities

The non-commercial category includes four types of facilities: Federal and State hatcheries, tribal operations, academic or research facilities, and Alaska non-profit organizations. We performed the economic analysis on 302 Federal and State facilities, 14 Tribal operations, one academic/research, and seven Alaska non-profits. These facilities are not operated commercially, and the types of tests used to examine impacts on commercial facilities are not applicable. Each group is slightly different, and we will discuss the economic tests performed on each group within each section.

a. Federal and State Facilities. For Federal and State facilities, EPA compared the pre-tax annualized costs to the 2001 operating budget (''budget test''). Table VI.B.4 summarizes the results by production system, test threshold, and size. Of the 302 Federal and State facilities, 39 have Option A costs that we project will exceed one percent of the budget (35 flow-through and four mixed flow-through and recirculating facilities). We project that 27 of these 39 facilities have costs that will exceed 3 percent of budget. For Option B, 120 have costs that we project will exceed one percent of the budget. We project that 75 of these 120 facilities have costs that will exceed three percent of budget. For Option 1, we project that 112 have costs that will exceed one percent of the budget. Fifty-nine of these 112 facilities have costs that we project will exceed three percent of budget. For Option 2, 123 have costs that we project will exceed one percent of the budget. We project that 71 of these 123 facilities have costs that will exceed three percent of budget. For Option 3, 223 (nearly three-fourths of the population) have costs that we project will exceed one percent of the budget. Of these 223 facilities, 108 have costs that we project will exceed three percent of budget.

The threshold levels shown in Table VI.B.4 (*i.e.*, 1% and 3%) do not necessarily reflect the threshold levels that EPA will use to measure regulatory impacts for the final rule using a budget test. For the Agency's final analysis, EPA anticipates using the same thresholds that are used to evaluate impacts a revenue test: greater than 3 percent, greater than 5 percent, and greater than 10 percent. EPA solicits comment on these threshold levels.

TABLE VI.B.4.—BUDGET TEST NON-COMMERCIAL FACILITIES

Production technology	Budget threshold	Size (1,000 lbs/yr)	Estimated number of facilities in analysis	Number of facilities estimated to exceed budget threshold by option [1]				
				A	B	1	2	3
Flow Through	1%	20–100	135	20	55	51	55	89
		100–475	121	15	49	46	49	88
		475+	46	0	8	11	11	39
	3%	20–100	135	16	40	32	40	48
		100–475	121	12	27	19	23	45
		475+	46	0	4	4	4	11
Recirculating	1%	20–100	n.d.	0	0	0	0	0
		475+	n.d.	0	0	0	0	0
	3%	20–100	n.d.	0	0	0	0	0
		475+	n.d.	0	0	0	0	0
Mixed	1%	20–100	11	4	8	4	8	8
	3%	20–100	11	0	4	4	4	4

n.d. not disclosed to protect confidentiality.
[1] Numbers in Table may not sum to numbers in text due to rounding

Part C of the detailed survey asked the respondent for the portion of the budget due from user fees, such as angler licenses, commercial fishing licenses, car vanity plates, and special purpose stamps. EPA examined the number of facilities that could pass through increased costs to the public by increasing user fees. Where user fees were already in place, we estimated the size of the increase they would need to cover the incremental costs (''User Fee'' analysis, see Section V.C.3.c) (see Table VI.B.5). Costs for thirty-nine facilities exceed one percent of the operating budget under Option A (20 flow-through facilities that produce between 20,000 and 100,000 lb/yr, 15 flow-through facilities that produce between 100,000 and 475,000 l/yr, and 4 mixed facilities producing between 20,000 and 100,000 lb/yr, shown in Table VI.B.4). Twenty-three of the 39 facilities do not have user fees. Of the remaining 16 facilities, eight can offset the increased costs by increasing user fees by less than five percent. The other eight facilities would need more than a five percent increase in user fees to offset the incremental costs incurred under Option A. Between 60 percent and 70 percent of the facilities that have costs that exceed one percent of budget do not have user fees through which to offset increased pollution control costs.

TABLE VI.B.5.—USER FEE ANALYSIS FOR NON-COMMERCIAL FACILITIES

User Fee Increase	Estimated number of facilities that have costs exceeding threshold							
	Percent of budget							
	1 Percent				3 Percent			
	All	20 to 100	100 to 475	475+	All	20 to 100	100 to 475	475+
Option A:								
All	39	23	15	0	27	16	12	0
No Fee [1]	23	12	12	0	23	12	12	0
>5 Percent [2]	8	8	0	0	4	4	0	0
<5 Percent [2]	8	4	4	0	0	0	0	0
Option B:								
All	120	63	49	8	75	44	27	4
No Fee [1]	76	34	34	8	50	27	19	4
>5 Percent [2]	28	20	8	0	24	16	8	0
<5 Percent [2]	16	9	7	0	1	1	0	0
Option 1:								
All	112	55	46	11	59	36	19	4
No Fee [1]	76	34	31	11	35	19	12	4
>5 Percent [2]	24	16	8	0	24	16	8	0
<5 Percent [2]	12	5	7	0	0	0	0	0
Option 2:								
All	123	63	49	11	71	44	23	4
No Fee [1]	80	34	34	11	46	27	15	4
>5 Percent [2]	28	20	8	0	24	16	8	0
<5 Percent [2]	16	9	7	0	1	1	0	0
Option 3:								
All	223	96	88	39	108	51	45	11
No Fee [1]	143	57	52	35	77	34	32	11
>5 Percent [2]	41	24	17	0	30	16	13	0
<5 Percent [2]	38	16	19	3	1	1	0	0

[1] Facilities that exceed threshold and do not rely on user fees.
[2] Facilities that must raise fees by more/less than 5% (>5%/<5%) to cover compliance costs.

b. Tribal Facilities. Tribal operations that returned detailed surveys are all owned and operated by the tribal government and operate on a non-commercial basis. EPA performed a budget test and determined that no Tribal facility incurs costs in excess of three percent of budget under any Option. Five of 14 facilities have costs that exceed one percent of their budgets under Option 3. No Tribal facility fails the one percent budget test under Options A, B, 1, and 2. For additional information about analyses for Tribal facilities, see DCN 20447.

c. Academic/Research Facilities. Of the academic/research facilities that returned a detailed survey, only one met the criteria of being a CAAP within the scope of the rule, and might incur costs under the rule. EPA performed the budget test and determined that the facility would not incur costs in excess of one percent of budget.

d. Alaska Non-profit Facilities. EPA analyzed the impact of possible costs on Alaska non-profit facilities by comparing the pre-tax annualized cost to reported salmon revenues. Alaska non-profits may harvest and market salmon that return to their release areas. We excluded grants, enhancement tax revenue, and income from miscellaneous sources such as visitor centers from the comparison. Fiscal Year 2000 had an unusually high salmon return (*i.e.*, large harvest). Therefore, we used Fiscal Year 2001 data from Alaska (2002, DCN 20074). For Option A, costs range from 0.97 to 1.8 percent of salmon revenues for 1998, 1999, and 2001 and 0.6 percent of salmon revenues for 2000. For Options B, 1, and 2, costs range from 1.2 to 2.3 percent of salmon revenues for 1998, 1999, and 2001 and 0.6 to 0.7 percent of salmon revenues for 2000. For Option 3, costs range from 1.3 to 2.4 percent of salmon revenues for 1998, 1999, and 2001 and 0.7 percent of salmon revenues for 2000.

e. Sensitivity Analysis for Non-commercial Facilities. EPA estimated ranges of impacts (DCN 20430) based on minimum, mean, and maximum value for operating and maintenance (O&M) costs (*see* Section V.A.2 for costing methods) for Options B, 1, 2, and 3. Table VI.B.6 summarizes the results for the sensitivity analysis for non-commercial facilities. For the one percent budget test, the impacts based on the mean values would not increase markedly if maximum O&M values were assumed. On the other hand, if evidence appears that the O&M costs resemble the minimum values, the impacts would drop by about half compared to impacts under mean O&M costs for Options B, 1, and 2. For the three percent budget test, the impacts associated with the maximum O&M costs are approximately three times higher than the impacts associated with minimum costs for Options B, 1, and 2. There is less than a two-fold spread for Option 3.

TABLE VI.B.6.—NUMBER OF NON-COMMERCIAL FACILITIES THAT HAVE COSTS EXCEEDING BUDGET THRESHOLDS

[O&M sensitivity analysis]

Budget test	O&M cost assumption	Option				
		A	B	1	2	3
1 Percent	Minimum	39	61	49	61	199
	Mean	39	120	112	123	223
	Maximum	39	134	126	134	223
3 Percent	Minimum	27	42	38	42	83
	Mean	27	75	59	71	108
	Maximum	27	112	112	112	134

EPA also examined alternative technology options for removing drugs, using activated carbon. As part of sensitivity analysis, EPA also examined the economic impacts for Options A, B, 2, and 3 with and without activated carbon costs (DCN 20443), assuming earnings based on cash flow analysis. Activated carbon could be used to treat CAAP effluent for drugs. These options include BMPs, but not treatment for drugs and chemicals. By estimating the costs for activated carbon treatment, EPA analyzed the impacts of requiring treatment as well. When activated carbon costs are added (costs for drug and chemical BMPs were subtracted to avoid double-counting costs), direct employment losses are about four times higher, and company closure and financial health impacts are roughly double. About one in four companies would have difficulty raising the capital needed to meet the activated carbon costs (*e.g.*, six to nine companies fail the credit test with the activated carbon costs).

C. Cost-effectiveness and Cost-reasonableness Analysis

EPA performed a revised nutrient cost-effectiveness (CE) and cost reasonableness (CR) analysis based on revised estimates of costs, loadings and removals (*see* Development Document for details). We do not expect benchmarks or thresholds for assessing CE/CR results to differ from those used in the proposed rule (that is, $4/lb for nitrogen, $10/lb for phosphorus cost-effectiveness and $0.73/lb for cost-reasonableness (*see* 68 FR 7249–7250 for discussion of benchmarks)). Option costs include costs for BMP components that address invasive species, drugs, and chemicals that have no effect on nutrients, BOD, or TSS. That is, cost-effectiveness and cost-reasonableness values are overstated.

1. Nutrient Cost-effectiveness Results

The tables in this section provide the nutrient cost-effectiveness values for nitrogen and phosphorus. Table VI.C.1 presents the results for nitrogen by production system, commercial and non-commercial sector, and option. For commercial flow-through facilities, the average cost-effectiveness for nitrogen is $24/lb for Option A and ranges from $11/lb to $14/lb for the other options. Incrementally, the effects of the different BMP requirements result in Options B, 1, and 2 having the same removals but different costs. The incremental calculations are based on the option with the lowest of the three costs (*e.g.*, Option 1) and ranges from $6/lb to $12/lb. Nutrient cost-effectiveness values are higher for non-commercial facilities. The average cost-effectiveness for nitrogen is $1,096/lb for Option A, and cost-effectiveness ranges from $30/lb to $49/lb for the other options. Again, we base the incremental calculations on the option with the lowest of the three costs with the same removals and ranges from $20/lb to $23/lb.

For commercial recirculating facilities, the table shows no average and incremental cost-effectiveness value for nitrogen because no nitrogen is removed. For non-commercial recirculating facilities, no nitrogen removals are seen for Option A. For the remaining options, average cost effectiveness ranges from $183/lb to $518/lb, and incremental cost-effectiveness ranges from $112/lb to $232/lb.

TABLE VI.C.1.—NUTRIENT COST-EFFECTIVENESS: NITROGEN

Subcategory, sector, and option	Pre-tax annualized costs ($2001)	Nitrogen removals (lb)	Cost-effectiveness ($2001/pound)	
			Average	Incremental
Commercial Flow-Through				
Option A	$213,030	8,970	$24	[1] $24
Option 1	344,350	30,998	11	6
Option 2	429,441	30,998	14	NA
Option B	438,443	30,998	14	NA
Option 3	920,663	79,960	12	12
Non-Commercial Flow-Through				
Option A	$1,492,671	1,362	$1,096	[1] $1,096
Option 1	2,692,963	60,203	45	20
Option B	2,968,001	60,203	49	NA
Option 2	2,969,498	60,203	49	NA
Option 3	5,799,459	194,534	30	23

TABLE VI.C.1.—NUTRIENT COST-EFFECTIVENESS: NITROGEN—Continued

Subcategory, sector, and option	Pre-tax annualized costs ($2001)	Nitrogen removals (lb)	Cost-effectiveness ($2001/pound)	
			Average	Incremental
Commercial Recirculating				
Option 1	$2,784	0	[2]	[2]
Option A	7,744	0	[2]	[2]
Option B	7,744	0	[2]	[2]
Option 2	7,744	0	[2]	[2]
Option 3	7,744	0	[2]	[2]
Non-Commercial Recirculating				
Option A	$17,594	0	[2]	[2]
Option 1	44,268	115	385	232
Option B	55,107	115	480	NA
Option 2	59,558	115	518	NA
Option 3	80,965	443	183	112

NA: The option higher costs, not related to nutrient removal, and equal removals compared to previous options.
[1] Option A is incremental to baseline, so the average and incremental values are the same.
[2] Undefined: Option costs are costs for BMP components that address invasive species, drugs, and chemicals that have no effect on nutrients, or facilities in these groups have adequate treatment to achieve requirements for pollutants in this table (*i.e.*, no incremental removals are estimated).

Table VI.C.2 presents the results for phosphorus by production system, commercial and non-commercial sector, and option. For commercial flow-through facilities, the average cost-effectiveness for phosphorus is $131/lb for Option A; the average cost-effectiveness ranges from $41/lb to $81/lb for the other options. Incrementally, the effects of the different BMP requirements result in Options B, 1, and 2 having the same removals but different costs. The incremental calculations are based on the option with the lowest of the three costs (*e.g.*, Option 1), and the incremental cost-effectiveness is estimated to be roughly $34/lb to $35/lb. Nutrient cost-effectiveness values are higher for non-commercial facilities. The average cost-effectiveness for phosphorus is $925/lb for Option A and ranges from $112/lb to $258/lb for the other options. Again, the incremental calculations are based on the option with the lowest of the three costs (*e.g.*, Option 1) with the same removals and ranges from $77/lb to $121/lb.

For commercial recirculating facilities, the average and incremental cost-effectiveness for phosphorus is undefined for commercial because no phosphorus is removed. For non-commercial recirculating facilities, no phosphorus removals are seen for Option A. For the remaining options, average cost effectiveness ranges from $481/lb to $2,987/lb and incremental cost-effectiveness ranges from $247/lb to $1,338/lb.

TABLE VI.C.2.—NUTRIENT COST-EFFECTIVENESS: PHOSPHORUS

Subcategory, sector, and option	Pre-tax annualized costs ($2001)	Phosphorus removals (lb)	Cost-effectiveness ($2001/pound)	
			Average	Incremental
Commercial Flow-Through				
Option A	$213,030	1,631	$131	$131[1]
Option 1	344,350	5,396	64	35
Option 2	429,441	5,396	80	NA
Option B	438,443	5,396	81	NA
Option 3	920,663	22,290	41	34
Non-Commercial Flow-Through				
Option A	$1,492,671	1,614	$925	$925[1]
Option 1	2,692,963	11,510	234	121
Option B	2,968,001	11,510	258	NA
Option 2	2,969,498	11,510	258	NA
Option 3	5,799,459	51,976	112	77
Commercial Recirculating				
Option 1	$2,784	0	[2]	[2]
Option A	7,744	0	[2]	[2]
Option B	7,744	0	[2]	[2]
Option 2	7,744	0	[2]	[2]
Option 3	7,744	0	[2]	[2]

TABLE VI.C.2.—NUTRIENT COST-EFFECTIVENESS: PHOSPHORUS—Continued

Subcategory, sector, and option	Pre-tax annualized costs ($2001)	Phosphorus removals (lb)	Cost-effectiveness ($2001/pound)	
			Average	Incremental
Non-commercial Recirculating				
Option A	$17,594	0	[2]	[2]
Option 1	44,268	20	2,220	1,338
Option B	55,107	20	2,764	NA
Option 2	59,558	20	2,987	NA
Option 3	80,965	168	481	247

NA: The option higher costs, not related to nutrient removal, and equal removals compared to previous options.
[1] Option A is incremental to baseline, so the average and incremental values are listed as being the same.
[2] Undefined: Option costs are costs for BMP components that address invasive species, drugs, and chemicals that have no effect on nutrients, or facilities in these groups have adequate treatment in place to achieve requirements for pollutants in this table (*i.e.*, no incremental removals are estimated).

Due to differences in option requirements for the subcategories, as well as differences in facility counts between the proposed rule and this NODA, it is difficult to compare cost-effectiveness values in Tables VI.C.1 and VI.C.2 directly to cost effectiveness values for the proposed rule. As a consequence, Table VI.C.3 facilitates comparisons between proposal and this NODA.

TABLE VI.C.3.—COMPARISON OF NUTRIENT RESULTS—PROPOSAL AND NODA

Production system	Total pre-tax annual costs ($2001)	Average nutrient cost effectiveness (TN+TP)		Average nutrient cost effectiveness (TN)		Average nutrient cost effectiveness (TP)	
		Removals	$/lb	Removals	$/lb	Removals	$/lb
Proposal							
Flow-Through	1,032,942	66,103	15.63	50,273	20.55	15,830	65.25
Recirculating	46,354	32,453	1.43	25,090	1.85	7,363	6.30
Net Pens	35,322	86,890	0.41	74,477	0.47	12,413	2.85
NODA							
Flow-Through	2,076,456	114,933	18.07	92,026	22.56	22,907	90.65
Recirculating	5,409	0	[1]	0	[1]	0	[1]
Net Pens	0	0	[1]	0	[1]	0	[1]

Note: Proposal costs, taken from Table IX.G.3 of the preamble from the proposed rule, were inflated to 2001 dollars. NODA results do not include costs or loads for facilities that produce 20,000 to 100,000 lbs/year. Option 1 is assumed for flow-through facilities in the size category 100,000 to 475,000 lbs/yr; Option 3 is assumed for all other flow-through and recirculating facilities.
[1] Undefined.

2. Cost-reasonableness Results

Table VI.C.4 shows the cost-reasonableness values for conventional pollutants. EPA estimated BOD and TSS removals for each facility for each option. Because BOD can be correlated with TSS, EPA selected the higher of the two values (not the sum) to avoid possible double-counting of removals. In general, TSS is the more frequently the higher of the two. In Option 3 for example, TSS is higher than BOD in nearly four out of five facilities. For commercial flow-through facilities, cost-reasonableness ranges from $1.53/lb to $1.94/lb for Options A, B, 1, and 2. Option 3 shows a lower cost-reasonableness value than for the other options—$0.64/lb. For non-commercial flow-through facilities, cost-reasonableness is $1.01/lb for option A and ranges from $1.18/lb to $1.70/lb for the other options. While cost-reasonableness is less than $2/lb for all options for flow-through facilities, it is undefined for commercial recirculating facilities and ranges from $5/lb to $100/lb for non-commercial recirculating facilities.

TABLE VI.C.4.—COST-REASONABLENESS: BOD AND TSS

Subcategory, sector, and option	Pre-tax annualized costs ($2001)	BOD and TSS Removals (lb) [1]	Cost-reasonableness ($2001/pound)
Commercial Flow-Through			
Option A	213,030	114,162	1.87
Option 1	344,350	225,797	1.53
Option 2	429,441	225,797	1.90

TABLE VI.C.4.—COST-REASONABLENESS: BOD AND TSS—Continued

Subcategory, sector, and option	Pre-tax annualized costs ($2001)	BOD and TSS Removals (lb) [1]	Cost-reasonableness ($2001/pound)
Option B	438,443	225,797	1.94
Option 3	920,663	1,447,954	0.64
Non-commercial Flow-Through			
Option A	1,492,671	1,480,192	$1.01
Option 1	2,692,963	1,743,075	1.54
Option B	2,968,001	1,743,075	1.70
Option 2	2,969,498	1,743,075	1.70
Option 3	5,799,459	4,925,784	1.18
Commercial Recirculating			
Option 1	2,784	0	[2]
Option A	7,744	0	[2]
Option B	7,744	0	[2]
Option 2	7,744	0	[2]
Option 3	7,744	0	[2]
Non-commercial Recirculating			
Option A	17,594	0	[2]
Option 1	44,268	598	73.98
Option B	55,107	598	92.09
Option 2	59,558	598	99.53
Option 3	80,965	16,150	5.01

[1] EPA determines the higher of BOD or TSS mass removal for each facility and then aggregates pounds across facilities.
[2] Undefined: Option costs are costs for BMP components that address invasive species, drugs, and chemicals that have no effect on BOD or TSS, or facilities in these groups have adequate treatment to achieve requirements for pollutants in this table (*i.e.*, no incremental removals are estimated).

Due to differences in option requirements for the subcategories and differences in facility counts between the proposed rule and this NODA, it is difficult to compare results in Table VI.C.4 directly to values in the proposed rule. As a consequence, Table VI.C.5 facilitates comparisons between proposal and this NODA.

TABLE VI.C.5.—COMPARISON OF COST-REASONABLENESS RESULTS—PROPOSAL AND NODA

Production system	Proposal			NODA		
	Total pre-tax annual costs ($2001)	Conventional pollutant removals	Average cost per pound ($/lb)	Total pre-tax annual costs ($2001)	Conventional pollutant removals	Average cost per pound ($/lb)
Flow-Through	1,032,942	4,450,465	0.23	2,076,456	2,524,102	0.82
Recirculating	46,354	638,365	0.07	5,409	0	[1]
Net Pens	35,322	868,899	0.04	0	0	[1]

Note: Proposal costs, taken from Table IX.G.1 of the preamble from the proposed rule, were inflated to 2001 dollars. NODA results do not include costs or loads for facilities that produce 20,000 to 100,000 lbs/year. Option 1 is assumed for flow-through facilities in the size category 100,000 to 475,000 lbs/yr; option 3 is assumed for all other flow-through and recirculating facilities.
[1] Undefined.

D. Small Business Analysis

EPA evaluates the economic impacts of proposed and final rules on small entities where required by the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA). The RFA/SBREFA defines several types of small entities, including small governmental jurisdictions (population less than 50,000), small organizations (not-profit organization that is independently owned and operated and is not dominant in its field), and small businesses. The CAAP industry includes sites that fall within the North American Industry Classification codes 112511 (finfish farming and fish hatcheries). The Small Business Administration size standard for this code is $0.75 million. A facility is owned by a small business if its corporate parent earns $750,000 or less in annual revenues.

For the purposes of the RFA, Federal, State, and Tribal governments are not considered small governmental jurisdictions (EPA, 1999, DCN 20121). Thus, facilities owned by these governments are not considered small entities, regardless of their production levels. EPA identified no public facilities owned by small local governments in the analysis. For the purpose of this rulemaking, EPA considers many of the non-profit organizations that produce salmon for the State of Alaska to be ''small.'' These non-profit facilities have assumed a public function: to raise fish (in this case salmon) in hatcheries to be released into the wild to supplement wild populations and sustain the Alaska

commercial and recreational fishing industries.

Among the costed facilities, EPA identified 117 facilities belonging to small businesses, seven belonging to small organizations, and one academic/research facility. For commercial facilities, the small business results for the facility closure analysis and associated loss in jobs and increase in local unemployment rates, financial health, credit test, and the sales test results for 20,000 to 100,000 lb/yr category are the same as those presented in Table VI.B.1 (see DCN 20448 for details about small business analysis), assuming cash flow analysis. That is, all these impacts fall on small businesses. The only difference from Table VI.B.1 is in the one percent sales test for the 100,000 to 475,000 lb/yr category, where the number of facilities exceeding the test threshold drops from 54 to 53 when restricted to small businesses.

VII. Solicitation of Comments

A. Alligator Production

As discussed in the proposal, alligator production is not subject to Part 451. As ascertained through contacts with industry experts, alligator production facilities do not discharge effluents from their production systems. Instead, effluents are treated in one-or two-stage lagoons and then applied to crop or forested land. EPA verified the information by reviewing the data from the detailed survey. Alligator producers do not meet the definition of a CAAP because they do not exceed the minimum threshold of discharging 30 days annually. In EPA's view, after having reviewed detailed data, these operations are not CAAPs and are similarly operated to CAFOs. EPA may recommend to permit writers that they consider applying requirements similar to CAFOs when permitting alligator production facilities. EPA seeks comment on whether this would be an appropriate approach for these operations.

B. BMPs

EPA also seeks comment on BMP language that might be included in the final rule or accompanying guidance. For example, in Idaho's general permit, these practices by CAAP facilities are prohibited to ensure protection of State Water Quality Standards for hazardous materials, deleterious materials, and floating, suspended or submerged matter.

- Discharging hazardous materials is prohibited.
- Discharging sludge, grit, and accumulated solid residues associated with CAAP operations and fish processing is prohibited.
- Practices (e.g., the removal of dam boards in raceways or ponds) which allow accumulated solids to be discharged to waters of the United States is prohibited.
- Discharging untreated cleaning wastewater (e.g., obtained from a vacuum or standpipe bottom drain system or rearing/holding unit disinfection) to waters of the United States is prohibited.
- Sweeping, raking, or intentionally discharging accumulated solids from raceways or ponds to waters of the United States is prohibited.
- Containing, growing or holding fish within an offline or full-flow settling basin is prohibited.

EPA seeks comments on whether these prohibitions, or any other specific requirements for BMP plans, should be included in the final rule or accompanying guidance.

EPA also seeks comment on whether it should modify the structure of the proposed BMP provisions so that the regulation would require specific best management practices and, separately, require sources to develop a BMP plan describing how they intend to meet those requirements. For example, EPA proposed that the BMP plan for flow-through systems must minimize excess feed entering the aquatic animal production system. (See proposal at 40 CFR 451.15(a); see also proposal at 40 CFR 451.25(a) (recirculating systems).) EPA may restructure the regulation so that a source would be required by its NPDES permit to minimize excess feed and, separately, to develop a BMP plan to describe how the source intends to comply with that requirement. Under this approach, the BMP plan, while required by permit, would simply be a tool to help the source implement the substantive permit requirement: minimizing excess feed. EPA also seeks comment on whether to require review of BMP plans by the permitting authority and, if so, how such a requirement should be expressed.

C. Disposal of Drugs and Chemicals

Information on practices for the disposal of drugs and chemicals is limited. EPA seeks comment on existing practices for the disposal of expired drugs and chemicals.

D. Differentiating Between Warm and Cold Water Species

Data from two warm water facilities indicated that they appear to comply with the proposed limits, but EPA recognizes that such facilities can have different wastewater characteristics than cold water species production facilities. EPA seeks comments and data regarding the ability or inability of warm water facilities to achieve the proposed limits for either flow-through or recirculating system effluents, as appropriate.

E. Combining the Proposed Recirculating and Flow-Through Subcategories Into One Subcategory

EPA may combine flow-through production systems and recirculating systems under a single subcategory with two sets of effluent limits: one that would apply to the discharge of full flow effluents and one that would apply to off-line treatment or recirculating system effluents. We received several comments indicating that there is not a clear distinction between recirculating and flow-through systems. EPA seeks comments on the establishment of a continuous discharge subcategory which would apply to wastewater discharges from both recirculating and flow-through systems.

F. Revised Economic Impact Methodology

For this notice, EPA projected impacts only when they occur using two out of the three forecasting methods. EPA seeks comment on basing its closure analysis for the final rule on impacts that occur using one of the three methods.

G. Factoring Unpaid Labor Charges in the Impact Analysis

EPA is not estimating a charge for unpaid labor reported by CAAP facilities when conducting its economic impact analysis. EPA seeks comment on methods and data that support the estimation of charges for unpaid labor and management in cash flow and net income analyses.

H. Facilities Excluded From the Economic Impact Analysis

Facilities that are excluded from closure analysis include:

- Start-ups (where the first year of income is negative yet this is not indicative of future earnings).
- Cost centers (that transfer production to other facilities under the same ownership at no cost or the cost is set to the operating costs).
- Facilities where the company does not record income statement information at the facility level.
- Facilities that are likely to close under baseline conditions without regard to the rule.

EPA seeks comment on omitting such facilities from the closure analysis.

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G. Tracy Mehan, III,

Assistant Administrator, Office of Water.

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