

REGULATORY OPTIONS CONSIDERED AND SELECTED FOR BASIS OF REGULATION

This section presents the technology options considered by EPA as the basis for the effluent limitations guidelines and standards for the CWT industry. It also describes the methodology for EPA's selection of the final technology options. The limitations and standards discussed in this section are Best Practicable Control Technology Currently Available (BPT), Best Conventional Pollutant Control Technology (BCT), Best Available Technology Economically Achievable (BAT), New Source Performance Standards (NSPS), Pretreatment Standards for Existing Sources (PSES), and Pretreatment Standards for New Sources (PSNS).

ESTABLISHMENT OF BPT

9.1

Section 304(b)(1)(A) requires EPA to identify effluent reductions attainable through the application of "best practicable control technology currently available for classes and categories of point sources." EPA determines BPT effluent levels based upon the average of the best existing performance by facilities of various sizes, ages, and unit processes within each industrial category or subcategory. However, in industrial categories where present practices are uniformly inadequate, EPA may determine that BPT requires higher levels of control than any currently in place if the technology to achieve those levels can be practicably applied.

In addition, CWA Section 304(b)(1)(B) requires a cost reasonableness assessment for BPT limitations. In determining the BPT limits, EPA must consider the total cost of treatment

technologies in relation to the effluent reduction benefits achieved.

In balancing costs against the benefits of effluent reduction, EPA considers the volume and nature of expected discharges after application of BPT, the general environmental effects of pollutants, and the cost and economic impacts of the required level of pollution control.

In assessing BPT for this industry, EPA considered age, size, unit processes, other engineering factors, and non-water quality impacts pertinent to the facilities treating waste in each subcategory. For all subcategories, no basis could be found for identifying different BPT limitations based on age, size, process, or other engineering factors for the reasons previously discussed. For a service industry whose service is wastewater treatment, the pertinent factors for establishing the limitations are cost of treatment, the level of effluent reductions obtainable, and non-water quality effects.

EPA determined that, while some CWT facilities are providing adequate treatment of all wastestreams, wastewater treatment at some CWT facilities is poor. EPA has determined that facilities which mix different types of highly concentrated CWT wastes with non-CWT wastestreams or with storm water are not providing BPT treatment. In addition, while some CWT facilities pretreat subcategory wastestreams for optimal removal prior to commingling, some facilities mix wastes from different subcategories without pretreatment. This practice essentially dilutes the waste rather than treats the waste. As such, the mass of

pollutants being discharged at some CWT facilities is higher than that which can be achieved, given the demonstrated removal capacity of treatment systems that the Agency reviewed. Many CWT facilities recognize that commingling often leads only to dilution and have encouraged their customers to segregate wastes as much as possible. Waste minimization techniques at most manufacturing facilities have also led to increased waste stream segregation.

Comparison of EPA sampling data and CWT industry-supplied monitoring information establishes that, in the case of metal-bearing wastestreams, virtually all the facilities are discharging large amounts of heavy metals. As measured by total suspended solids (TSS) levels following treatment, TSS concentrations are substantially higher than levels observed at facilities in other industry categories employing the very same treatment technology.

In the case of oil discharges, many facilities are achieving low removal of oil and grease relative to the performance required for other point source categories. Many collect samples infrequently to analyze for metal and organic constituents in their discharge since these parameters are not included in their discharge permits. Further, facilities treating organic wastes, while successfully removing organic pollutants through biological treatment, fail to remove metals associated with these organic wastes.

The poor pollutant removal performance observed for some direct discharging CWT facilities is not unexpected. As pointed out previously, some of these facilities are treating highly concentrated wastes that, in many cases, are process residuals and sludges from other point source categories. EPA's review of permit limitations for the direct dischargers show that, in most cases, the dischargers are subject to "best professional judgment" limitations which were based primarily on guidelines for facilities treating and discharging much more dilute wastestreams. EPA has concluded that treatment performance in the industry is often inadequate and that the

mass of pollutants being discharged is high, given the demonstrated removal capability of treatment option that the Agency has reviewed.

EPA's options to evaluate treatment systems in place at direct discharging CWTs were extremely limited since most of the facilities in this industry are indirect dischargers. This is particularly true of the metals and oils facilities. Many indirect discharging CWTs are not required to control discharges of conventional pollutants because the receiving POTWs are designed to achieve removal of conventional pollutants and therefore, generally do not monitor or optimize the performance of their treatment systems for control of conventional pollutants. Because BPT applies to direct dischargers, the data used to establish limitations and standards are normally collected from such facilities. For this rule, EPA relied on information and data from widely available treatment technologies in use at CWT facilities discharging indirectly -- so called "technology transfer." EPA concluded that certain technologies in place at indirect discharging CWT facilities are appropriate for use as the basis for regulation of direct dischargers.

Technological Options Considered as the Basis for the Metals Subcategory Limitations and Standards **9.1.1**

EPA has considered four technology options in establishing BPT effluent level reductions for the metals subcategory. All rely on chemical precipitation to reduce the discharge of pollutants from CWT facilities. The four technology options are as follows:

- Option 1: chemical precipitation, and liquid solid separation;
- Option 2: selective metals precipitation, liquid-solid separation, secondary precipitation, and liquid-solid separation;
- Option 3: selective metals precipitation, secondary precipitation, liquid-

solid separation, tertiary precipitation, and clarification; and

Option 4: primary precipitation, liquid-solid separation, secondary precipitation, liquid solid separation, and sand filtration.

As detailed in the 1995 proposal and the 1999 supplemental proposal, while single stage chemical precipitation followed by liquid-solid separation is widely used in this subcategory, EPA dropped it from further consideration at the time of the original proposal. EPA concluded that single stage, chemical precipitation of mixed disparate metal-bearing waste streams is not an acceptable technology basis for BPT limitations. The Agency also dropped the option 2 technology at the time of the 1999 proposal because it estimated that the option 2 and option 3 technologies have nearly equivalent costs and that pollutant removals are greater for option 3. Therefore, EPA now considers two technology options as the basis for the metals subcategory limitations and standards. Each is explained in detail below.

METALS SUBCATEGORY OPTION 3¹ - SELECTIVE METALS PRECIPITATION, LIQUID-SOLID SEPARATION, SECONDARY PRECIPITATION, LIQUID-SOLID SEPARATION, TERTIARY PRECIPITATION, AND CLARIFICATION

The first treatment option (option 3) that EPA evaluated is based on “selective metals precipitation.” “Selective metals precipitation” is a specialized metals removal technology that tailors precipitation conditions to the metal to be removed. The extent to which a metal is precipitated from a solution will vary with a number of factors including pH, temperature, and

¹The numbering of options reflects the numbering for the 1999 proposal. Option 3 was first considered for the 1995 proposal. Option 4 is a technology EPA evaluated for the 1999 proposal.

treatment chemicals. Selective metals precipitation adjusts these conditions sequentially in order to provide maximum precipitation of metals. Selective metals precipitation requires segregation of incoming wastestreams and careful characterization of the metals content of the waste stream. Next, there are multiple precipitations in batches at different pH levels in order to achieve maximum removal of specific metals. Selective metals precipitation results in the formation of a metal-rich filter cake. This treatment option requires numerous treatment tanks and personnel to handle incoming wastestreams, greater quantities of treatment chemicals, and better control of the precipitation steps. One of the benefits of this technology, however, is that it results in a metal-rich filter cake that facilities employing this treatment have the option of selling as feed material for metal reclamation. For metal streams which contain concentrated cyanide complexes, achievement of the BPT limitations under this option would require alkaline chlorination in a two step process prior to metals treatment. These BPT cyanide limitations are discussed in greater detail below.

METALS SUBCATEGORY OPTION 4¹ - PRIMARY PRECIPITATION, LIQUID-SOLID SEPARATION, SECONDARY PRECIPITATION, AND SAND FILTRATION

The second technology EPA evaluated as the technology basis for limitations and standards in the metals subcategory is option 4, a two stage precipitation process. The first stage of this technology is similar to the option 1 chemical precipitation technology considered (and rejected) during the development of this rule and is based on chemical precipitation, followed by some form of solids separation and sludge dewatering. In option 4, however, a second precipitation step is also performed followed by sand filtration. Under option 4, the treater varies pH levels and treatment chemicals in order to promote optimal removal of the wide

range of metal pollutants found in CWT metals wastewaters. Since most CWT metal facilities utilize single-stage chemical precipitation only, generally limitations and standards based on option 4 would require some facilities to more carefully control their treatment steps, increase quantities of treatment chemicals they use, perform an additional precipitation step, and add a clarification sand filtration step. Once again, for metals which contain concentrated cyanide complexes, like option 3, alkaline chlorination in a two step process is also part of the option 4 treatment process.

Rationale for the Final Metals

Subcategory BPT Limitations 9.1.1.1

For the final CWT rule, EPA established BPT limitations for the metals subcategory based on the option 4 technology. The Agency concluded that this treatment system represented the best practicable technology currently available and should be the basis for the BPT metals limitations for the following reasons. First, the option 4 technology is one that is readily applicable to all facilities that are treating metal-bearing waste streams. It is based on a technology including two-stage chemical precipitation that is currently used at approximately 25 percent of the facilities in this subcategory. Second, the adoption of this level of control would represent a significant reduction in pollutants discharged into the environment by facilities in this subcategory. Option 4 would annually remove approximately 4.1 million pounds of TSS and metals now discharged to the Nation's waters. Third, the Agency assessed the total cost of water pollution controls likely to be incurred for option 4 in relation to the effluent reduction benefits and determined these costs were reasonable – \$0.40 per pound (\$1997). In the 1999 proposal, EPA explained why it rejected metals option 3 as the basis for BPT. See 64 FR 2280 at 2306.

The Agency used chemical precipitation treatment technology performance data from the

Metal Finishing regulation (40 CFR Part 433) to establish direct discharge limitations for TSS because the facility from which the option 4 limitations were derived is an indirect discharger and the treatment system is not necessarily designed for optimum removal of conventional parameters, due to the lack of stringent local limits for these parameters. EPA has concluded that the transfer of this data is appropriate given the absence of adequate treatment technology for this pollutant at the only otherwise well-operated BPT CWT facility examined by EPA. Based on a review of the data, EPA concluded that similar wastes (in terms of TSS concentrations) are being treated at both metal finishing and centralized waste treatment facilities, and that the use of the metal finishing data to derive TSS limits for this subcategory is warranted. Because the technology basis for the transferred limitations includes clarification rather than sand filtration, the Agency also included a clarification step prior to sand filtration (which the option 4 facility does not have) in the technology basis for option 4 for facilities subject to BPT. Therefore, because the technology basis for CWT is based on primary chemical precipitation, primary clarification, secondary chemical precipitation, secondary clarification, and sand filtration and the technology basis for Metal Finishing is based on primary precipitation and clarification only, EPA concluded that CWT facilities will perform similarly (or better) when treating TSS in wastes in this subcategory.

BPT limitations established by option 4 (except TSS) are based on data from a single, well-operated system. Generally, for purposes of defining BPT effluent limitations, EPA looks at the performance of the best treatment technology and calculates limitations from some level of average performance measured at facilities that employ this "best" treatment technology. In reviewing technologies currently in use in this subcategory, however, EPA found that facilities generally utilize a single stage chemical precipitation step -- a technology

which does not achieve adequate metals removals for the waste streams observed at these operations. EPA did identify facilities that utilize additional metals wastewater treatment, generally secondary chemical precipitation, but without the final multimedia filtration step. Also, EPA found that only the BPT model facility accepts a full spectrum of waste, often with extremely high metals concentrations and provides, therefore, a suitable basis to determine the performance that a well-designed and operated system can achieve for a wide range of raw waste concentrations. Consequently, EPA adopted BPT limitations based on performance data from this facility. For further discussion, see the 1999 proposal at 64 FR 2280-2357.

CYANIDE SUBSET
TECHNOLOGIES EVALUATED

As discussed above, the presence of high cyanide concentrations detrimentally affects the performance of metal precipitation processes due to the formation of metal-cyanide complexes. Effective treatment of such wastes typically involves a cyanide destruction step prior to any metal precipitation steps. Consequently, in the case of metal streams which contain concentrated cyanide complexes, EPA concluded an additional treatment step is required to destroy cyanide prior to metals precipitation. During development of this rule, EPA considered the following three regulatory options for the destruction of cyanide.

CYANIDE SUBSET OPTION 1 - ALKALINE CHLORINATION

The option 1 technology, alkaline chlorination, is widely used for cyanide destruction in this industry as well as in others. For this subset, it represents current performance. While this technology can effectively treat non-complexed, dilute cyanide-bearing wastestreams, it is often ineffective in treating concentrated cyanide complexes.

CYANIDE SUBSET OPTION 2 - ALKALINE CHLORINATION IN A TWO STEP PROCESS

The cyanide option 2 technology is alkaline chlorination in a two step process. In the first step, cyanide is oxidized to cyanate in a pH range of 9 to 11. The second step oxidizes cyanate to carbon dioxide and nitrogen at a controlled pH of 8.5. EPA's data demonstrate that this technology is effective in treating concentrated cyanide complexes.

CYANIDE SUBSET OPTION 3 - CONFIDENTIAL CYANIDE DESTRUCTION

EPA evaluated a third technology which is extremely effective in reducing cyanide (including concentrated cyanide complexes). Application of this technology resulted in cyanide reductions of 99.8 percent for both amenable and total cyanide. The option 3 technology is also claimed confidential

As detailed in the 1995 and 1999 proposals, the cyanide option 3 technology is a proprietary process that does not employ off-the-shelf technology. Consequently, EPA dropped it from further consideration since it is not publicly available.

RATIONALE FOR FINAL CYANIDE SUBSET BPT LIMITATIONS

EPA based the final BPT limitations on cyanide option 2. This is the same technology that was the basis for the 1999 proposed limitations. There are several reasons supporting the selection of limitations based on cyanide option 2, as explained in detail in the 1999 proposal at 64 FR 2309. First, the facility achieving cyanide option 2 removals accepts a full spectrum of cyanide waste. Consequently, the treatment used by the cyanide option 2 facility can be readily applied to all facilities in the subset of this subcategory. Second, adoption of this level of control would represent a significant reduction in pollutants discharged into the environment by facilities in this subset.

Finally, the Agency assessed the total cost for cyanide option 2 in relation to the effluent reduction benefits and determined these costs were economically reasonable.

Technological Options Considered as the Basis for the Oils Subcategory Limitations and Standards

9.1.2

EPA has considered twelve technology options in establishing BPT effluent reduction levels for the oils subcategory during development of this rule. The first four options were evaluated at the time of the 1995 proposal (60 FR 5478); the other eight options, following the 1995 proposal. The twelve technology options considered are as follows:

- Option 1: emulsion breaking/gravity separation;
- Option 2: emulsion breaking/gravity separation and ultrafiltration;
- Option 3: emulsion breaking/gravity separation, ultrafiltration, carbon adsorption, and reverse osmosis;
- Option 4: emulsion breaking/gravity separation, ultrafiltration, carbon adsorption, reverse osmosis, and carbon adsorption;
- Option 5: emulsion breaking/gravity separation, ultrafiltration, and chemical precipitation;
- Option 6: emulsion breaking/gravity separation, dissolved air flotation, and gravity separation;
- Option 7: emulsion breaking/gravity separation, secondary gravity separation, dissolved air flotation, and biological treatment;
- Option 8: emulsion breaking/gravity separation and dissolved air flotation;
- Option 8v: emulsion breaking/gravity separation, air stripping, and dissolved air flotation;
- Option 9: emulsion breaking/gravity separation, secondary gravity separation, and dissolved air flotation;
- Option 9v: emulsion breaking/gravity separation, air stripping, secondary gravity separation, and dissolved air flotation; and
- Option 10: emulsion breaking/gravity separation and secondary gravity separation.

As detailed in the 1995 proposal and 1999 supplemental proposal, while emulsion breaking/gravity separation (option 1) is widely used in this subcategory, the data EPA has examined supports the Agency's concerns that the performance of emulsion breaking and/or gravity separation unit operations are inadequate because they do not achieve acceptable pollutant removals. For example, one of the facilities in the oils subcategory that EPA sampled discharged a biphasic sample (oil and water) from the emulsion breaking/gravity separation unit during an EPA sampling visit. When EPA analyzed the sample, the biphasic liquid stream had a relatively small organic phase percentage, yet contained extremely high overall concentrations of toxic pollutants, especially priority, semi-volatile organics (such as polynuclear aromatic hydrocarbons, phthalates, aromatic hydrocarbons, n-paraffins, and phenols). Hence, the Agency concluded that gravity separation systems without further treatment provide inadequate removals. Consequently, EPA dropped the oils option 1 technology from further consideration.

The Agency also dropped the option 4 technology (emulsion breaking/gravity separation, ultrafiltration, carbon adsorption, reverse osmosis, and carbon adsorption) from consideration at the time of the original proposal because EPA's analysis showed that some pollutant concentrations actually increased following the additional carbon adsorption.

At the time of the 1995 proposal, the

Agency co-proposed BPT limitations based on emulsion breaking/gravity separation and ultrafiltration as well as emulsion breaking/gravity separation and ultrafiltration with added carbon adsorption and reverse osmosis to remove metal compounds found at significant levels in this subcategory. Because the costs associated with the latter option were four times higher than ultrafiltration alone, EPA was concerned about its impacts on facilities in this subcategory. After the 1995 proposal, EPA collected additional information on facilities in the oils subcategory and revisited its conclusion about the size and nature of the oils subcategory. EPA published a Notice of Data Availability in 1996 describing the new information and EPA's revised assessment of the oils subcategory. Based on analyses presented in the 1996 Notice, EPA determined it should no longer consider emulsion breaking/gravity separation and ultrafiltration with added treatment steps (option 3) as the basis for BPT limitations because the projected total costs relative to effluent reductions benefit were not economically reasonable.

Based on comments to the 1995 proposal and the 1996 Notice of Data Availability, EPA was strongly encouraged to look at alternate technology options to emulsion breaking/gravity filtration and ultrafiltration. This concern was driven in large measure by the fact that many of the facilities in the oils subcategory are classified as "small businesses" and the economic cost of installing and operating ultrafiltration technology was quite high. Additionally, many commenters stated that ultrafiltration is a sophisticated technology which would be difficult to operate and maintain with the majority of these wastestreams. Commenters also noted that the Agency had failed to consider non-water quality impacts adequately -- particularly those associated with the disposal of the concentrated filtrate from these operations. As a result, based on comments to the original proposal, the 1996 Notice of Data Availability, and additional site visits, EPA identified several other treatment options that were efficient, produced tighter oil

and grease limits, and were less expensive. As such, EPA did not consider emulsion breaking/gravity separation and ultrafiltration (option 2) as an appropriate technology for limitations for the oils subcategory.

Following the 1995 proposal and the 1996 Notice of Data Availability, EPA preliminarily considered options 5 - 9v in establishing BPT effluent reduction levels for this subcategory. However, EPA dropped options 5, 6, and 7 early in the process. EPA dropped option 5 since it relied on ultrafiltration which, as described previously, the Agency determined was inappropriate for this subcategory. The Agency dropped option 6 since EPA is unaware of any CWT facilities that currently use the option 6 treatment technologies in the sequence considered. Finally, EPA dropped option 7 because EPA's sampling data showed little additional pollutant reduction associated with the addition of the biological treatment system.

Following the SBREFA panel, at the request of panel members, EPA also examined another option, option 10, which is based on emulsion breaking/gravity separation followed by a second gravity separation step. At the time of the 1999 proposal the Agency concluded it should not propose BPT limitations based on this technology because EPA's data show that this technology alone did not adequately control the metal pollutants of concern relative to other widely available technologies.

Finally, as described in more detail in the 1999 proposal (See 64 FR 2311), the Agency dropped option 8v and 9v from consideration because the addition of air stripping with overhead recovery or destruction would not achieve any substantial additional removal of volatile and semi-volatile parameters from the wastewater. The discharge limits would be the same with or without the additional technology basis of air stripping with overhead recovery.

Consequently, EPA now considers only two technology options for the basis for establishing the oils subcategory limitations and standards. These are as follows:

Option 8²: emulsion breaking/gravity separation and dissolved air flotation; and

Option 9²: emulsion breaking/gravity separation, secondary gravity separation, and dissolved air flotation

Each of these are discussed below.

OILS SUBCATEGORY OPTION 8² - DISSOLVED AIR FLOTATION

The technology basis for option 8 is dissolved air flotation (DAF). DAF separates solid or liquid particles from a liquid phase by introducing air bubbles into the liquid phase. The bubbles attach to the particles and rise to the top of the mixture. Often chemicals are added to increase the removal of metal constituents. Generally, limitations and standards based on option 8 would require facilities to more carefully control their treatment systems and/or to install and operate a DAF system. For oils streams with significant concentrations of metals, option 8 would also require increased quantities of treatment chemicals to enhance metals removals.

OILS SUBCATEGORY OPTION 9² - SECONDARY GRAVITY SEPARATION AND DISSOLVED AIR FLOTATION

The technology basis for limitations based on option 9 is secondary gravity separation and DAF. Secondary gravity separation involves using a series of tanks to separate the oil and water and then skimming the oily component off. The resulting water moves to the next step. The gravity separation steps are then followed by DAF. As mentioned previously, EPA concluded

all oils facilities currently utilize some form of gravity separation, although most perform primary gravity separation only. Generally, limitations and standards based on option 9 would require facilities to more carefully control their treatment systems, perform additional gravity separation steps, and/or install and operate a DAF system. For oils streams with relatively high concentrations of metals, option 9 would also require the use of increased quantities of treatment chemicals to enhance the removal of metals.

Rationale for Oils Subcategory BPT Limitations 9.1.2.1

The technology basis for the final BPT limitations is oils option 9: *emulsion breaking/gravity separation, secondary gravity separation and dissolved air flotation*. This is the same technology that was the basis for the 1999 proposed limitations. EPA notes that all direct discharging oils facilities already have treatment-in-place equivalent to secondary gravity separation. Therefore, EPA can not consider the option 8 technology as the basis for BPT limitations in the oils subcategory.

EPA developed the final limitations for this option using sampling data from facilities both with and without the secondary gravity separation step. EPA's data show that the secondary gravity separation step may not always be necessary to meet the final limitations, depending on the level of treatment in the initial gravity-separation/emulsion-breaking step. EPA's data show there is a wide range of pollutants being discharged from this initial treatment step. EPA concluded that if many of the facilities optimize treatment at this level, the secondary gravity separation step may not be required. However, EPA estimated the costs to comply with the limitations with the secondary gravity separation step included to ensure this technology option's economic achievability.

²As noted above, EPA is no longer considering oils Options 1- 4 proposed in 1995. During development of the 1999 proposal, EPA also preliminarily considered seven other options numbered 5 - 9v. EPA has chosen to focus its attention on options 8 and 9.

The Agency adopted BPT limitations for the oils subcategory based on option 9, emulsion breaking/gravity separation, secondary gravity separation and dissolved air flotation for two reasons. First, the adoption of this level of control would represent a significant reduction in pollutants discharged into the environment by facilities in this subcategory. Second, the Agency assessed the total costs of water pollution controls likely to be incurred for this option in relation to the effluent reduction benefits and determined these costs were reasonable at \$0.63/lb (\$1997). EPA believes it is important to note that BPT limitations for conventional parameters established by option 9 are based on data from a single, well-operated, indirect-discharging system. Generally, for purposes of defining BPT effluent limitations, EPA looks at the performance of the best treatment technology and calculates limitations from some level of average performance measured at facilities that employ this "best" treatment technology. The facilities sampled as the technology basis for this subcategory, however, were not required to optimize their oil and grease or TSS removals because they discharge to POTWs. Current POTW/local permit limitations for oil and grease in this subcategory range from 100 mg/L to 2,000 mg/L and for TSS from 250 mg/L to 10,000 mg/L. Many have no oil and grease or TSS limits at all. EPA concluded that only one of the systems in this subcategory for which EPA has data was designed to remove oil and grease and TSS effectively. EPA concluded that the oil and grease and TSS removals are uniformly inadequate at the other facilities included in the BPT limitations calculations for other parameters. Consequently, EPA based the oil and grease and TSS limitations on data from a single facility.

Technological Options Considered as the Basis for the Organics Subcategory Limitations and Standards

9.1.3

EPA has considered four technology options in establishing limitations and standards for the

organics subcategory during development of this rule. The four technology options are as follows:

- Option 1: equalization, air stripping with emissions control, biological treatment, and multimedia filtration;
- Option 2: equalization, air stripping with emissions control, biological treatment, multimedia filtration, and carbon adsorption;
- Option 3: equalization, air-stripping with emissions control, and biological treatment; and
- Option 4: equalization and biological treatment.

The 1999 proposal explained that the Agency dropped option 2 from further consideration because EPA's sampling data showed that, following the carbon adsorption step, specific pollutants of concern actually increased. The 1999 proposal also explained that EPA dropped option 1 from consideration because the multimedia filtration step is primarily included to protect the carbon adsorption unit installed downstream from high TSS levels. Since EPA rejected option 2 which includes the carbon adsorption unit, EPA similarly rejected the option which includes the multimedia filtrations step.

Also, as described in more detail in the 1999 proposal (see 64 FR 2312), the Agency dropped option 3 from consideration because the addition of air stripping with overhead recovery or destruction would not achieve any substantial additional removal of volatile and semi-volatile parameters from the wastewater. Effluent limitations and standards based on option 3 treatment would be essentially the same as those established by option 4.

Consequently, for the final CWT rule, EPA considered only one technology basis, option 4, for the development of limitations and standards for the organics subcategory.

*Rationale for Organics Subcategory**BPT Limitations*

9.1.3.1

The technology basis for the final BPT limitations is organics option 4: *equalization and biological treatment*. Biological treatment for this option is in the form of a sequential batch reactor. This is the same technology that was the basis for the 1999 proposed limitations. The preamble to the proposal provided further explanation of EPA's decision (64 FR 2311-12).

The Agency concluded that this treatment system represented the best practicable technology currently available and should be the basis for the BPT organics limitations for several reasons. The technology is already used at the four direct discharging facilities that treat organic wastes and results in the removal of 28,700 lbs annually of conventional pollutants (at baseline). Moreover, because the treatment is in place, the cost of compliance with the limitations will obviously be reasonable.

Unlike the other BPT limitations adopted in the final CWT rule, the adoption of limitations based on option 4 will not, in all probability, result in any significant change in the quantity of pollutants discharged into the environment by facilities in this subcategory. As noted, EPA's data suggests that all direct discharging facilities in this subcategory currently employ equalization and biological treatment systems, and EPA assumed that all those facilities will be able to meet the BPT limitations without additional capital or operating costs. If any facilities were to incur increased operating costs associated with the limits, EPA concluded these increases are negligible and has not quantified them. Many of these facilities are not currently required to monitor for organic parameters or are only required to monitor a couple of times a year. Thus, the estimated costs for complying with BPT limitations for this subcategory are associated with additional monitoring only. The Agency determined the additional monitoring is warranted, and will promote more effective and consistent treatment at these facilities.

The selected BPT option is based on the performance of a single indirect discharging facility. While EPA identified four direct discharging organics subcategory facilities that utilize biological treatment, EPA did not use data from these facilities to establish limitations because they commingle organics subcategory wastewaters with other CWT subcategory wastewaters or wastewaters subject to other national effluent guidelines and standards. Many facilities that are treating wastes that will be subject to effluent limitations for the Organic Waste Subcategory also operate other industrial processes that generate much larger amounts of wastewater than the quantity of off-site generated organic waste receipts. The off-site generated organic waste receipts are directly mixed with the wastewater from the other industrial processes for treatment. Therefore, identifying facilities to sample for limitations development was difficult because the waste received for treatment and treatment unit effectiveness could not be properly characterized for off-site generated waste. The treatment system on which EPA based option 4 was one of the few facilities identified which treated organic waste receipts separately from other on-site industrial wastewater.

The Agency used biological treatment performance data from the Thermosetting Resin Subcategory of the OCPSF regulation to establish direct discharge limitations for BOD₅ and TSS because the facility from which Option 4 limitations were derived is an indirect discharger and the treatment system is not operated to effectively remove conventional pollutants. EPA has concluded that the transfer of this data is appropriate given the absence of adequate treatment technology for these pollutants at the only otherwise well-operated BPT CWT facility in this subcategory that the Agency was able to evaluate. Moreover, EPA concluded that the biological treatment systems at CWT facilities will perform similarly to those at OCPSF facilities. EPA based this conclusion on its review of the NPDES permits for the four

direct discharging facilities in this subcategory. Two of these facilities are located at manufacturing facilities that commingle their wastewater for treatment and are already subject to OCPSF. The other two facilities have conventional pollutant limits which are lower than those adopted for the final CWT rule. EPA has concluded that all of these facilities should be able to comply with the transferred limitations without incurring additional costs. Likewise, EPA has not estimated any additional pollutant removals associated with this data transfer.

Rationale for Multiple Wastestream Subcategory BPT Limitations **9.1.4**

EPA developed four sets of limitations for each of the possible combinations of the three subcategories of wastestreams: oils and metals, oils and organics, metals and organics, and oils, metals and organics. The multiple wastestream subcategory limitations were derived by combining BPT pollutant limitations from up to all three subcategories selecting the most stringent values where they overlap³. Therefore, the technology basis for the multiple wastestream subcategory limitations reflects the technology basis for the applicable subcategories.

Multiple wastestream subcategory limitations are only available to CWT facilities which accept waste in multiple subcategories. These facilities must certify as well as demonstrate that their treatment system obtains equivalent removals to those which are the basis for the separate subcategory limits. The multiple wastestream subcategory allows the facility to monitor for compliance just prior to discharge rather than directly following treatment of each subcategory's waste stream. For multiple subcategory facilities, this option simplifies implementation and reduces monitoring costs. EPA has, however, estimated additional burden

associated with the certification process in "National Pollutant Discharge Elimination System (NPDES) / Compliance Assessment/Certification Information," ICR (No.1427.05), for direct dischargers and "National Pretreatment Program (40 CFR part 403)," ICR (No. 0002.08), for indirect dischargers.

EPA has determined these limitations are also best practicable technology limitations for facilities that operate in one or more CWT categories for the following reasons. EPA has concluded that, for multiple subcategory facilities, the limitations adopted in this subcategory in combination with the certification process will provide pollutant removals equal to or greater than those projected if the facility elects to comply with the individual subcategory limitations. Further, analysis shows that the costs for multi-subcategory facilities to comply with the multiple wastestream subcategory limitations are generally equal to or less than the costs associated with complying with each applicable subcategory's limitations individually. Because EPA determined that costs of complying with the individual subcategory limits are achievable and costs of complying with the multiple subcategory limits are no greater, EPA concluded that the multiple wastestream subcategory limits are economically achievable.

³EPA selected the most stringent maximum monthly average limitations and its corresponding maximum daily limitation.

BEST CONVENTIONAL TECHNOLOGY (BCT) 9.2

For the final CWT rule, EPA adopted BCT limitations equivalent to BPT for all subcategories. In deciding whether to adopt different BCT limits, EPA considered whether there are technologies that achieve greater removals of conventional pollutants than adopted for BPT, and whether those technologies are cost-reasonable under the standards established by the CWA, and implemented through regulation. EPA generally refers to the decision criteria as the “BCT Cost Test.” For all four subcategories, EPA identified no technologies that can achieve greater removals of conventional pollutants than those that are the basis for BPT that are also cost-reasonable under the BCT Cost Test. Accordingly, EPA adopted BCT effluent limitations equal to the BPT effluent limitations.

BEST AVAILABLE TECHNOLOGY (BAT) 9.3

EPA adopted BAT effluent limitations for all subcategories of the CWT industry based on the same technologies selected as the basis for BPT for each subcategory. The BAT limitations are the same as the BPT limitations for priority and non-conventional pollutants. As described in the BPT discussion, in general, the adoption of this level of control will represent a significant reduction in pollutants discharged into the environment by facilities in this industry. Additionally, EPA has evaluated the economic impacts associated with compliance and found the technologies to be economically achievable.

With the exception of the metals subcategory, EPA has not identified any more stringent treatment technology option different from those evaluated for BPT that might represent best available technology economically achievable for this industry. For the metals subcategory, EPA did consider as BAT technology a treatment technology that it had evaluated for the 1999 proposal, option 3, based on the use of selective metals precipitation. However, as detailed in the proposal (64 FR

2307-2308, 2312), there is little additional toxic removal associated with option 3 while the costs to the industry for are four times greater than the cost of the BPT option, option 4⁴.

EPA has concluded that it should not adopt BAT limitations based on option 3 for several reasons. First, the option 3 technology may not be the best “available” technology for existing metals subcategory facilities because physical constraints may prevent its use at certain facilities. Currently, only one facility in the metals subcategory is employing selective metals precipitation, which requires the separation and holding of wastestreams in numerous treatment tanks. EPA is aware that some facilities do not have, and may not be able to obtain, sufficient space to install the additional treatment tanks that would be needed for selective metals precipitation. Second, while the removals associated with option 4 are not as great as those calculated for option 3, achievement of limitations based on the option 4 technology will still represent a significant advance in removals for the industry over those obtained from conventional precipitation technology. Given these factors, EPA has concluded it should adopt BAT limitations based on the option 4 technology.

For the oils and organics subcategories, as detailed in the proposal (64 FR 2312-2313), EPA has evaluated treatment technologies for BAT limitations, which theoretically should provide greater removal of pollutants of concern. For example, EPA identified an add-on treatment technology to technologies considered for BPT -- carbon adsorption -- that should have further increased removals of pollutants of concern. However, EPA’s data show increases rather than decreases in concentrations of specific pollutants of concern. EPA has found that the treatment performance

⁴ EPA’s data show that option 3 would remove approximately 6 % more additional toxic pound-equivalents than option 4.

of activated carbon is sometimes unreliable due to the competitive adsorption and desorption of pollutants that have different affinities for adsorption on activated carbon. Also, pH changes of the wastewater going through the carbon adsorption system may cause stable metal complexes to dissolve and thus cause an increase in some metal concentrations through the adsorption system. Consequently, EPA did not adopt BAT limitations based on this technology.

NEW SOURCE PERFORMANCE STANDARDS (NSPS)

9.4

Under Section 306 of the Act, EPA must propose and promulgate Federal standards of performance for categories of new sources. Section 306(e) provides that, after the effective date of the standards of performance, the owner or operator of a new source may not operate the source in violation of any applicable standard of performance. The statute defines “standard of performance” as a standard for the control of the discharge of pollutants which reflects the greatest degree of effluent reduction achievable through application of the best available demonstrated control technologies, processes, operating methods or other alternatives, including, where practicable, a standard permitting no discharge of pollutants (see Section 306(a)(1) of the CWA, 33 U.S.C. § 1316(a)(1)). Congress envisioned that new treatment systems could meet tighter controls than existing sources because of the opportunity to incorporate the most efficient processes and treatment systems into plant design (see general discussion of legislative history in *American Iron and Steel Institute v. EPA*, 526 F.2d 1027, 1057-59 (3rd Cir. 1975)). In establishing these standards, Congress directed EPA to consider the cost of achieving the effluent reduction and any non-water quality environmental impacts and energy requirements. As the legislative history of the CWA makes clear, consideration of cost in establishing new source standards is given less weight than in establishing BAT limitations because pollution

control alternatives are available to new sources that would not be available to existing sources (see Legis. Hist. (Sen. Muskie statement of House-Senate Conference Report on 1972 Act)).

For the oils and the organics subcategory, EPA promulgated NSPS that would control the same conventional, priority, and non-conventional pollutants as the BPT effluent limitations. The technologies used to control pollutants at existing facilities are fully applicable to new facilities. Therefore, EPA promulgated NSPS oils and organics subcategory limitations that are identical to BPT/BCT/BAT.

For the metals subcategory, however, EPA promulgated NSPS effluent limitations based on a technology which is different from that that used to establish BPT/BCT/BAT limitations. EPA promulgated NSPS for the metals subcategory based on the NSPS technology proposed in 1999 -- selective metals precipitation, liquid-solid separation, secondary precipitation, liquid-solid separation, and tertiary precipitation and clarification. This technology (option 3) provides the most stringent controls attainable through the application of demonstrated technology. EPA has concluded that this technology is the best demonstrated control technology for removing metals from the metal waste streams typically treated in the CWT industry. Additionally, EPA has concluded that there is no barrier to entry for new sources to install, operate, and maintain treatment systems that will achieve discharge levels associated with these option 3 technologies.

An additional critical factor in EPA’s decision is that new facilities will not face the same constraints on using selective metals precipitation that existing facilities may. Thus, new facilities in configuring their operation will have the opportunity to provide sufficient space to operate the multiple tanks associated with the option 3 technology.

EPA’s determination to establish new source limitations based on option 3 is also tied

to its conclusion that facilities using this technology have the technical capability to recover and reuse metals, whereas facilities employing technologies to comply with option 4 limitations do not generally have the capability to reuse the metals and will dispose of metal-bearing sludges in landfills. EPA's analysis shows that in the event that a new facility elects to recover and re-use metals rather than simply treating the wastes, the start-up costs for the option 3 technology may actually be less than the start-up costs for the option 4 technology. This is because of the significant reduction in RCRA permitting costs associated with recycling activities versus wastewater treatment activities. Furthermore, EPA has examined the market for re-use of metals and has concluded that these markets exist. Consequently, EPA has concluded that metals re-use with option 3 is viable. As such, this technology selection promotes the objectives of both the Clean Water Act and the Pollution Prevention Act. While EPA has concluded there is no barrier to entry associated with the option 3 technology, EPA recognizes that a CWT metals recycling facility will be required to be somewhat more selective about the waste receipts it accepts than a CWT treatment facility. However, EPA's data show that the vast majority of metal-bearing wastewaters accepted at CWT facilities are not dilute. In EPA's view, this is because generating facilities elect to treat dilute metal-bearing wastestreams on-site because of the ease in treating these wastes and the costs associated with the transport and treatment of these dilute wastes off-site. Also, there is a large amount of capacity available at existing CWT metals subcategory facilities. Consequently, EPA has concluded that existing CWT metals subcategory facilities already provide adequate capacity for dilute metal-bearing wastestreams in the event that the frequency of dilute wastes being transferred off-site for treatment increases. Finally, EPA notes that new CWT metals subcategory facilities are not required to install the option 3 technology or to recover metals. However, EPA's economic

analyses show that new sources should carefully consider recycling as an alternative to wastewater treatment.

The Agency used performance data from the CWT metals subcategory BAT limitations data set to promulgate NSPS limitations for oil and grease because the facility from which the NSPS limitations were derived did not have oil and grease in its influent at treatable levels during EPA's sampling episodes. EPA has concluded that transfer of this data is appropriate given that the technology basis for NSPS includes selective metals precipitation and an additional precipitation step. As such, EPA has every reason to conclude that facilities employing the NSPS technology could achieve the limitations, given the fact that the oil and grease limitations are based on performance at a facility employing fewer treatment steps.

As was the case for BPT/BAT, the technology basis for the multiple wastestream subcategory new source limitations reflects the technology basis for the applicable subcategories.

PRETREATMENT STANDARDS FOR EXISTING SOURCES (PSES)

9.5

Section 307(b) of the Clean Water Act requires EPA to promulgate pretreatment standards for pollutants that are not susceptible to treatment by POTWs or which would interfere with the operation of POTWs. EPA looks at a number of factors in deciding whether a pollutant is not susceptible to treatment at a POTW or would interfere with POTW operations -- the predicate to establishment of pretreatment standards. First, EPA assesses the pollutant removals achieved by directly discharging CWT facilities using BAT treatment. Second, for CWT facilities that are indirect dischargers, EPA estimates the quantity of pollutants likely to be discharged to receiving waters after POTW removals. Third, EPA studies whether any of the pollutants introduced to POTWs by CWT facilities interfere with or

are otherwise incompatible with POTW operations. In some cases, EPA also looks at the costs, other economic impacts, likely effluent reduction benefits, and treatment systems currently in-place at CWT facilities.

Among the factors EPA considers before establishing pretreatment standards is whether the pollutants discharged by an industry pass through a POTW or interfere with the POTW operation or sludge disposal practices. One of the tools traditionally used by EPA in evaluating whether pollutants pass through a POTW, is a comparison of the percentage of a pollutant removed by POTWs with the percentage of the pollutant removed by discharging facilities applying BAT. In most cases, EPA has concluded that a pollutant passes through the POTW when the median percentage removed nationwide by representative POTWs (those meeting secondary treatment requirements) is less than the median percentage removed by facilities complying with BAT effluent limitations guidelines for that pollutant. For a full explanation of how EPA performs its removal analysis, see Chapter 7.

For the metal and organics subcategories, the Agency promulgated pretreatment standards for existing sources (PSES) based on the same technologies as adopted for BPT and BAT⁵. EPA has determined that the technologies that form the basis for PSES for this final rule are economically achievable for both subcategories. These standards will apply to existing facilities in the metals and organics subcategories of the CWT industry that introduce wastewater to publicly-owned treatment works (POTWs). These standards will prevent pass-through of pollutants from POTWs into receiving streams and also help control contamination of POTW sludge. The final CWT pretreatment standards represent a national baseline for treatment of

CWT wastewaters. Local authorities may establish stricter limitations (based on site-specific water quality concerns or other local factors) where necessary.

For the oils subcategory, EPA proposed to base PSES on option 8 even though option 9 (the BAT technology) achieved greater removals. Option 8 is the same technology as option 9, but does not include the secondary gravity separation step. At that time, the economic analysis showed that the additional costs associated with option 9 resulted in higher economic impacts for the subcategory. In particular, EPA expressed concerns about the economic impacts of the more expensive technology for small businesses in the oils subcategory. Furthermore, EPA estimated that pollutant removals (in pound-equivalents) for option 9 were only one percent higher than the removals for option 8.

Following proposal, EPA finalized its estimates of costs, loadings reductions, and economic impacts, and then re-examined its technology selection for PSES in the oils subcategory. As part of this examination, EPA carefully considered the impacts of both option 8 and option 9 and the differences between them. EPA also looked at subsets of the oils facilities, including the set of small businesses. Based on an evaluation of all factors, EPA has not changed the technology basis from the 1999 proposal and set PSES standards for the oils subcategory based on option 8.

The Agency's economic analysis is discussed in detail in Section X of the final preamble and Chapter 5 of the final EA. Briefly, in evaluating economic impacts, EPA looks at a variety of impacts to facilities and firms (in particular, small businesses). For this industry, EPA determined that the most relevant economic impacts are on CWT processes and facilities. Waste industries such as the CWT industry are difficult to model economically; EPA's first attempts to model CWT operations as part of a larger facility greatly overestimated closures (see Section 7.2 of the 1995 EA and 64

⁵ For the metals subcategory, the technology basis for PSES does not include the second clarification step since this step was only included to meet the transferred TSS limitations that apply to direct dischargers only.

FR 2326). EPA therefore decided to examine the impacts on the CWT operations and, in particular, the profitability of individual CWT processes and facilities (note that a CWT “facility” is all of the CWT processes at a given facility and does not include the non-CWT operations at a given facility).

EPA estimates that option 8 will cost \$8.2 million per year while option 9 would cost \$11.9 million per year. As discussed in Section X.H of the final preamble, based on these costs EPA projects 10 process closures (4.7 percent of indirect oils processes) and 12 facility closures (9.4 percent of indirect oils facilities) associated with option 8. EPA projects 15 process closures (7.0 percent of indirect oils processes) and 12 facility closures associated with option 9. The incremental economic impact of option 9 relative to option 8 for oils indirect dischargers is thus five process closures. For small businesses, however, EPA projects two process closures (2.1 percent of indirect oils processes owned by small businesses) and eight facility closures (14.0 percent of indirect oils facilities owned by small businesses) for option 8. EPA projects seven process closures (7.4 percent of indirect oils processes owned by small businesses) and eight facility closures for option 9. Thus, small businesses represent a significant share of facility closures and all of the additional process closures associated with moving from option 8 to option 9. However, EPA estimates lower additional pollutant removals between option 8 and option 9 than estimated in 1999. For the final rule, EPA estimates an incremental pollutant reduction of only 2,644 pound-equivalents between option 8 and option 9, compared to 3,658 pound equivalents estimated at the 1999 proposal (see Section IV.J of the final preamble for a discussion of changes in estimated pollutant reductions). EPA has determined that achieving these slight additional pound-equivalent removals does not warrant imposition of the additional cost and impacts of option 9. All of these reasons support the selection of option 8 as the PSES technology basis. Therefore, EPA promulgated

PSES standards for the oils subcategory technology based on option 8

In determining economic achievability for indirect dischargers in the oils subcategory, EPA acknowledges that its estimates of the impacts are not trivial (e.g., an almost 10% facility closure rate). However, EPA has determined that the standards are economically achievable for the oils subcategory as a whole. EPA has concluded that, in the circumstances of this industry, the costs reflect appropriate levels for PSES control for a number of reasons. First, costs are high because a significant number of facilities in the oils subcategory will require major upgrades to their in-place treatment. The information collected for this rulemaking shows that many of the facilities with the larger impacts have little effective treatment in place. Second, this rule represents the first time EPA has established limitations and standards for this industry, so some economic impact may be expected (*American Iron and Steel Institute v. EPA*, 526 F.2d 1027,1052 (3rd Cir. 1975)).

As was the case for BPT/BAT, the technology basis for pretreatment standards for the multiple wastestream subcategory reflect the technology bases for the applicable subcategories.

PRETREATMENT STANDARDS FOR NEW SOURCES (PSNS)

9.6

EPA established pretreatment standards for new sources that are equal to NSPS for priority and non-conventional pollutants for the oils and organics subcategories. Since the pass-through analysis remains unchanged, for these subcategories, the Agency established PSNS for the same priority and non-conventional pollutants as were established for PSES. EPA considered the cost of the PSNS technology for new oils and organics facilities. EPA concluded that such costs are not so great as to present a barrier to entry, as demonstrated by the fact that currently operating facilities are using these technologies. The Agency considered energy

requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected PSNS.

For the metals subcategory, however, EPA established PSNS based on a different technology than that proposed in 1999. At that time, EPA proposed to base PSNS on the option 3 technology. For the final rule, however, EPA based the pretreatment standards for new sources on the option 4 technology. EPA concluded the additional removals projected with the option 3 technology for indirect dischargers do not justify the selection of option 3. This is because, unlike in the case of direct dischargers, a significant share of the additional pollutant removals associated with option 3 for indirect dischargers will occur at the POTW anyway.

As was the case for PSES, the technology basis for the multiple wastestream subcategory new source limitations reflects the technology basis for the applicable subcategories.