

improved gas flotation conducted to develop oil and grease limits for the Offshore Guidelines. (See 58 FR 12462, March 4, 1993).

Option 3—(Zero Discharge; Cook Inlet BPT): With the exception of facilities in Cook Inlet, all coastal oil and gas facilities would be prohibited from discharging produced water. Coastal facilities in Cook Inlet would be required to comply with existing BPT effluent limitations (48/72 mg/l described above) for oil and grease.

Option 4—(Zero Discharge; Cook Inlet Improved Flotation): With the exception of facilities in Cook Inlet, all coastal oil and gas facilities would be prohibited from discharging produced water. Coastal facilities in Cook Inlet would be required to comply with the oil and grease limitations of 29 mg/l 30-day average and 42 mg/l daily maximum based on improved operating performance of gas flotation and the statistical analysis conducted for the Offshore Guidelines.

Option 5—(Zero Discharge All): This option would prohibit all discharges of produced water based using injection.

Specific alternatives have been developed for Cook Inlet to account for the different operational practices, and geological situations that exist at these platforms. As previously stated, zero discharge is widely, if not exclusively, practiced in all coastal areas except Cook Inlet. Injection of produced waters is not practiced in Cook Inlet because, where waterflooding is occurring, treated seawater is injected instead. Industry claims that injection of seawater other than produced water for enhanced recovery is practiced primarily because injection of produced water would cause formation fouling. Industry has claimed that fouling would occur due to bacteria and scale formation in produced water, and otherwise not present in seawater. EPA has determined that formation fouling problems associated with produced water injection are not insurmountable because filtration and anti-fouling chemicals can be added prior to injection, and periodic downhole workovers can be performed to reopen clogged formation surfaces.

An additional problem with injecting produced waters is that no other formations exist that can accommodate this wastestream other than the producing formation. Cook Inlet operators would experience significant additional cost associated with piping produced water if zero discharge was required from where it is currently treated to where it could be injected. Of the 13 producing platforms in the Inlet, 9 of them currently direct their

extracted hydrocarbon fluids to one of 3 land-based separation and treatment facilities. These land-based facilities separate the hydrocarbons from the produced water, treat the produced water and then discharge it in accordance with EPA's Region X's NPDES general permit requirements. The Alaska Oil and Gas Conservation Commission has confirmed that no geological formations exist beneath the land-based facilities that are large enough to accept the approximately 100,000 barrels per day (bpd) of produced water generated from these facilities. Thus, produced water would be piped back to the platforms for injection if produced water discharges were prohibited. The costs for such piping would comprise 74 percent of the total costs for injection. This would be a major cost factor for the Inlet operations overall since the volume of produced water being discharged from these 3 land-based facilities amounts to approximately 99 percent of that discharged from all 13 platforms.

6. BCT Options

a. BCT Methodology.

The methodology to determine the appropriate technology option for BCT limitations is previously described in Section VI.A.

b. BCT Cost Test Calculations and Option Selection.

The five options previously described, were evaluated according to the BCT cost reasonableness tests. The pollutant parameters used in this analysis were total suspended solids and oil and grease. All options, except the "BPT All" option, fail the BCT cost reasonableness test and thus, EPA proposes to establish BCT limitations equal to BPT. Costs for the "BPT All" option are equal to zero because facilities are complying with the current BPT limitations. The range of the results for the POTW test (first part of the BCT cost test) for the other options is \$1.35 to \$3.70 per pound of conventional pollutant removed. Since a value of less than \$0.53 per pound (1992\$) is required to pass the POTW test these four options fail the first BCT cost test. Thus, EPA is proposing to establish the BCT limitations for produced water equal to BPT (48 mg/l monthly average; 72 mg/l daily maximum). The calculations for BCT cost reasonableness test for the produced water options are described in more detail in Section XI of the Coastal Technical Development Document. There are no incremental non-water quality environmental impacts associated with the BCT option because it is equal to BPT.

7. BAT and NSPS Options

EPA has selected Zero discharge; Cook Inlet improved gas flotation (Option 4) for the BAT and NSPS level of control for produced water. A discussion of the cost and impacts and a description of the selection rationale is contained below:

a. Costs.

The cost and pollutant removals associated with the options considered for BAT are presented in Table 5.

TABLE 5.—COSTS AND POLLUTANT REMOVALS FOR PRODUCED WATER BAT OPTIONS

Option	Costs (1992\$) (x1000)	Pollutant removals (lbs) (x1000)
1. BPT all	0	0
2. Improved gas flotation all	12,400	12,440
3. Zero discharge; cook inlet BPT	28,600	4,306,800
4. Zero discharge; cook inlet improved gas flotation ...	30,860	4,308,300
5. Zero discharge all	49,700	5,484,800

These estimates are presented incremental to the baseline of current industry operating practices which is equal to BPT where discharges are occurring. Thus, as shown on Table 5, costs attributable to Option 1, which is equal to BPT, is zero. On January 9, 1995 (60 FR 2387), EPA promulgated general NPDES permits that would prohibit discharges of produced water from coastal facilities in Texas and Louisiana. For the purpose of this proposal, EPA's compliance cost estimates and economic impact assessments are determined without considering this permit. Had EPA's costing estimates assumed that the general permit would be in effect, the total estimated cost of the proposed BAT limitations for produced water for the entire coastal subcategory would be \$10.4 million instead of \$30.9 million annually.

In developing the costs of zero discharge for this option, EPA determined, based on Texas and Louisiana state permit data, the number and volume of produced water discharges that would be discharging by the time this final rule is scheduled to be signed July 1996. This investigation identified, by operator and oil and gas field, 216 produced water separation/treatment facilities that would be discharging approximately 180 million barrels per year (bpy) in Texas and