

# U.S. Environmental Protection Agency Overview of Final SBF Effluent Limitation Guidelines



Presented to the Gulf Coast Environmental Affairs Group  
Holiday Inn Central, Lafayette, LA  
March 8, 2001, 1:00 PM – 2:00 PM

# Overview of SBF Rulemaking

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- Since 1990, the oil and gas industry developed SBFs to provide the drilling performance of traditional oil-based fluids (OBFs) but with lower environmental impact and greater worker safety.
- In 1998, EPA initiated an expedited rulemaking to foster industry development and use of SBFs as a pollution prevention technology while allowing the discharge of waste solids (cuttings) containing less toxic and persistent materials.
- A proposal and a Notice of Data Availability were published in the Federal Register in February 1999 (64 FR 5488) and April 2000 (65 FR 21548) respectively. The final rule was signed on December 28, 2000 and published on January 22, 2001 (66 FR 6850)
- Throughout the development of the effluent guidelines, EPA worked with industry stakeholders to compile engineering, economic, and analytical data concerning use of SBFs and identify possible technology options.

# SBF Rulemaking Participants

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- SBF Rulemaking Participants included:
  - EPA Office of Research (Gulf Breeze Lab, FL),
  - EPA Regions 4,6,9, and 10 (GOM, California, Alaska),
  - Department of Energy,
  - Minerals Management Service,
  - Alaska Oil and Gas Conservation Commission,
  - American Petroleum Institute,
  - National Ocean Industries Association,
  - Individual Stakeholder Companies
  - Cook Inlet Keeper
  - Cook Inlet Regional Citizens Advisory Council

# SBF Rulemaking Participants

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## Industry Work Groups include:

- Analytical - Reverse Phase Extraction (offshore), GC/MS (onshore confirmatory) for formation oil contamination
- Biodegradation - Solid Phase Test, Anaerobic Closed Bottle Test, Respirometer Test
- Sediment Toxicity - Solid phase (sediment) test with amphipod, *Leptocheirus plumulosus*, Sediment-water inter-phase test with mysid shrimp
- Seabed Survey (GOM) – Shallow and Deepwater SBF well sites
- Technology Assessment - Best Management Practices (BMPs), Cuttings Retention Data

# SBF Rulemaking Participants

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## Summary of Stakeholder Meetings since February 1999:

- Proposal Public Meeting      March 17, 1999      Houston, TX
- Stakeholder Meeting      July 22, 1999      Washington, DC
- Stakeholder Meeting      August 26, 1999      Washington, DC
- Industry Stakeholder Mtg.      October 28, 1999      New Orleans, LA
- Stakeholder Meeting      November 18, 1999      Washington, DC
- Stakeholder Meeting      January 27, 2000      Washington, DC
- Draft NODA Review      March 9-16, 2000      Washington, DC
- NODA Public Meeting      April 25, 2000      New Orleans, LA
- Stakeholder Meeting      July 20, 2000      Washington, DC
- Stakeholder Meeting      October 12, 2000      Washington, DC

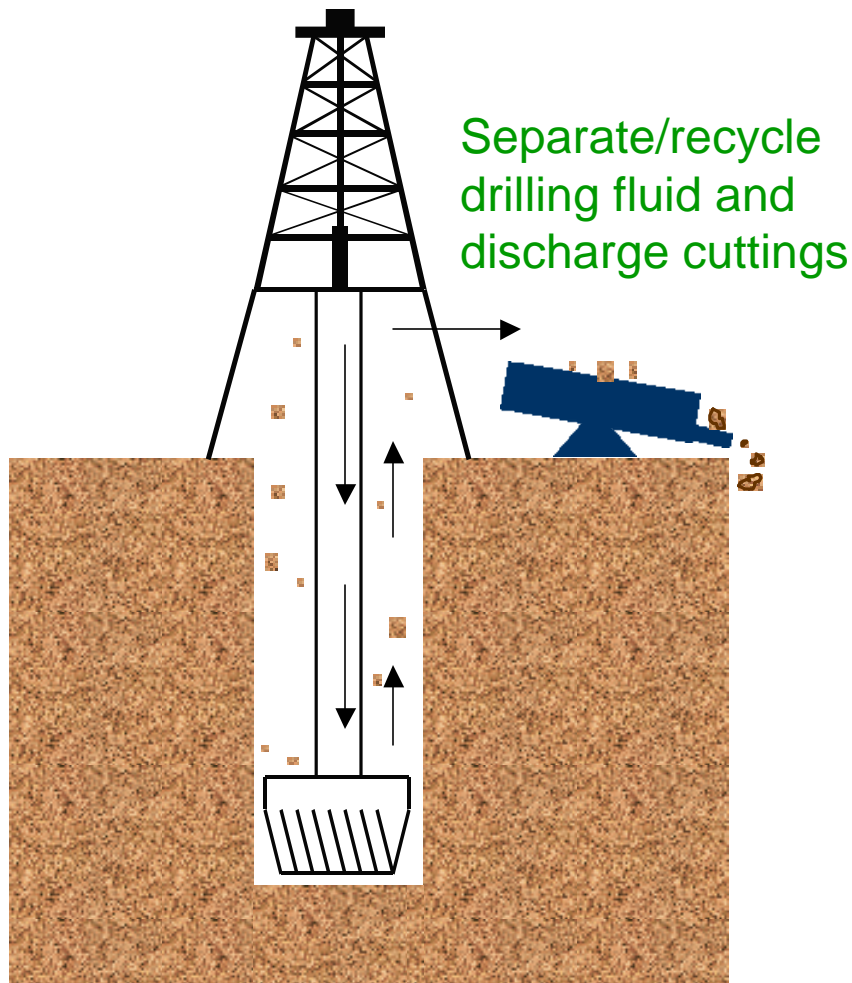
# Final Rule Overview

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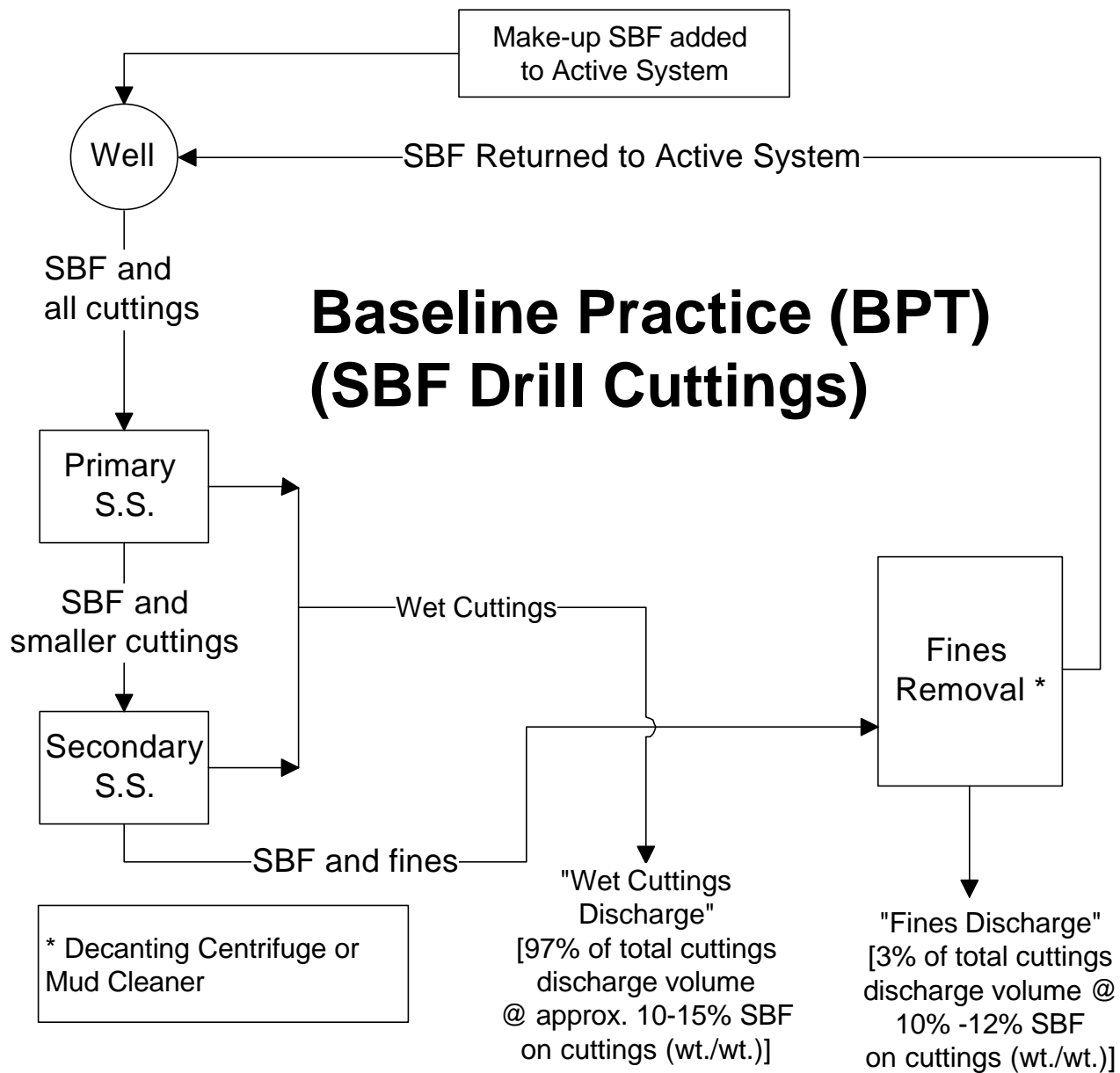
- EPA divided the SBF discharges into two categories:
  - SBF discharges associated with cuttings (large volume)
  - All other SBF discharges (usually small volumes, mostly spills)
- EPA evaluated three technology options for SBF-cuttings wastes: (1) Use of advanced solids control equipment and allow controlled discharges; (2) same as (1) but with some of the cuttings wastes (fines) captured for no discharge; and (3) no discharge of any cuttings wastes.
- EPA evaluated two technology options for all other SBF wastes: (1) no discharge; and (2) use of best management practices (BMPs) to control SBF discharges.

# Final Rule Overview

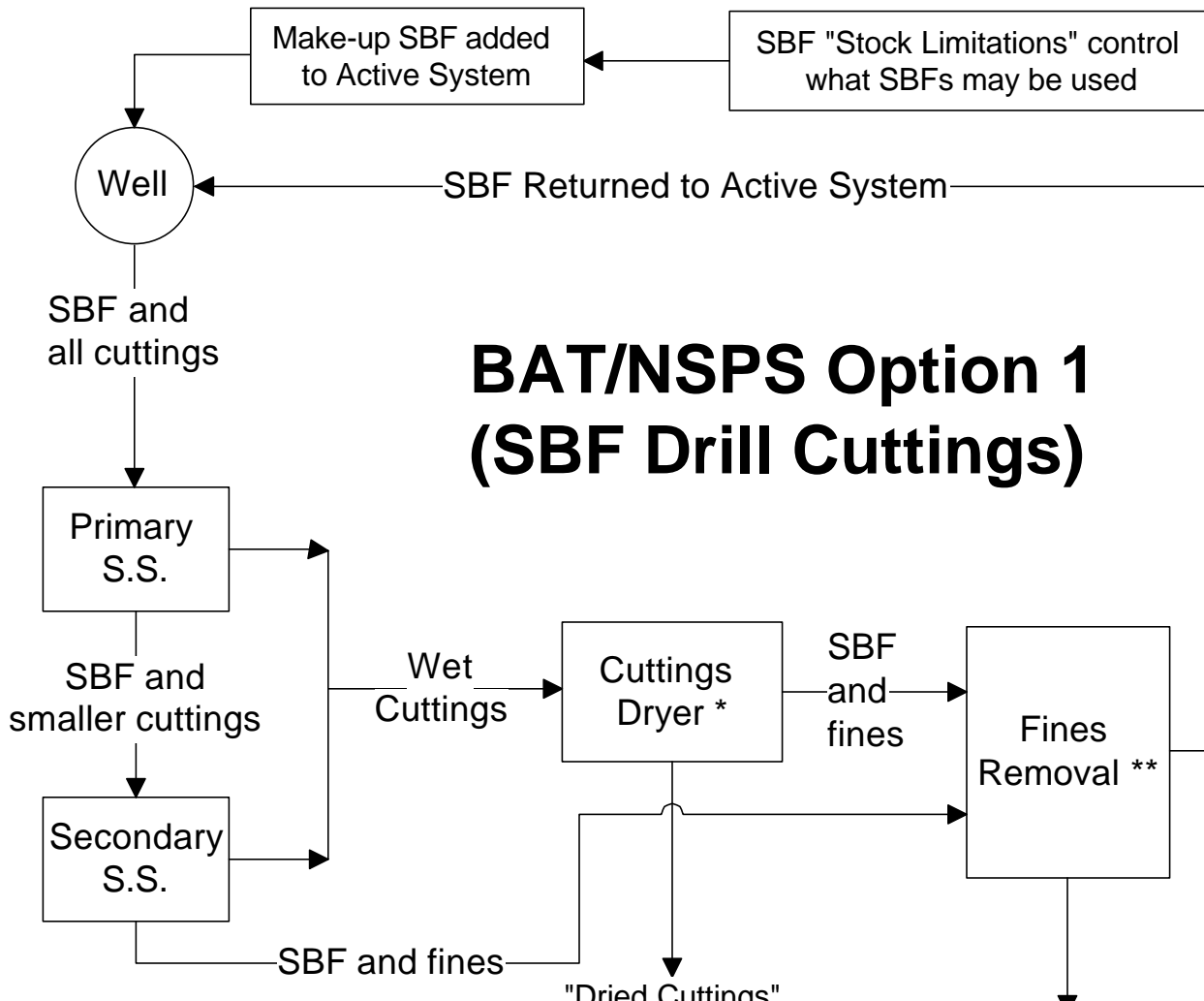
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- **Drilling Fluid Functions**
  - Removes cuttings from hole
  - Stabilizes well bore
  - Controls subsurface pressures
- **Drilling Fluid Package**
  - Base fluid
  - Clay
  - Weighting agents
  - Rheology control agents
  - Suspension aids
  - Surfactants
- **Some fluid retained on discharged cuttings**







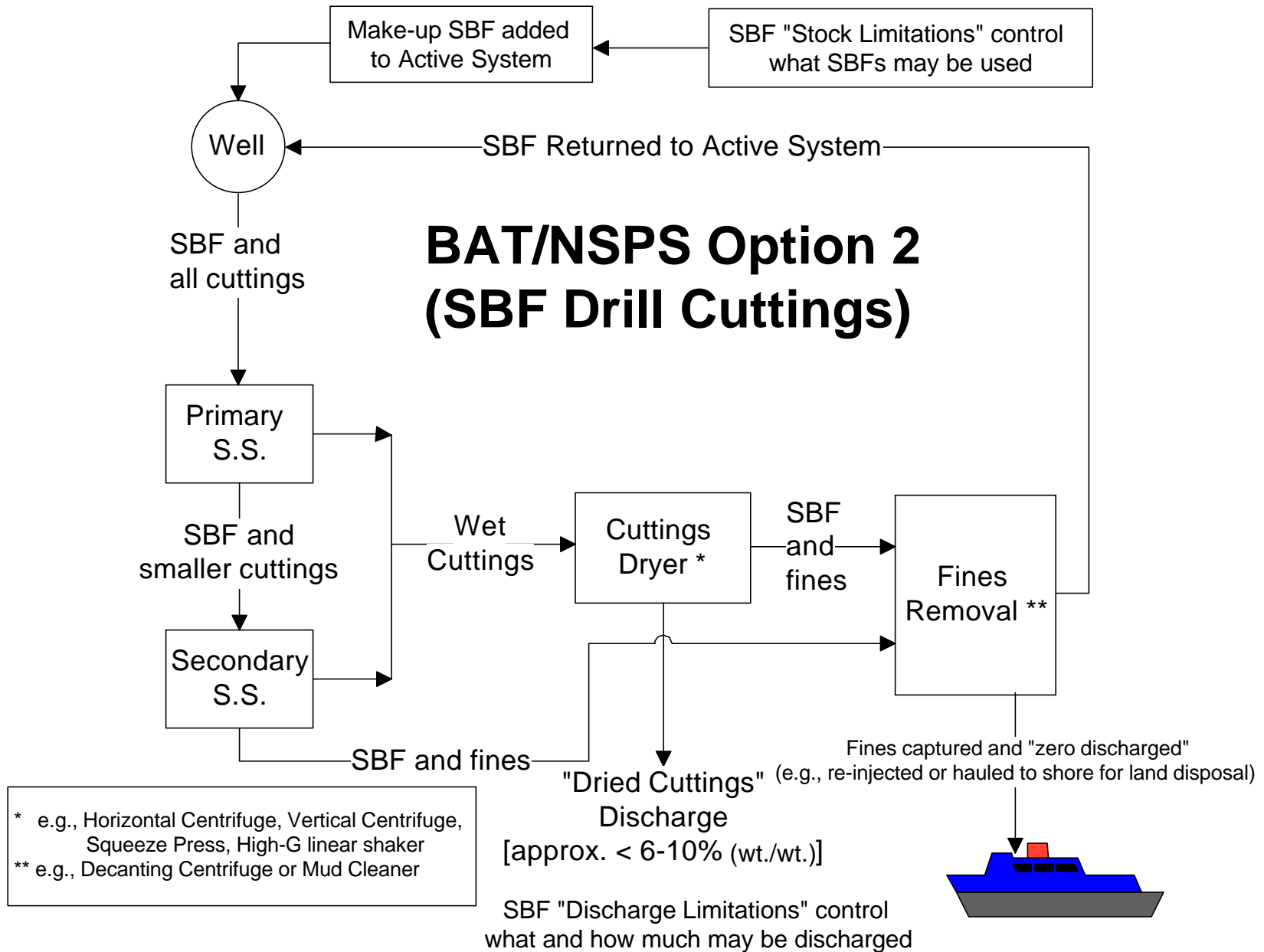
# BAT/NSPS Option 1 (SBF Drill Cuttings)

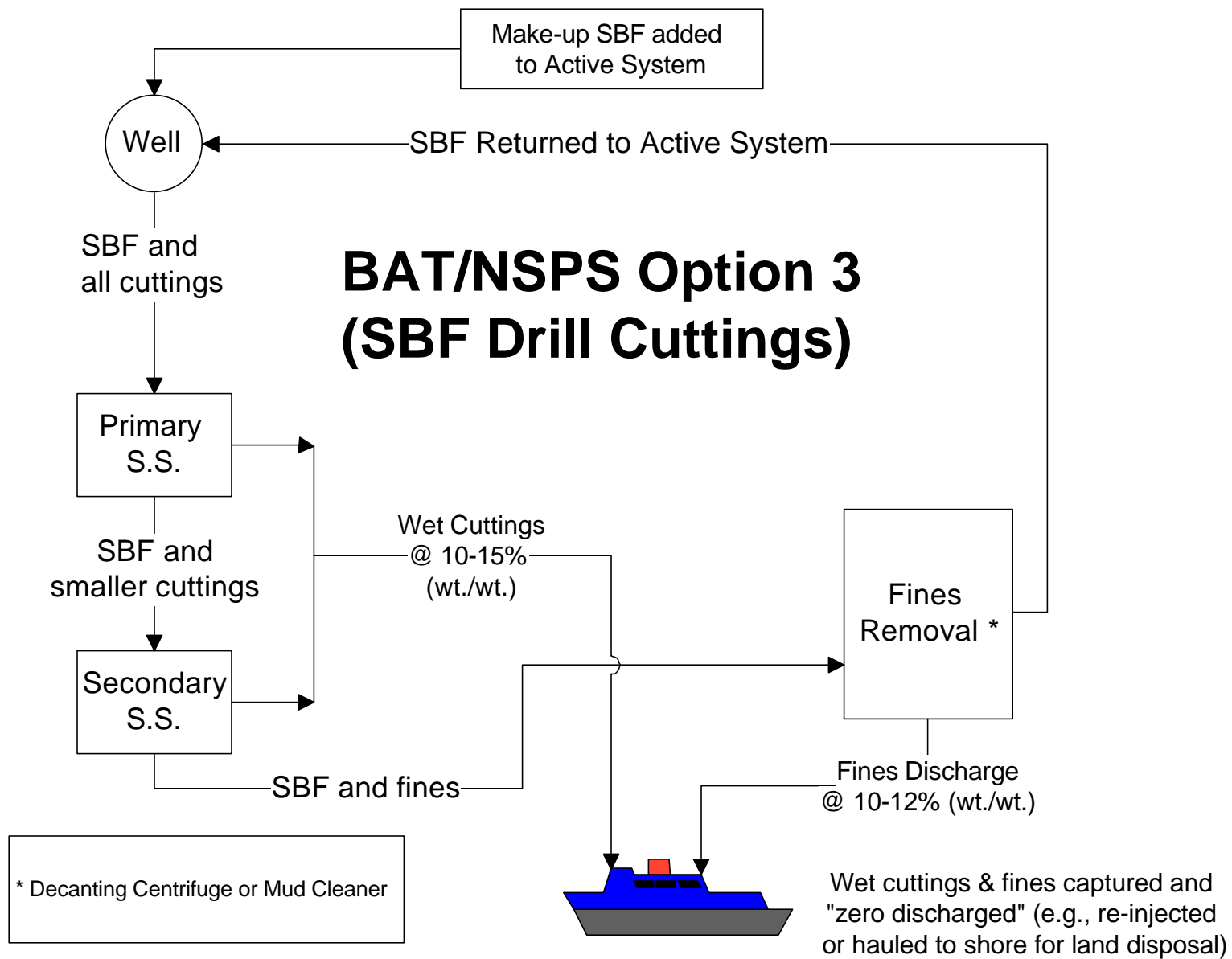
\* e.g., Horizontal Centrifuge, Vertical Centrifuge, Squeeze Press, High-G linear shaker  
 \*\* e.g., Decanting Centrifuge or Mud Cleaner

"Dried Cuttings" Discharge  
 [97% of total cuttings discharge volume @ approx. < 6-10% SBF on cuttings (wt./wt.)]

"Fines Discharge"  
 [3% of total cuttings discharge volume @ approx. < 10-12% SBF on cuttings (wt./wt.)]

SBF "Discharge Limitations" control what and how much may be discharged





# Final Rule Overview

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- EPA rejected the zero discharge option for SBF-cuttings in all Offshore waters based on the increase of discharged pollutants and non-water quality environmental impacts (NWQIs) due to more anticipated use of WBFs and OBFs.
- NWQIs include air emissions, fuel usage, land disposal requirements, worker safety, spills, and environmental justice issues.
- Under the zero discharge option for SBF-cuttings a majority of operators would switch from using SBFs to WBFs or OBFs:
  - Switching from SBFs to WBFs would generally lead to more WBF development wells and more discharges to the ocean as WBF operations produce more waste per well than SBF wells
  - WBF and OBF operations are slower than SBF operations and some wastes are hauled to shore which result in more air emissions and fuel usage
  - Due to technical demands, operators will most often use SBF or OBF in the deepwater areas. An inadvertent release of whole OBF is substantially more deleterious and long-lasting than SBF which are less toxic and more biodegradable

# Final Rule Overview

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- EPA used a two part approach to control SBF-cuttings discharges:
  - (1) Product substitution through use of stock limitations (e.g., sediment toxicity, biodegradation, PAH content, metals content) and discharge limitations (e.g., diesel oil prohibition, formation oil prohibition, sediment toxicity, aqueous toxicity); and
  - (2) Control of the quantity of SBF discharged with SBF-cuttings.
- EPA finds that the second part is particularly important because limiting the amount of SBF content in discharged cuttings controls: (1) the amount of SBF discharged to the ocean; (2) the biodegradation rate of discharged SBF; and (3) the potential for SBF-cuttings to develop cuttings piles and mats which are detrimental to the benthic environment.

# Final Rule Overview

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## SBF Discharges Associated With Cuttings

- EPA selected BAT/NSPS Option 2 with various stock limitations for controlling SBF-cuttings as this option minimizes pollutant loadings to the ocean with acceptable air emissions, fuel usage, and land disposal requirements.
- EPA did, however, select the zero discharge with exclusions for operators in Coastal Cook Inlet based on the limited number of wells and the ability of most Coastal Cook Inlet operators to re-inject their cuttings waste drilling fluids.

## SBF Discharges Not Associated With Cuttings

- The BAT and NSPS is zero discharge for all SBF discharges not associated with drill cuttings as this represents current practice.

# Final Rule Limits

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## BPT & BCT Technology Options Selected

- The BPT and BCT limitation is no free oil as measured by the static sheen test for SBF-cuttings (current requirements) and zero discharge for all other SBF discharges (current practice)

## BAT & NSPS Technology Options Selected for SBF-cuttings

- EPA is controlling SBF discharges through a variety of stock and discharge BAT and NSPS limitations
- EPA is also retaining BAT/NSPS limits on mercury, cadmium content in stock barite and the prohibition of diesel oil discharge for SBF-cuttings discharges
- EPA also incorporated Best Management Practices (BMPs) into the final rule to provide industry with additional flexibility in meeting ROC discharge limits.

# Final Rule Limits

## BAT/NSPS Stock Limitations for SBF-Cuttings

Pollutant Parameter	BAT/NSPS	Method
Mercury <sup>1</sup>	1 mg/kg	Maximum in stock barite
Cadmium <sup>1</sup>	3 mg/kg	Maximum in stock barite
PAH	0.001% (10 ppm)	PAH (as phenanthrene) content by EPA Method 1654A
Sediment Toxicity <sup>2</sup>	1.0	Modified ASTM E1367-92 using C <sub>16</sub> -C <sub>18</sub> IOs as the reference base fluid
Biodegradation <sup>3</sup>	1.0	Modified ISO 11734 using C <sub>16</sub> -C <sub>18</sub> IOs as the reference base fluid

<sup>1</sup> Retained from current regulations (40 CFR 435)

<sup>2</sup> The sediment toxicity rate ratio (10-day LC<sub>50</sub> of C<sub>16</sub>-C<sub>18</sub> IOs/10-day LC<sub>50</sub> of stock base fluid being tested) must be equal to or less than 1.0.

<sup>3</sup> The biodegradation rate ratio (percent degradation of C<sub>16</sub>-C<sub>18</sub> IOs/percent degradation of stock base fluid being tested, both at 275 days) must be equal to or less than 1.0.



# Final Rule Limits

## BAT/NSPS Discharge Limitations for SBF-cuttings

Pollutant Parameter	BAT/NSPS	Method
Diesel Oil <sup>1</sup>	No discharge	
SPP Toxicity <sup>1</sup>	LC <sub>50</sub> of 3%	SPP Test (Mysidopsis bahia)
Formation Oil	No discharge	RPE (screening method) and GC/MS (compliance assurance method)
Base Fluid ROC	6.9% <sup>2</sup> , 9.4% <sup>3</sup>	API Recommended Practice 13B-2
Sediment Toxicity <sup>4</sup>	1.0	Modified ASTM E1367-92 using C <sub>16</sub> -C <sub>18</sub> IOs as the reference SBF

<sup>1</sup> Retained from current regulations (40 CFR 435)

<sup>2</sup> SBF base fluids that meet the stock base fluid performance of C<sub>12</sub>-C<sub>14</sub> vegetable esters, C<sub>8</sub>-low viscosity esters, or C<sub>16</sub>-C<sub>18</sub> IOs may be discharged at this ROC limitation

<sup>3</sup> SBF base fluids that meet the stock base fluid performance of C<sub>12</sub>-C<sub>14</sub> vegetable esters or C<sub>8</sub>-low viscosity esters may be discharged at this ROC limitation

<sup>4</sup> The sediment toxicity rate ratio (4-day LC<sub>50</sub> of C<sub>16</sub>-C<sub>18</sub> IO-SBF/4-day LC<sub>50</sub> of SBF being tested) must be equal to or less than 1.0.

# Final Rule Limits

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## BAT & NSPS Technology Options Selected for SBF discharges not associated with cuttings

- The BAT and NSPS is zero discharge for all SBF discharges not associated with drill cuttings.
- SBF wastes associated with accumulated solids in the SBF active mud system and the associated wash water at the completion of the SBF well (e.g., cleaning out mud pits and solids control equipment) are associated with the drill cuttings.
- The zero discharge requirement for SBF discharges not associated with drill cuttings will be applied where zero discharge is already current practice (e.g., drill deck, SBF transfer operations).



*SBF squeegee operations  
on Ram-Powell TLP*

# Final Rule Benefits

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- In summary, compliance with this rule by new and existing sources is estimated to:
  - Reduce the annual discharge of cuttings by 118 million pounds; and
  - Lead to an annual decrease of almost 3,000 tons of air emissions and over 200,000 barrels of oil equivalent (BOE) fuel usage per year.
- EPA estimates that the rule will result in annual savings of \$48.9 million and no adverse economic impacts to the industry as a whole.

# Next Steps – NPDES Permits

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- EPA and State permit writers are required to incorporate the new guidelines into revised NPDES permits.
- EPA permit writers are just beginning to start the revision of the appropriate NPDES permits
- EPA HQ will be supporting these NPDES permit revisions
- Operators will comply with the new SBF effluent guidelines when the controlling NPDES permit is finally revised.

# For More Information...

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Electronic copies of EPA supporting analyses and Federal Register notices can be found at: <http://www.epa.gov/ost/guide/sbf/>

For information on SBF guidelines, contact the SBF Project Engineer:  
Carey Johnston, (202) 260 7186, [johnston.carey@epa.gov](mailto:johnston.carey@epa.gov)

For information on NPDES permits the EPA contacts are:

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Scott Wilson, Region 6	Western GOM	214-665-7511	<a href="mailto:wilson.js@epa.gov">wilson.js@epa.gov</a>
Bill Truman, Region 4	Eastern GOM	404-562-9457	<a href="mailto:truman.bill@epa.gov">truman.bill@epa.gov</a>
Eugene Bromley, Region 9	California	415-744-1906	<a href="mailto:bromley.eugene@epa.gov">bromley.eugene@epa.gov</a>
Kristine Koch, Region 10	Alaska	206-553-6705	<a href="mailto:koch.kristine@epa.gov">koch.kristine@epa.gov</a>